VETERINARY ANATOMY

POSTHATCH DEVELOPMENTAL STUDIES ON FEMALE REPRODUCTIVE SYSTEM OF KADAKNATH AND WHITE LEGHORN FOWL

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ABSTRACT

The present experiment was conducted on gross and histological observations of female reproductive system of 72 chicks/ pullets of Kadaknath and White Leghorn with 36 in each breed. These chicks/growers were divided into 06 groups viz; group I (1 week), group II (4 week), group III (8 week), group IV (12 week), group V (16 week) and group VI (20 week). The Kadaknath chicks were procured from All India Co-ordinated Research Project on Poultry Livestock Farm, Krishinagar. Adhartal, Jabalpur. However, WLH chicks were collected from Phoenix Poultry Farm, Jabalpur.

Gross observation revealed that in group I the left ovary was elongated or triangular and placed slightly to the left of the median plane. Its surface was smooth upto group III in Kadaknath whereas in WLH the surface became uneven in group III. The mean length of ovary in group I was 0.68 ±0.03 cm and 0.77 ±0.03 cm in Kadaknath and WLH respectively. The width of ovary was 0.48±0.03 cm and 0.50±0.04 cm in Kadaknath and WLH respectively. The size of the ovary gradually increased in both the breeds from group I to VI. The mean length of the ovary in group VI was 2.02±0.09 cm and 4.77 ±0.36 cm in Kadaknath and WLH, respectively. The mean weight of ovary was 0.08±0.01g in group I of Kadaknath that increased to 0.31 ±0.04 g in group VI. However, in WLH the weight increased rapidly which was 0.08±0.18 g in group I and attained 21.17±2.29 g in group VI.

Histological observation revealed that in group I the germinal epithelium comprised of a single layer of cuboidal epithelium. The tunica albuginea which separated the cortex and medulla was not appreciable; however, the two regions were still differentiated. The follicles were small in size with 84.62 per cent and follicles ranged between 0 - 50 µm and 15.38 per cent between 30 - 100 µm. The developing follicles were limited to the cortex of the ovary in both the breeds.

In group III, the germinal epithelium was high cuboidal, the stratification of large follicles was seen in WLH. Yolk appeared in the follicles of 38.34 µm diameter in both the breeds. In group IV, the percentage of the larger follicle was more (24 per cent) in WLH than in Kadaknath (0.47 per cent). The fibromelanin which was present in the medulla in the previous groups became thick and extended in to cortex and surrounded the follicles. In group V, the distinction between cortex and medulla was lost and numerous immature and mature follicles were seen in both the breeds. The follicles were scattered in Kadaknath, whereas in WLH these were densely packed with dense vascular zone.

The different segments of left oviduct were not differentiated in group I of both the breeds. The mean lumen diameter was 400.40±8.65 µm and 403±0.6.29 µm in group I in Kadaknath and WLH, respectively, which increased to 425.90±12.50 µm and 428.50±3.33 µm in group II. In group I, the left oviduct showed mucosal folds in Kadaknath. However, in WLH these folds were mural and longer than Kadaknath. In group II, the mural folds became larger than previous groups.

The epithelium of infundibulum simple cuboidal to low columnar upto group IV in Kadaknath and upto group III in WLH. Thereafter became pseudostratified comprised of single layer of ciliated columnar epithelial cells with goblet cells. The lumen diameter of magnum in Kadaknath was 408.00+5.54 µm in group III, which increased to 911.70+2.88 µm in group VI. Fibromelanin was thick in the later group of Kadaknath. In general the values of different parameters of isthmus were greater in WLH than Kadaknath. Mural folds in shell gland short and wide in Kadaknath, whereas tall in WLH. These folds were pedunculated and discoid in Kadaknath, however in WLH these were leaf shaped. In general the fold is shorter in vagina than shell gland in all the groups. The epithelium was pseudostratified in later groups.

Moderate PAS positive reaction was seen in the basement membrane of the follicular epithelium being more prominent in large follicles. The cells of the epithelium of isthmus showed intense PAS positive granules in its apical part. However, in magnum the mild PAS positivity was seen in the basement membrane. The epithelium and gland in the propria submucosa of magnum showed mild positive reaction for Ninhydrin. Sudan black –B reaction showed the intense positive reaction in follicular content of large follicle. Moderate reaction in follicular epithelium in later groups.

HISTOMORPHOLOGICAL STUDIES OF REPRODUCTIVE SYSTEM IN LAYING KADAKNATH AND WHITE LEGHORN FOWL

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ABSTRACT

The present experiment was conducted on gross and histological observation of female reproductive system of 48 layers of Kadaknath and White Leghorn with 24 in each breed. These birds were divided into 04 groups viz; group I (24 weeks), group II (32 weeks), group III (40 weeks) and group IV (48 weeks). The Kadaknath fowl were procured from All India Co-ordinated Research Project on Poultry Farm, Krishinagar, Adhartal, Jabalpur. However, White Leghorn fowl were collected from Phoenix Poultry Farm, Jabalpur.

Gross observation revealed that left ovary was elongated triangular with base directed rostrally and conical apex caudally in group I of Kadaknath. From group II onwards the ovary became in the form of bunch of grapes. However, in White Leghorn the ovary showed number of large follicles in all the four groups. The length of the ovary was 3.10±0.15 cm in group I of Kadaknath which increased to 5.85±0.11 cm in group II and then gradually decreased and became 5.18±0.07 cm in group IV. In White Leghorn the ovary had maximum length 6.45±0.08 cm in group I which gradually decreased to 3.93±0.14 cm in group IV.

The left oviduct extended caudally from the left ovary and opened in the urodeum of cloaca lateral to the left ureter. The coils of oviduct were not seen in group I of Kadaknath whereas, coiling was observed in rest of the groups of Kadaknath and all the groups of White Leghorn. The colour of the oviduct was grayish in all the groups of Kadaknath, however in group IV the colour intensity was reduced. In White Leghorn, it was white in colour in all the groups. Growth spurt of length and weight of oviduct in Kadaknath and White Leghorn revealed that there was maximum increase of length (391.19%) and weight (975.24%) from group I-II in Kadaknath breed of fowl. However, from group II-III the length was slightly decreased (-0.04%) whereas weight was increased (12.64%). In White Leghorn both the parameters showed decreasing trend.

Histological observation of the ovary showed that the division of the ovary in to cortex and medulla was evident in group I of Kadaknath. However, in later groups of Kadaknath and all the groups of WLH the division between cortex and medulla was not distinct. The surface epithelium was made up of single layer of cuboidal cells with spherical to oval nuclei. However, squamous epithelium was also noticed at some places. Developing follicles were seen in the outer cortical zone just beneath the germinal epithelium in group I of both the breeds. The follicles were seen in clusters in Kadaknath. However, in WLH these were scattered with presence of abundant loose connective tissue in between the follicles. Follicles above 200 µm were lined with large granulose cell layer having single layer of cuboidal cells. Cytoplasm was granular. The basement membrane of granulose cells was well marked in these follicles. This layer was surrounded by theca interna and theca externa.

The height of epithelium of infundibulum was 14.69±0.45 µm in group I of Kadaknath which gradually increased and measured 19.71±0.45 µm in group IV. The wall thickness of magnum was

315.92±1.79 µm in group I which increased to 685.67±1.71 µm in group IV of Kadaknath fowl. It was greater in White Leghorn in comparison to Kadaknath except in group IV. Collagen fibers were seen in the propria submucosa which extended into the core of mural folds, tunica serosa, surrounding the blood vessels and in between the muscle bundles of tunica muscularis.

The epithelium of isthmus was ciliated simple columnar with goblet cells. In Kadaknath the height of epithelium was 14.33±0.43 µm in group I which increased to 20.43±0.40 µm in group IV. However, in White Leghorn epithelial height increased to 25.44±0.25 µm in group III which decreased to 18.99±0.45 µm in group IV. Total wall thickness of shell gland wall was 296.08±1.79 µm in group I of Kadaknath which increased to 636.08±1.79 µm in group IV. The thickness of vaginal wall was greater in all the groups of Kadaknath fowl in comparison to White Leghorn. It was maximum in group IV of Kadaknath, whereas in White Leghorn, it was maximum in group III. The epithelium of the vagina was ciliated pseudostratified columnar with few goblet cells. Mild PAS positive activity was seen in the thecal layer of large sized follicles in both the breeds.

HISTOMORPHOLOGICAL AND HISTOCHEMICAL STUDIES ON CERTAIN SECONDARY LYMPHOID ORGANS OF KADAKNATH FOWL

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ABSTRACT

The histomorphological and histochemical studies were conducted on the secondary lymphoid organ (spleen, harderian gland and caecal tonsil) of the Kadaknath fowl at different age groups from day old to more than 32 week of age. The reddish-brown, ovoid shaped spleen was situated at the right site of the junction of proventriculus and gizzard. The spleen was covered with thick connective tissue capsule made up of mainly collagen and reticular fibers with few elastic fibres. The parenchyma of the spleen was divided into white pulp and red pulp without clearcut demarcation. The amount of white pulp was increasing with the advancement of age. In older age group, the amount of collagen fibers and number of capsulated lymphatic nodules were more. The lymphatic tissue was consisted of different sized lymphocyte, plasma cells, mast cells and PALS. Some melanin pigments were observed in the capsule and parenchyma of the spleen.

The black coloured harderian gland was situated ventral and postero- medial aspect of the eyeball. The Harderian gland was covered by thin connective tissue capsule and divided into different lobules of variable sizes by connective tissue trabeculae made up of mainly reticular fibers. The epithelium of corpus glandulae and excretory duct was lined by simple columnar epithelium of varying height. The apical portion of the glandular part was darkly stained and serous in nature, while the basal portion was light stained and mucous in nature. Much amount of plasma cells, different sized of lymphocytes, mast cells, macrophages and melanin pigments were present in the interlobular tissue of the gland. The activity for PAS and AMPS reaction was more towards the apex of the glandular unit than the base.

The proximal dilated part of the caecum considered for caecal tonsil was composed of all four histological layers. The lymphatic tissue was present in the mucosa and submucosa of the caeca in the form of diffused and encapsulated lymphatic nodules. The number and size of encapsulated lymphatic nodule was increasing with the advancement of the age. The height of the mucosal villi was decreasing with the advancement of age, whereas the lumen of the caeca was increasing with the advancement of age.

ULTRASTRUCTURAL AND HISTOENZYMAT STUDIES ON BURSA OF FABRIC KADAKNATH

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ABSTRACT

The ultrastructural and histoenzymatic studies were conducted on the bursa of Fabricius in Kadaknath breed of poultry from day old to 30 weeks of age. The gray to black coloured Bursa of Fabricius located as dorsal diverticulum on the proctodeal wall of cloaca was composed of four tunics such as tunica mucosa, tunica submucosa, tunica muscularis and tunica serosa. The outer most layer, tunica serosa was made up of mesothelium and subserosal loose connective tissue. The mucosal layer was again divided into two parts such as connective tissue framework and follicles. The lamina propria of each plica was completely filled with follicles separated by connective tissue trabeculae. Each follicle was consisted of outer dark cortex and inner pale medulla, which was separated by undifferentiated epithelial reticular cells. The clear cut cortex and medulla were visible in sixth week of age. The cortex stained more deeply than the medulla due to higher concentration of small lymphocytes in it. The star shaped reticuloepithelial cells formed the supportive framework of both the cortex and medulla.

The two different type of epithelium such as follicle associated epithelium (FAE) and interfollicular epithelium (IFE) were found. The FAE was multistratified type and IFE was monostratified type. The tunica mucosa was lined by pseudostratified columnar epithelium except at crypt, which was lined by simple columnar epithelium. Four types of cells were observed in the epithelium such as type-I, type-II, type-III and type-IV. Presence of melanocytes in bursa of Fabricius was unique characteristic feature of present study. Fusiform cell with elongated nuclei in the cytoplasm was generally occurred in tunica serosa, tunica muscularis, lamina propria and septae. The melanocytes were higher in group-IV. In histoenzymic study, tunica serosa, tunica muscularis, epithelium, interfollicular septae and epithelial reticular cells showed moderate to intense AKPase as well as ATPase activity within groups, whereas ACPase activity was more in medulla and weak activity was in tunica serosa in almost all the groups of Kadaknath birds.

ULTRASTRUCTUl AND HISTOENZYMAT STUDIES ON BURSA OF FABRIC KADAKNATH

Dr.S.K.Karmore **Anar Singh Dharve**
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ABSTRACT

The Ultrastructural and histoenzymatic studies were conducted on the spleen of Kadaknath breed of poultry at different age groups from day old to 40 weeks of age. The reddish- brown, elongated to ovoid shaped spleen was located to the right side near the junction of proventriculus and gizzard. The spleen was covered with thick connective tissue capsule made up of mainly collagen and reticular fibers with few elastic fibers. Underneath the capsule, the splenic parenchyma was divided into white pulp and red pulp without clear cut demarcation. The white pulp was made up of network of reticular cells and reticular fibers. In this region small, medium and large sized lymphocyte were present in abundance with few plasma cells, sheathed arteries and lymphatic nodules. In group I and II, more numbers of the lymphoblasts and lymphocytes were observed in white pulp. In group III, all types of lymphocytes such as small, medium and large lymphocytes were seen. While in group IV and V, the presence of large lymphocytes were more.

The fibroblasts observed in spleen were flat or stellate shaped cells with long cytoplasmic prolongations. The plasma cells were abundant in white pulp which showed heterochromatin in a characteristic pattern. There was presence of monocytes, heterophils, granules secreting cells, plasma cells, macrophages, mast cells and giant cells in red pulp and white pulp of spleen. The reticulum cells were stellate or irregular shaped cells with smaller nuclear cytoplasmic ratio. Two types of reticulum cells were found. Large reticulo epithelial cells were found more in white pulp of spleen. The red pulp was consisted of reticular cells and fibers, which form a meshwork in which erythrocytes, few lymphocytes of various sizes and granulocyte were present. The structure of lymphocytes, heterophils, macrophages, fibrocytes was similar to that present in white pulp. Histoenzymatically, negative ACPase activity was seen in red pulp, whereas in white pulp the activity was increasing with the advancement of age. AKPase and ATPase activity was mild in red pulp, whereas in white pulp, it was moderate to intense.

ULTRASTRUCTURAL AND HISTOENZYMATIC STUDIES ON THYMUS OF KADAKNATH FOWL

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ABSTRACT

The Ultrastructural and histoenzymatic studies were conducted on the thymus of Kadaknath fowl from day old to 30 weeks of age. Gray to black colored thymus was located into two long chains on the either side of neck region. It was encapsulated by thin connective tissue capsule along with adipose tissue. The thymic parenchyma of each lobe was consisted of a centrally located medulla surrounded by irregular cortex. In all the age groups, the parenchyma was composed of lymphoid cells or thymocytes, reticuloepithelial cells, myoid cells and macrophages as the predominant component. The other cell types occasionally seen were granulocytes, mast cells and plasma cells. Division of the cortex and medulla started at first week and was distinct at fourth week of age. Lymphocytes were more numerous in the cortex than in the medulla. These cells had a thin rim of cytoplasm around the nucleus with clumped chromatin. Three types of lymphocytes were found. Greater proportion of large lymphocytes was present in the medulla. Three types of reticuloepithelial cells such as pale, dark and undifferentiated cells were observed in the present study. Similarly, round to ovoid, elongated and triangular shaped myoid cells were found in the thymus. The cytoplasm of these myoid cells contained abundance of myofibrils.

The Hassall's corpuscles were made up of less hyalinized center and peripheral concentrically arranged epithelial reticular cells. The centre of the Hassall's corpuscles was appeared either solid or cystic. Presence of melanocytes was unique characteristic feature of present study. Melanocytes had round or spindle-shaped nuclei and clear cytoplasm with brown pigment granules and many cytoplasmic processes. The number of melanocytes, myoid cells, Hassall's corpuscles and plasma cells were increasing with the advancement of age in Kadaknath fowl. The histoenzymatic observataions in thin connective tissue capsule, septae, cortex, medulla, Hassall's corpuscle, myoid cells and reticulo epithelial cells showed weak to intense activity of AKPase, ACPase and ATPase activity within groups.

VETERINARY PHYSIOLOGY

PHYSIOLOGICAL CHANGES FOLLOWING SYNCHRONIZATION OF ESTRUS AND FIXED TIMED INSEMINATION WITH DOUBLE $PGF_2\alpha$ AND HEATSYNCH PROTOCOL IN SAHIWAL COWS

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ABSTRACT

Synchronization of estrus is an overt phenomenon of making a number of cows come into heat at the same time. This allows better planning of breeding activities and wider use of artificial insemination. Recently an estrus synchronization protocol called Heatsynch in cattle has been developed by Pancarci *et al*. (2002) which makes use of a combination of GnRH-$PGF_2\alpha$- Estradiol Cypionate injection. The major advantages of heatsynch are reduced hormone cost, easier scheduling and implementation, since all injections and A.I. are at 24 and 48 hr interval in cows. The present study was therefore, undertaken to compare the efficacy of Double $PGF_2\alpha$ and Heatsynch protocol for estrus synchronization and fertility response in non-inseminated, non-pregnant, anestrus (Pre-service or post service) or repeat breeders Sahiwal cows. The plasma progesterone, estradiol-17 β concentration, biochemical and haematological parameters were also studied during the investigation. Animals were divided into three groups G-I (control), G-II (Double $PGF_2\alpha$) and G-III (Heatsynch). In G-I, six animals were inseminated, when cows were seen in behavioral estrus, two animals were found to be pregnant based on rectal palpation after 60 days with a conception rate of 33.33%. In G-II, out of six Sahiwal cows three animals were found to be pregnant with a conception rate of 50%. In G-III out of six Sahiwal cows, one animal was found to be pregnant with a conception rate of 16.66%. The mean values of different haematological, biochemical and hormonal profile in (G-II) and (G-III) protocol were estimated. The mean TEC and Hb values in G-II and G-III were 5.09±0.25 (10^6/µl), 10.38±0.68 (g%) and 5.41±0.22 (10^6/µl), 10.91±0.43 (g%) respectively on day of induced estrus, which is lower than day 0 values and highly significant difference ($P<0.01$) were found in G-III (within group) but no significant difference were found in G-II (within group). The mean total protein and inorganic phosphorus values in both G-II and G-III are 9.51±0.18 (g/dl), 6.86±0.49 (mg/dl) and 8.29±0.27 (g/dl), 5.98±0.73 (mg/dl) respectively on day of induced heat which is higher than day 0 values. A significant difference ($P<0.01$) found out in total protein value but there is no significant difference in inorganic phosphorus ($P>0.05$) within group. The mean glucose value in G-II is 69.33±2.82 (mg/dl) on day of induced estrus which is higher than 0 day value but differ non-significantly within group. The mean plasma progesterone concentration (ng/ml) in G-II is 0.67±0.09 on 11th day which falls to 0.14±0.03 on 12th day and there was gradual increase in mean plasma Estradiol- 17-β concentration from 0 day to 14th day. The mean plasma progesterone concentration in G-III before treatment 0.48±0.12 (ng/ml) was higher than day of induced estrus 0.10±0.03 (ng/ml) and the mean plasma Estradiol-17-β concentration 31.33±0.97 (pg/ml) on day of induced estrus (Day 10) was significantly higher. Present investigation reveals that Double $PGF_2\alpha$ protocol is more efficient than Heatsynch protocol in Sahiwal cows.

PHYSIOLOGICAL CHANGES IN SYNCHRONIZATION OF ESTRUS AND FIXED TIME INSEMINATION USING OVSYNCH PROTOCOL IN CROSSBRED COWS

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ABSTRACT

The ability to synchronize the onset of estrus, the time of breeding and successful calving offers economic and managemental benefits to dairy producers. Almost half of dairy cows may have not been detected for behavioral estrus. This inefficiency results in larger than optimal calving intervals, loss of milk yield and can limit reproductive performance in commercial dairy herds. Ovsynch is one of the most "classical" and widely known systems. The protocol consists of two injections of a GnRH analogue separated by a single administration of $PGF_2\alpha$. The present study was therefore, undertaken to compare the efficacy of Ovsynch protocol and double $PGF_2\alpha$ protocol, given 11 days apart on estrus synchronization and fertility response in non-inseminated, non-pregnant, anestrus (Pre-service or post service) or repeat breeders crossbred cows. The plasma progesterone, estradiol 17 β, biochemical and haematological parameters were also studied. The experimental animals were divided into 3 groups G-I(control), G-II (Ovsynch) and G-III (Double $PGF_2\alpha$). In G-I, 6 animals were inseminated when cows were seen in estrus, 2 animals were found to be pregnant based on rectal palpation after 60 days with a conception rate of 33.33%. In G-II, out of 6 crossbred cows 3 animals were found to be pregnant based on rectal palpation after 60 days with a conception rate of 50%. In G-III out of 6 crossbred cows, 2 animals were found to be pregnant as per rectal palpation after 60 days. This gave a conception rate of 33.33%. The mean values of different haematological, biochemical and hormonal profile in (G-II) and (G-III) protocol were estimated. The mean TEC and Hb values in G-II and G-III were 5.50±0.37 (10^6/µl), 11.48±0.84 (g%) and 4.99±0.19 (10^6/µl), 9.54±0.53 (g%) respectively on day of induced estrus which is lower than day 0 values and a significant difference ($P<0.05$) were found within group. The mean total protein and inorganic phosphorus values in both G-II and G-III are 7.66±0.37(g/dl), 7.52±0.27 (mg/dl) and 8.51±0.41 (g/dl), 5.98±0.88 (mg/dl) respectively on day of induced heat which is higher than day 0 values and are significant ($P<0.05$) within group. The mean plasma progesterone concentration in G-II before treatment (0.73±0.12 ng/ml) was higher than day of induced estrus (0.16±0.06ng/ml) and the mean plasma Estradiol- 17-β concentration 30.72±0.77 (pg/ml) on day of induced estrus (Day 10) was significantly higher ($P<0.01$). The mean plasma progesterone concentration (ng/ml) in G-III is 0.56±0.11 on 11th day which falls to 0.25±0.10 on 12th day. There was gradual increase in mean plasma Estradiol- 17-β concentration from 0 day to 14th day in G-III. Present investigation reveals that Ovsynch protocol is more efficient than Double $PGF_2\alpha$ protocol in crossbred cows.

STUDIES ON THE EPIDIDYMAL PHYSIOLOGY OF BUCKS DURING WINTER AND SUMMER SEASON.

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ABSTRACT

The present investigation was designed to study certain morphological and biochemical characteristics of epididymal washings/plasma during winter and summer season in the bucks. Histomorphometrical changes in caput, corpus and cauda epididymis was also studied during the two seasons. These studies were undertaken with the view to find out the effects of summer season on the epididymal physiology of bucks. The epididymis was collected from sixteen apparently healthy bucks, immediately after their slaughter. In the laboratory, separation and washings of caput, corpus and cauda epididymis were carried out separately. The washings were collected and volume was made to 20 ml for caput and cauda and 15 ml for corpus epididymis. The spermatozoa of the cauda epididymis showed higher mass motility as compared to corpus epididymis and caput epididymis in which they were non-motile in both the seasons.

The result obtained showed a increases highly significant ($P<0.01$) difference in sperm concentration between caput, corpus and cauda epididymis, out of which cauda was having maximum concentration (1097.12± 81.25 millions/ml) and least in corpus (140.37±7.41 millions/ml) though similar, but low concentration of the spermatozoa was recorded during summer season .The live per cent values of the spermatozoa were significantly ($P<0.05$) lower in corpus (82.13±1.99) epididymis as compared to the caput (86.04±2.20) and cauda (86.72±1.62) epididymis. In summer season there was low per cent of live spermatozoa found out in the epididymis most of the spermatozoa from the caput epididymis showed the cytoplasmic droplet (43.53±17.40 per cent) at their neck portion. However, the spermatozoa of the corpus and cauda epididymis revealed a significant ($P<0.05$) reduction in the cytoplasmic droplet at the neck portion.

The total protein content (g/dl) was highly significant ($P<0.01$) in summer season as compared to winter season in the epididymis of experimental bucks. Epididymal cholesterol content also increased non-significantly during summer season as compared to winter season. In the present study the pH of all the epididymal portions during both seasons was detected to be 6.7. The higher sodium ion concentration was found in caput epididymis during winter season. The concentration of potassium increased non-significantly in summer season in caput, corpus and cauda as compared to winter season.

Serum cortisol concentrations were significantly ($P<0.05$) increased during summer season as compared to the winter season. Serum T_3 concentration during winter season was low as compared to summer season, while T_4 concentrations during winter season were slightly higher than concentration of T_4 in summer season. In the epididymal caput and corpus the tubular diameter and epithelial height were diminished in summer season. The result clearly indicates that motility of the spermatozoa was adversely affected during summer season in bucks. The higher concentration of cortisol during summer season is a result of heat stress in experimental bucks.

EFFECT OF EXOGENOUS THYROXINE ON BIOCHEMICAL AND PHYSIOLOGICAL STATUS IN CALVES

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ABSTRACT

Buffaloes contribute significantly as the main livestock species for milk and meat production. Thyroid hormones are general metabolic hormones required by the neonates to build up their immune competence along with other homeostatic activities. The lipid and HDL cholesterol levels are higher in the buffalo calves than that of the cow calves of the same age. Higher serum lipids further potentiate the cause of hypothermia due to underutilization of lipids by the buffalo calves. The study was conducted on 12 apparently healthy buffalo calves and 12 healthy cow calves at Livestock Farm (calf unit), Adhartal, N.D.V.S.U., Jabalpur (M.P.). The thyroxine was administered orally once a day @ 0.167 mg/kg body weight in powder form mixed along with 5 gram jaggery on 15th day, 30th day and 45th day to the experimental calves. The blood samples were collected in sterilized glass vials containing 10% aqueous solution of EDTA for haematological parameters as well as without anticoagulant for separation and collection of serum.

Studies on physiological responses, suggested that heart rate increased significantly ($P<0.05$) in thyroxine supplemented cow calves but not in buffalo calves, in comparison to control group. The rectal temperature and respiration rate did not increase significantly in thyroxine supplemented buffalo calves and cow calves than control groups of buffalo calves and cow calves. The body weight remained almost constant in treatment groups. In early age, the total erythrocyte count (TEC) recorded was higher and it decreased significantly ($P<0.05$) in thyroxine supplemented buffalo calves and cow calves. The total leukocytes count (TLC) of thyroxine supplemented buffalo calves and cow calves decreased in comparison to control groups. In the biochemical parameters, serum glucose, serum triglycerides increased significantly ($P<0.05$) whereas, serum protein and cholesterol level was decreased in thyroxine supplemented buffalo calves and cow calves as compared to buffalo calves and cow calves, respectively. The HDL cholesterol did not differ significantly in treatment groups as compared to control groups.

The immunoglobulins concentration increased in thyroxine supplemented buffalo calves while did not differ significantly in thyroxine supplemented cow calves as compared to control groups of both buffalo calves and cow calves, respectively. In the present investigation thyroxine level increased significantly ($P<0.05$) in both treatment groups of buffalo calves and cow calves as compared to control groups of buffalo calves and cow calves, respectively. However, the cortisol level did not differ significantly in treatment groups as compared to control groups. The adaptability index (%) of thyroxine supplemented buffalo calves did not differ significantly as compared to control group of buffalo calves whereas, adaptability index (%) of thyroxine supplemented cow calves decreased significantly ($P<0.05$) than control group of cow calves. However, the adaptability index (%) of buffalo calves was found to be higher than cow calves in all respect. The findings lead to these conclusions that Thyroxine supplementation was found to be a potent immnomodulator as it augmented the titer of serum immunoglobulin in neonatal buffalo calves as compared to that in cow calves. Mobilisation of lipids and HDL cholesterol of buffalo calves produced heat to maintain homeostasis in buffalo calves. The increased thyroxine level in thyroxine supplemented buffalo calves helped to maintain their body temperature and increased basal metabolic rate, thus helped in their survival and reduced mortality.

"EVALUATION OF DIET CONTAINING GERMINATED MAIZE AND MULTIENZYME COMPLEX ON GROWTH AND PRODUCTION PERFORMANCE OF BROILERS"

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ABSTRACT

Present study entitled "evaluation of diet containing germinated maize and multienzyme complex on growth and production performance of broilers and multienzyme complex" was conducted to study the effect of germinated sorghum on broiler's growth performance. A total of two hundred (200) day old broiler chicks of Vencobb strain were divided in 5 groups of 40 each. Germinated maize grain was fed to different groups of broiler chicks at different levels. The parameters studied were hematological and biochemical parameters, growth, body weight gain, feed consumption, feed conversion ratio and carcass characteristics.

The weekly body weight gain, cumulative body weight, feed consumption, cumulative feed conversion ratio showed a significant ($p<0.01$) change in all treatment groups when compared with control group. There were no significant changes found in hematological parameter, but blood Ca, P, ACP, ALP and protein were found to be significantly different in all treated groups. Carcass characteristics, meat weight, edible carcass yield, breast yield, thigh yield, intestinal length and weight were also found significantly ($p<0.01$) increased in all the treated groups as compared to control groups.

On the basis of all above parameters when the economics was calculated, it was found that 50% and 75% germinated sorghum of total cereal content give more profit as compared to other treated groups and control group.

"COMPARATIVE STUDIES ON GROWTH AND PRODUCTION PERFORMANCE OF BROILERS ON DIETS CONTAINING GERMINATE SORGHUM AND MULTIENZYME COMPLEX"

Dr. Archana jain **Mohit Gautam**
(Advisor) **(Researcher)**

ABSTRACT

Present study entitled "**comparative studies on growth and production p**erformance of broilers on diets containing germinated sorghum and multienzyme complex" was conducted to study the effect of germinated sorghum on broiler's growth performance. A total of two hundred (200) day old broiler chicks of Vencobb strain were divided in 5 groups of 40 each. Germinated sorghum grain was fed to different groups of broiler chicks at different levels. The parameters studied were hematological and biochemical parameters, growth, body weight gain, feed consumption, feed conversion ratio and carcass characteristics.

The weekly body weight gain, cumulative body weight, feed consumption, cumulative feed conversion ratio showed a significant ($p<0.01$) change in all treatment groups when compared with control group. There were no significant changes found in hematological parameter, but blood Ca, P, ACP, ALP and protein were found to be significantly different in all treated groups. Carcass characteristics, meat weight, edible carcass yield, breast yield, thigh yield, intestinal length and weight were also found significantly ($p<0.01$) increased in all the treated groups as compared to control groups.

On the basis of all above parameters when the economics was calculated, it was found that 50% and 75% germinated sorghum of total cereal content give more profit as compared to other treated groups and control group.

STUDIES ON BIOCHEMICAL AND HORMONAL PROFILE OF NON-DESCRIPT ANOESTRUS COWS AND THEIR MANAGEMENT

Dr. H.S.Singh **Manoj Kumar Ahirwar**
(Advisor) **(Researcher)**

ABSTRACT

The present study was carried out in 409 animals of 17 villages of Rewa district including peri-urban and rural areas. The information was collected on the basis of benchmark survey through a common questionnaire regarding farmer's status, animal status, feeding practices adopted by farmers, productive and reproductive status of potential dairy pockets of Rewa district. The average daily milk yield of cows in peri-urban area (2.13±0.39 liters/day) as compared to rural area (1.83±0.47). Lactation length of cows in peri-rural area 215.23±19.73 days as compared to rural area i.e. 181.37±13.57. Lactation milk yield of cows in peri-urban area was 458.41±123 as compared to rural area i.e. 331.07±107. Peak yield of cows in peri- urban area was 2.67±0.49 liters/day as compared to rural cows i.e. 2.17±0.53 liters/day. Dry period of cows in peri-urban area was 197.35±21.37 days as compared to rural area i.e. 297.13±23.89 days. Age at first calving of cows in peri-urban area was 49.23±10.35 months as compared to rural area i.e. 51.39±12.35 months. Service per conception of cows belong to peri-urban area was 1.52±0.089 as compared to rural area i.e. 0.91±0.07. Service period of cows belong to peri-urban area was 148.98±5.8 as compared to rural area i.e. 98.462±4.5. Calving interval of cows in peri-urban area was 410.97±15.2 days as compared to rural area i.e. 408.05±19.3 days. The total incidence of reproductive disorders was 66.38% in which true anoestrous cows was 35.45% followed by 15.54% suboestrous animals, 8.31% repeat breeders, 3.91% retention of placenta (ROP) and 3.17% of prolapse cases. In present investigation 48 animals were divided into four groups (n=12) viz. T_1 (Normal cyclic animals), T_2 (Anoestrous control), T_3 (True anoestrous) and T_4 (Suboestrous). The anoestrous control animals comprises six true anoestrous and six suboestrous animals and T_3 and T_4 were supplemented with mineral mixture containing deficient minerals were evolved for 60 days.

The results of before and after supplement of various blood-biochemical and hormonal profile of true anoestrous cows in winter season (December 2015-January 2016) showed significant ($p<0.05$) increase in body weight of animals (217±8.42) as compared to (210.33±9.15), BCS was non-significant high (2.25±0.13) as compared to (2.13.33±9.15), significant increase in total cholesterol (138.91±3.40) compared to (133±0.3.34), triglycerides was significantly high (11.0±0.96) compared to (9.13±0.87), total protein was non-significantly high (7.05±0.77) compared to (6.69±0.75), albumin was significantly low (0.85±0.27) compared to (1.08±0.30), globulin was significantly high (4.59±0.62) compared to (3.26±0.52). The A/G ratio was non-significantly low (1.07±0.30) as compared to (1.08±0.30), blood glucose was non-significantly low (67.83±2.38) as compared to (71.91±2.45). The results of WBC showed a non-significant increase (8.91±0.86) as compared to (8.50±0.84), lymphocytes per cent was significantly high (66.37±2.35) as compared to (50.19±2.05), monocytes per cent was significantly low (2.30±0.44) as compared to (4.25±0.60). Results revealed that RBC was non-significantly low (5.03±0.70) compared to (5.80±0.70), hemoglobin was non-significantly low (8.16±0.83) compared to (8.41±0.84). Serum Co, Se, Cu, Mn, Fe, Mg, and P concentration

showed highly significant increase, whereas Ca showed a non-significant decrease. The hormonal concentrations of T_3,T_4, insulin and progesterone showed a highly significant increase whereas, cortisol concentrations showed highly significant decrease. Suboestrous animals also showed significant ($p<0.05$) increase in body weight, total cholesterol, neutrophils (%), Cu and Mn, whereas there was highly significant ($p<0.01$) increase in total protein, Mg, Ca, P, T_3, T_4, insulin and progesterone. A highly significant decrease in globulin, A/G ratio and cortisol concentration was observed. Non-significant differences in WBC, lymphocytes (%), monocytes (%), RBC and Hb concentration. The majority of parameters in control and normal cyclic animals showed non-significant differences.

The results of before and after mineral mixture supplementation of various biochemical and hormonal profile of true anoestrous cows in summer season (March-April 2016) showed significant increase in triglycerides, RBC and Hb, whereas highly significant differences were seen in total cholesterol, total protein, albumin, blood glucose, Co, Se, Cu, Mn, Zn, Ca, P, Mg, T_3, T_4, insulin and cortisol. A non-significant difference was observed in body weight, BCS, globulin, A/G ratio, WBC and Fe concentrations. Animals belong to suboestrous group showed significant increase in blood glucose and Hb, whereas highly significant differences were recorded in BW, triglycerides, total protein, albumin, RBC, Co, Cu, Mn, Fe, Zn, Ca, P, Mg, T_3, T_4, insulin and cortisol. A non-significant difference in BCS, total proteins, Globulin, A/G ratio and WBC were seen in the study. The majority of the parameters in control and normal cyclic animals showed non-significant differences. It can be concluded that supplementation of mineral mixture improves reproductive efficiency in non-descript

EFFECT OF ASCORBIC ACID AND ALPHA-TOCOPHEROL ON EXPRESSION OF HEAT SHOCK PROTEIN (HSP70) DURING HEAT STRESS IN COMMERCIAL BROILERS

Dr. Aditya Mishra
(Advisor)

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ABSTRACT

Among various environmental conditions, high ambient temperature beyond the range of the thermoneutral zone in poultry has been known as one of the most fatal stressors, which adversely affects feed intake, growth rate, immunity and mortality. In the present research investigation a possibility was explored to investigate the effect of ascorbic acid and alpha- tocopherol on expression of Heat shock protein (HSP70) during heat stress in commercial broilers. A total of 168 broiler birds (Cobb-400) randomly divided into seven groups with 12 birds in 2 replicates in each group and were maintained in comfort (26±1.0°C) and heat stressed (37±5.0°C) conditions. G1 group was kept as control. G2, G3 and G4 group was supplemented with 100, 200 and 300 mg ascorbic acid (AA) respectively and G5, G6 and G7 were supplemented with 100, 200 and 300 mg vitamin E. The cloacal temperature were non-significant at weekly intervals during the entire experimental period in both heat stressed and comfort group of broiler birds. The overall mean concentration of plasma HSP70 concentration showed non-significant difference between comfort and heat stressed birds in all the groups in broiler chickens. However, in broilers significantly ($p<0.05$) higher concentration of HSP70 was observed in control group of comfort condition as compared to treatment groups. Similarly, a significantly ($p<0.01$) higher concentration of HSP70 was observed in heat stressed control group of broilers as compared to heat stressed treatment groups. The overall mean concentration of plasma corticosterone (CORT) in broiler showed significant difference ($p<0.01$) between comfort and heat stressed birds in all the groups. In western blot analysis, the 70kd HSP70 protein was detected in all the treatment as well as in control group. On density ratio calculations using standard curve the HSP70 concentrations was expressed as ng /µg total protein. In G3, the lowest concentration of HSP70 of 2.682 ng /µg total protein was observed in liver samples as compared to control group. The overall mean concentration of plasma glucose and plasma albumin showed non-significant difference between comfort and heat stressed birds in all the groups. Similar trend was also seen in breast muscle pH of sacrificed birds. On day 45, in both conditions, the higher TBA value of was observed in control group whereas, the lowest TBA value was recorded in G3 in sacrificed broilers. In both comfort and heat stressed condition, significantly higher ($p<0.05$) body weight gain, total feed intake (g), FER and PI was observed in G3 group of broilers. In G3 group, all the organoleptic parameters were found within the normal range as compared to that of control group. In the present investigation, AA and vitamin E supplementation may be useful in amelioration of heat stress in broilers.

EFFECT OF ASCORBIC ACID ON IMMUNOHISTOCHEMISTRY OF HEAT SHOCK PROTEIN (HSP70) DURING HEAT STRESS IN COMMERCIAL BROILERS

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(Advisor)

Kailash Kumar
(Researcher)

ABSTRACT

Heat stress is one of the most challenging environmental conditions that affect commercial poultry farming. Thermal stress not only reduces production but also causes higher mortality in poultry thus, inflict considerable economic losses. In the present research investigation a possibility was explored to investigate the effect of ascorbic acid on immunohistochemistry of heat shock protein (HSP70) during heat stress in commercial broilers. A total of ninety six each of Cobb-400 broiler were randomly divided and maintained in comfort (26±1.0°C) and heat stressed (37±5.0°C) conditions. Birds were divided into 4 groups and each group consisting of 12 birds in 2 replicates. G1 group was kept as control. G2, G3 and G4 group was supplemented with 100, 200 and 300 mg ascorbic acid (AA) respectively. The cloacal temperature were non-significant at weekly intervals during the entire experimental period in both heat stressed and comfort group of broiler birds. The overall mean concentration of plasma HSP70 concentration showed non-significant difference between comfort and heat stressed birds in all the groups in broiler chickens. However, in broilers significantly ($p<0.05$) higher concentration of HSP70 was observed in control group of comfort condition as compared to treatment groups. Similarly, a significantly ($p<0.01$) higher concentration of HSP70 was observed in heat stressed control group of broilers as compared to heat stressed treatment groups. In comfort condition, maximum concentration of AA was observed in G4 group, which differ significantly ($p<0.01$) from control. The immunohistochemical localization of HSP70 reveals that HSP70 positive signals were detected in the nucleus and cytoplasm of the myocardial cells, the hepatocytes and the epithelial cells of renal tubules of both heat stressed and control group. The intensely HSP70 staining was identified in the venule of the heart and in kidneys in the heat stressed group as compared to control group. The overall mean concentration of plasma glucose and plasma albumin showed non-significant difference between comfort and heat stressed birds in all the groups. Similar trend was also seen in breast muscle pH of sacrificed birds. On day 45, in both conditions, the higher TBA value of was observed in control group whereas, the lowest TBA value was recorded in G3 in sacrificed broilers. In both comfort and heat stressed condition, significantly higher ($p<0.05$) body weight gain, total feed intake (g), FER and PI was observed in G3 group of broilers. In the present investigation, AA supplementation may be useful in combating rigors of heat stress in chickens.

EFFECT OF ORGANIC TRACE MINERAL SUPPLEMENTATION ON INTERLEUKIN10 GENE EXPRESSION, IMMUNE AND ANTIOXIDANT DEFENCE SYSTEM IN BROILER

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ABSTRACT

Trace minerals are essential to sustain production besides regulating anti-oxidant and immune systems in chicken. Zinc (Zn), selenium (Se) and chromium (Cr) act as catalysts in many enzyme and hormone systems. A single or blend of organic trace mineral (OTM) in diets has been shown to have multiple beneficial effects. Hence, in the present investigation, organic zinc, selenium and chromium were used to enhance immune response and modulate oxidative stress in broiler chickens. Total 312 day-old Cobb broiler chicks were used in the experiment. Broilers were divided into 13 groups and each group consisting of 24 birds in 3 replicates. T1 group was kept as control. T2, T3, T4 groups were supplemented with zinc (40 mg/kg of feed) from inorganic, 50 % inorganic + 50 % organic and organic form respectively. T5, T6, T7 groups were supplemented with selenium (0.3 mg/kg of feed) from inorganic, 50 % inorganic + 50 % organic and organic form respectively. T8, T9, T10 groups were supplemented with chromium (2 mg/kg of feed) from inorganic, 50 % inorganic + 50 % organic and organic form respectively. T11, T12, T13 groups were supplemented with combination of all 3 minerals from inorganic, 50 % inorganic + 50 % organic and organic form respectively.

The cloacal temperature and respiration rate differed non-significantly at weekly intervals during the entire experimental period. The mean concentration of plasma IgG and corticosterone concentration showed non-significant difference between control and treatment groups in broiler. RT-PCR expression analysis of IL 10 gene revealed that maximum upregulation (9.21 fold) was found in T7 group, followed by T10 (4.80 fold) and T4 (4.6 fold) in spleen as compared to control group. Mean heterophil and lymphocyte ratio was significantly ($p<0.05$) higher in T1 group as compared to control and other treatment group. Non significant difference was found for mean plasma glucose level between all groups. Mean total protein, albumin and globulin were significantly ($p<0.05$) higher in T13 group followed by T10. Mean plasma superoxide dismutase and glutathione peroxidise concentration were non significantly different in all groups. Significantly ($p<0.05$) higher mean plasma catalase concentration was found in T13 group. Significantly ($p<0.05$) higher mean plasma TBA value was found in control group. Mean body weight gain, feed intake, FER and PI were significantly ($p<0.05$) higher in T13 followed by T7. In the present investigation organic Zn, Se and Cr supplementation showed systemic effects with a better antioxidant and anti-inflammatory status, which could be translated into better production performance and lower mortality. Up-regulation of cytokine IL-10 gene expression in the spleen indicates beneficial effect of organic trace minerals in augmentation of immunological apparatus in broilers.

EFFECT OF ORGANIC TRACE MINERALS SUPPLEMENTATION ON EXPRESSION OF CXCLI2 GENE IN BROILERS

Dr. Aditya Mishra (Advisor)

Manju Kumari (Researcher)

ABSTRACT

It is well recognized that demand of poultry meat and meat products has increased due to shortage of red meat supply and price phenomena. Annual broiler global meat production was 84.6 million tons in 2013 and covered 33% of global meat demand. It is well established that trace minerals are important for broiler normal growth and development. However, due to relative less economic importance, trace minerals sector failed to attract poultry scientist attentions. The current interest in trace minerals nutrition has been vigorously undertaken due to better bioavailability of trace minerals and concerns of environmental pollution. Hence, in the present investigation, the effect of organic trace minerals supplementation on expression of CxCLi2 gene in broilers was attempted. A total of 162 broiler birds randomly divided into nine groups were used for the experiment. Broilers were divided into 09 groups and each group consisting of 18 birds in 3 replicates. T1 group was kept as control. T2, T3 group was supplemented with zinc (40 mg/kg of feed) from inorganic and organic form respectively. T4, T5 group was supplemented with selenium (0.3 mg/kg of feed) from inorganic and organic form respectively. T6, T7 group was supplemented with chromium (2 mg/kg of feed) from inorganic and organic form respectively. T8, T9 group was supplemented with combination of all 3 minerals from inorganic and organic form respectively. The cloacal temperature and respiration rate differ non-significantly at weekly intervals during the entire experimental period. The mean concentration of plasma IgG was found to be significant ($p<0.05$) on day 28 whereas, corticosterone concentration showed non-significant difference between control and treatment groups in broiler. RT-PCR expression analysis of CxCLi2 gene in spleen revealed that maximum up regulation (8.06 fold) was found in T5 group, followed by T9 (7.25 fold) whereas in bursa of fabricius the maximum up regulation (13.57 fold) was found in T9 group followed by T5 (10.10) fold as compared to control group. Mean heterophil and lymphocyte ratio was significantly ($p<0.05$) higher in T9 group as compared to control and other treatment groups. Non-significant difference was found for mean plasma glucose level between all groups. Mean total protein was significantly ($p<0.05$) higher in T9 followed by T8 group as compared to control. Mean plasma superoxide dismutase concentration were non significantly different in all the groups. Mean body weight gain, feed intake, FER and PI were significantly ($p<0.05$) higher in T9 followed by T5 group as compared to control. In the present investigation organic Zn, Se and Cr supplementation showed better antioxidant and humoral immune response, which could lead to increased production performance and decreased mortality in broiler birds.

"EFFECT OF DIFFERENT LEVELS OF GERMINATED MAIZE BASED DIETS ON FEED CONVERSION RATIO AND EGG PRODUCTION IN KADAKNATH"

Dr. Archana Jain
(Advisor)

Akhelesh Kumar Karoriya
(Researcher)

ABSTRACT

The present research work entitled "Effect of different levels of germinated maize based diets on feed conversion ratio and egg production in kadaknath" was conducted to study the effect of germinated maize on Kadaknath's growth and production performance. A total of one hundred and twenty eight (128) day old Kadaknath chicks distributed randomly into four treatment groups. Each group was divided into four replicates of 08 chicks each. Germinated maize grain was fed to different groups of Kadaknath chicks at different levels. Group T0 was given ration containing 100% normal maize, group T1 was given ration containing germinated maize at 50% level of cereal component, group T2 was given ration containing germinated maize at 75% level of cereal component and group T3 wase given ration containing 100% germinated maize, of cereal component.

The haematological parameters estimated were Hb, PCV, TEC, TLC, MCV, MCH, MCHC and showed a significant ($p<0.01$) change in all treatment groups when compared with control group.

Biochemical parameters, were calcium, phosphours, alkaline phosphatase, acid phosphatise, total protein, total cholesterol, glucose and showed a significant ($p<0.01$) change in all treatment groups when compared with control group except ALP and ACP, which decreased significantly in all the treated groups as compared to control groups. There was a significant increase ($p<0.01$) in the growth parameters like weekly body weight, feed consumption, cumulative feed conversion ratio, in all treatment groups when compared with control group. Total egg production was found higher in all treatment groups with highest in T2 group as compared to control group. The age at first laying was decreased and the length of laying period increased in T2 group followed by T1 and T3 as compared to control group.

On the basis of all above parameters when the economics was calculated, it was found that 75% germinated maize of total cereal content give more profit as compared to other treatment groups and control group.

EFFECT OF ORGANIC TRACE MINERALS SUPPLEMENTATION ON EXPRESSION OF IMMUNOREGULATORY GENES IN BROILERS.

Dr. Aditya Mishra **Anand Kumar Jain**
(Advisor) **(Researcher)**

ABSTRACT

Broiler production in tropical countries is generally suboptimal as indicated by the poor growth performance; suppressed immune function and high mortality rate. Organic trace minerals (OTMs) have been used in the broiler industry in order to enhance the immune system and modulate oxidative stress in broiler chickens. Hence, in the present investigation, organic zinc, selenium and chromium were used in the broiler diets. A total of 216 broilers comprising of twelve treatments with three replicate each maintained in battery cage system in a well ventilated room in the College Experimental Poultry Unit. The physiological responses of experimental broilers in terms of cloacal temperature and respiration rate were non-significant at weekly interval during the entire experimental period in both control and treatment group. The overall mean concentration of plasma corticosterone showed significant difference ($p<0.05$) between all the treatment groups on day 28 and 35. Plasma glucose concentration also differed non significantly ($p>0.05$) among the different treatment groups. However, significantly ($p<0.05$) higher concentration of total serum protein, albumin and globulin was observed in organic trace mineral supplemented (OTM) group as compared to control groups. Similarly, a significantly ($p<0.05$) higher concentration of serum sodium and potassium was observed in OTM supplemented group as compared to control group. A significantly ($p<0.05$) higher concentration of serum chloride was observed in control group as compared to OTM supplemented groups. On day 35, the maximum plasma IgG concentration was observed in OTM supplemented whereas, the minimum concentration was recorded in control group. On day 28 and 35, the overall mean heterophill : lymphocyte ratio showed significant difference ($p<0.05$) between control and OTM supplemented groups. A significantly higher immune organ weight (spleen and bursa of fabricius) was recorded in OTM supplemented group as compared to control group. RT-PCR gene expression analysis revealed that maximum up regulation of chTLR2b (2.8921 fold) and chTLR4 (3.0214 fold) was observed in T6 group, followed by T12 (2.531 fold) and (2.8865 fold) group, respectively in bursa of fabricius as compared to control group. RT-PCR expression analysis of chIL-12p35 gene revealed that maximum up regulation (3.7412 fold) was observed in T3 group, followed by T4 (3.1245 fold) and T12 (3.0125 fold) group in bursa of fabricius as compared to control group. RT-PCR expression analysis of chIFN -γ gene revealed that maximum up regulation (3.5601 fold) was observed in T12 group in bursa of fabricius as compared to control group. In spleen, RT-PCR gene expression analysis revealed that maximum up regulation of chTLR2b (3.8413 fold), chTLR4 (3.2140 fold) chIL-12p35 (2.7842 fold) and chIFN -γ (1.8621 fold) was observed in T3 group as compared to control group. The overall mean concentration of SOD showed significant difference ($p<0.05$) between control and OTM supplemented groups. Significantly ($p<0.05$) higher mean plasma TBA value was observed in control group. Significant difference ($p<0.05$) was observed in body weight gain between all the groups as compared to control group. The maximum body weight gain was attained in T12 group, supplemented with combination of organic form of Zn, Se and Cr whereas, minimum body weight gain was attained in T1 (control group). Significant difference ($p<0.05$) in total feed intake (g) was observed in T12 group as compared to control group. Maximum feed intake was observed for T12 group and minimum feed intake was observed for T7 group. The FER differed significantly ($p<0.05$) for all the treatment groups as compared to T1 group. Significant difference ($p<0.05$) was observed in dressed weight (%) and drawn weight (%) in T12 as compared to T1 group. Eviscerated weight (%), organ (liver, heart gizzard, giblets and pancreas) weight (% live wt.) and percent processing loss (blood, feather and head) differed non significantly between all the groups. In the present investigation organic Zn, Se and Cr supplementation showed better antioxidant and immune response, which could lead to increased production performance and minimum mortality in broiler birds.

DEPARTMENT OF BIOCHEMISTRY

STUDIES ON SERUM BIOCHEMICAL AND HORMONAL PARAMETERS DURING DIFFERENT STAGES OF PREGNANCY IN MURRAH BUFFALOES

Dr. R. Aich **Gajendra Singh Dhakad**
(Advisor) **(Researcher)**

ABSTRACT

Reference values for Murrah buffaloes especially during different stages of pregnancy are yet not established. The aim of the present study was to establish a reference values for serum biochemical and hormonal parameters for Murrah buffaloes during different stages of pregnancy. A total 28 Murrah buffaloes were included in the study and divided into- non pregnant (group-I), Ist trimester of pregnancy (group-II), IInd trimester of pregnancy (group-III) and IIIrd trimester of pregnancy to till parturition (group-IV) and each group consist of 7 animals. Serum samples were collected for estimation of biochemical constituent like total protein, albumin, globulin, A/G ratio, total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides, AST, ALT, ALP, glucose, urea, BUN, uric acid, creatinine and hormonal parameters like progesterone and estradiol hormone. Highly significant difference ($P<0.01$) in serum values was observed albumin in late pregnancy as compared to mid pregnancy and non pregnant animal, HDL cholesterol between non pregnant with mid and late pregnant animals; early pregnant with late pregnant animals, ALT in late pregnancy as compared to other groups, AST in late pregnancy as compared to other groups, glucose during pregnancy as compared to non pregnant animals, urea between non pregnant with early pregnant, middle pregnant and late pregnant animals; early pregnant with late pregnant animals, BUN between non pregnant with early pregnant, middle pregnant and late pregnant animals; early pregnant with late pregnant animals and progesterone hormone concentration in middle of pregnancy as compared to non pregnant and late pregnant animals. Significant difference ($P<0.05$) in serum values was observed in total protein in mid and late pregnancy as compared to non pregnant animal, total cholesterol in IIIrd trimester of pregnancy as compared to other groups and uric acid only between non pregnant and IIIrd trimester of pregnancy. No significant difference ($P>0.05$) in serum values was observed in globulin, A/G ratio, LDL cholesterol, triglycerides, ALP, creatinine and estradiol hormone concentration. In conclusion, the present study established a reference values provided a useful guide for interpreting serum biochemical and hormonal parameters during different stages of pregnancy in Murrah buffaloes.

HYPOCHOLESTEREMIC EFFECT OF HERBAL EXTRACTS IN WHITE LEGHORN EGGS

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Dr. Kapil Malviya
(Researcher)

ABSTRACT

The present study is aimed to estimate the hypoglycaemic, hypolipidemic and hypercholestremic effects of *Ziziphus mauritiana, Morus alba and Psidium guajava* of methanolic extracts and its powder in White leghorn layer birds. Experiments were conducted in 60 birds and they were divided in 10 groups of six birds each namely controls, T_1-T_6 and E_1-E_3. Blood samples were collected from all experimental birds on days 0, 14, 28, 42 and 56, 70 and 84. Serum was separated and used for the estimation of total lipids, cholesterol, triglycerides, HDL, LDL VLDL-cholesterol, uric acid, creatinine, ALT, AST, and G6PDH. Total lipids, Cholesterol and triglycerides were estimated in lipid extract of yolk. The methanolic extract and leaves powder supplementation in diet have beneficial effect in lowering the lipid, cholesterol and triglyceride in serum (mg/dl) and yolk (mg/g yolk). Consequently low density lipoprotein (LDL), very low density lipoprotein (VLDL) decreased significantly. Increase in high density lipoprotein (HDL) concentration indicated that these treatments had more positive influence. *P. guajava* leaves extract as well as leaves powder was found more effective in manipulating the lipid profile in serum. Yolk contents of lipids, cholesterol and triglycerides reduced if expressed in terms of mg/g yolk but showed an increase in these parameters, if calculated on the basis of mg/yolk because of the fact that the total weight of egg yolk increased. *Ziziphus* had profound effect in lowering the glucose in blood, however, morus and guava also reduced the same. Clinical parameter viz. AST and ALT had significantly higher activity recorded in *P. guajava* leaves powder supplemented group. Serum uric and serum creatinine had decline significantly all treated groups.The haemoglobin concentration elevated upto 20% in *P. guajava* methanolic extract and leave powder group.

No significant change was noticed in lipid peroxidase activity in any methanolic extract supplied group, but reduced activity of SOD was recorded in all methanolic extracts supplemented groups however the leaves powder had least activities. Variation in reduced glutathione was significantly high. *P. guajava* extracts. Serum Glucose-6-Phosphate dehydrogenase activity increased significantly and it was time dependant. The data exhibited significant increase in egg number, egg weight and body weight in all supplemented groups. Such Increase was also time dependant.

STUDIES ON HAEMATO-BIOCHEMICAL CHANGES IN *HAEMONCHUS CONTORTUS* NATURALLY INFECTED GOATS"

Dr. Ranjit Aich **Dipesh Bandhaiya**
(Advisor) **(Researcher)**

ABSTRACT

Haemonchus contortus is considered as main gastrointestinal parasite causing anaemia and hypoproteinemia in ruminants. The study was conducted to determine the correlation between faecal egg count, FAMACHA© score with haemato-biochemical parameters in goats predominantly infected with *Haemonchus contortus*. A total number of 100 goats were divided into five groups (Group I, II, III, IV and V) on the basis of egg per gram (EPG). Results revealed a highly significant (P<0.01) negative correlation between EPG and FAMACHA© score with Hb, PCV and TEC. Strong positive correlation was observed between EPG and FAMACHA© score (P<0.01). Mean values of Hb, PCV and TEC were declined in groups with increase in EPG and highly significant (P<0.01) differences were observed between all groups. Highly significant (P<0.01) and negative correlations were observed between TLC, lymphocyte, monocyte and duo of EPG and FAMACHA© scores whereas correlations between EPG, FAMACHA© scores and both of neutrophil and eosinophil were highly significant (P<0.01) and positive. However, EPG and FAMACHA© score with basophil were showed significant (P<0.05) and negative correlation. The mean values of TLC decreased in groups having higher worms load. In DLC, the mean values of both neutrophil and eosinophil were elevated but lymphocyte and monocyte values were decreased with the increase in worm burden. Significant (P<0.01) differences were observed in values of TLC and DLC between all groups but, no significant difference was observed for monocyte between group-I and II and for basophil between group-II and IV; and group-III and V. Significantly (P<0.01) negative correlation of EPG and FAMACHA© score with glucose, total serum protein, albumin and A/G ratio were reported. Whereas, highly significant (P<0.01) positive correlation of EPG and FAMACHA© score with globulin and cholesterol were observed. Mean values of glucose, total protein, albumin and A/G were decreased in groups with high worms load whereas globulin and cholesterol were increased and mean values these parameters were showed highly significant (P<0.01) difference between all groups. But, in globulin highly significant (P<0.01) difference was observed between all the groups except group-I and group-II as well as in between group-IV and group-V. The correlation of EPG and FAMACHA© score with duo of ALT and AST were positive and highly significant (P<0.01). The mean values of ALT and AST were elevated in groups with high worms load and highly significant (P<0.01) difference was observed between all the groups for mean values of ALT and AST.

INVESTIGATION ON ACUTE PHASE PROTEIN AS BIOMARKER FOR DIAGNOSIS OF SUB-CLINICAL MASTITIS IN CROSS-BRED COWS

Dr. Ranjit Aich (Advisor)

Deepa Chouhan (Researcher)

ABSTRACT

Sub-clinical mastitis (SCM) causes two-third losses of the total milk production and is more challenging than clinical mastitis due to absence of visible changes in the udder or milk. Sub-clinical mastitis is frequently diagnosed by cultural examination, California mastitis, and electrical conductivity and by SCC. These tests have their own limitations; therefore, it is of great importance to investigate biomarkers that could be used for early and rapid detection of sub-clinical mastitis. The present study was carried out to investigate the role of acute phase protein (Serum amyloid A and milk amyloid A) for diagnosis of sub-clinical mastitis in cross-bred cows. The study was conducted on 40 apparently healthy cross-bred cows, in the mid-lactation period and were equally divided into four groups (Group-I, Group-II, Group-III and Group-IV). On bacteriological examination of milk, out of 57 samples, 27 (47.36%) cross-bred cows were found bacteriologically positive and 30 (52.63%) cross-bred cows were found bacteriologically negative. A highly significant ($P<0.01$) difference in the mean values of SCC was observed between group I with group III and group IV as well as between group II with group III and group IV. But no significant difference was observed between group I and group II and also between group III and group IV. Highly significant ($P<0.01$) difference in mean values of SAA was reported between all the groups whereas no significant difference was observed between group I and group II. Highly significant ($P<0.01$) difference in mean values of MAA was reported between all the groups but no significant difference was observed between group III and group IV. Results of the correlation matrix revealed significantly ($P<0.01$) strong positive correlations of SCC with acute phase proteins, serum amyloid A and milk amyloid A concentration in serum and milk, respectively and highly significant ($P<0.01$) positive correlation was also observed between serum amyloid A and milk amyloid A. The proposed cutoff points for SCC, SAA and MAA were >200,000 cells/ml, 74 µg/ml and 10 µg/ml, respectively for the diagnosis of subclinical mastitis with high sensitivity (90% to 100%). The study revealed the most accurate test for the diagnosis of subclinical mastitis found to be SAA followed by SCC and MAA. The area under curve of the SAA was larger than those of SCC and MAA, which suggests that the SAA test was more accurate than SCC and MAA for the diagnosis of sub-clinical mastitis.

MOLECULAR AND IMMUNOGENIC CHARACTERIZATION OF EXCRETORY-SECRETORY PROTEIN OF *HAEMONCHUS CONTORTUS* ISOLATED FROM GOAT

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(Advisor)

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ABSTRACT

Haemonchosis is a predominant infection in small ruminants caused by *Haemonchus contortus*, causes severe anaemia that may be fatal to animals. *Haemonchus contortus* releases certain excretory-secretory (E/S) proteins which are essential for their survival inside the host and can perform functions like tissue penetration and host protein degradation. A 24 kDa E/S protein is one of the most important components of the *Haemonchus contortus* E/S products, which was shown to have important biological and immunogenic functions. In this study, the molecular and immunogenic characterization of E/S proteins of *Haemonchus contortus* have been done. For molecular characterization of gene encoding 24 kDa E/S protein, the total RNA was isolated and cDNA was synthesized. The amplified product of 24 kDa E/S gene was isolated by PCR of cDNA and then its sequencing was done which revealed that it contains 661 base pairs which encodes the protein consisting 219 amino acids. For the immunogenic characterization, the E/S antigens were isolated by *in vitro* cultivation of *Haemonchus contortus* in RPMI 1640 medium. Fractionation of whole E/S antigen was done by SDS-PAGE which revealed the presence of 24, 55, 62, 66 and 93 kDa molecular weight polypeptide bands. The purification of whole E/S antigen was done by gel filtration chromatography using Sephacryl S-200. Fractionation of purified E/S antigen was done by SDS-PAGE (12.5% resolving gel) which revealed the presence of 24 kDa and 66 kDa molecular weight polypeptides. On Western blot analysis, both 24 kDa and 66 kDa proteins were found immunodominant with hyperimmune sera (raised in rabbit) which was used as primary antibody. Antigenicity of purified E/S antigen was determined by indirect ELISA and the titer was found in between 800-1600. Evaluation of antigenicity of purified E/S antigen was done by indirect ELISA by using 10 serum samples randomly collected from goats and among those, a total of 5 samples were found positive for the presence of *Haemonchus contortus* antibodies. It suggested that the purified E/S has retained enough antigenicity during purification which may be used as potential vaccine candidate as well as for development of user-friendly, cost effective serodiagnostic technique like dip-stick ELISA for serodiagnosis of haemonchosis in goats.

VETERINARY PHARMACOLOGY

ANTIBACTERIAL AND IMMUNO- MODULATORY ACTIVITY OF *MORINGA OLEIFERA* IN ALBINO RATS

Dr. R.K. Sharma
(Advisor)

Priyanka Deshmukh
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ABSTRACT

Medicinal plants are economical and safe therapeutic alternatives to combat antimicrobial resistance. Immunomodulatory plants are comparatively a recent concept in phytomedicine where they provide an alternative approach to conventional chemotherapy for a variety of diseases. *Moringa* leaves have been reported to be a rich source of β-carotene, protein, vitamin C, calcium, potassium and act as good source of natural antioxidants like ascorbic acid, flavonoids, phenolics and carotenoids that work mutually to strengthen immunity.

So, the present work was undertaken to evaluate the *in vitro* antibacterial activity of *Moringa oleifera* against various micro-organism and to assess its immunomodulatory potential in the albino rats. Furthermore, leaf extracts of *Moringa oleifera* were also screened for their phytochemical constituents. This study comprised of six groups containing six rats in each group. Group I served as control, received standard feed and water. Group II and IV received aqueous extract of *Moringa oleifera* @ 400 mg/kg b.wt, orally for 45 days. Group III and V received ethanolic extract of *Moringa oleifera* @ 400 mg/kg b.wt, orally for 45 days. Group VI received standard immunomodulatory drug Levamisole @ 50 mg/kg b.wt, orally for 45 days. Various haematological and biochemical studies were carried out on 0, 15 and 30th day of study.

The chemical composition of aqueous and ethanolic extract of *Moringa oleifera* indicated the presence of reducing sugar, alkaloids, flavonoids, tannins, saponis, glycosides, sterols, proteins and amino acids. The antibacterial activity of *Moringa oleifera* aqueous and ethanolic extracts were undertaken against *Bacillus cereus, Staphylococcus aureus, Streptococcus pyogenes, Escherichia coli, Klebsiella pneumoniae, Salmonella* Typhimurium. The antibiotic Ciprofloxacin was simultaneously placed as control drug for antibiotic sensitivity. The findings of present study indicated that the ethanolic extracts of *Moringa oleifera* inhibited the growth of gram positive bacteria from 40 per cent up to 90 per cent concentration while the minimum inhibitory concentration for gram negative bacteria was 50 per cent. However, the aqueous extracts did not inhibit the growth of gram positive and gram negative bacteria even up to the highest concentration i.e. 90 per cent.

In immunomodulatory studies, a significant increase ($P< 0.05$) in HA titre was observed in levamisole treated group VI, ethanolic extract treated group V and aqueous extract treated group IV of *Moringa oleifera* as compared to group I. In delayed hypersensitivity test a significant increase ($P< 0.05$) in paw volume was observed in response to Sheep Red Blood Cells (SRBC's) in group II (aqueous extract), group III (ethanolic extract) and group VI (levamisole). Phagocytic index was also found to be non-significantly increased in levamisole treated group VI, ethanolic extract treated group III and aqueous extract treated group II as compared to group I.

The haematological observation revealed highly significant increase in the values of TLC, TEC, DLC, Hb and PCV in the ethanolic extract treated group V and aqueous extract treated group IV as compared to control group I. Serobiochemical profile revealed significant increase ($P< 0.05$) in the values of total protein and globulin while significant reduction ($P< 0.05$) in the values of AST and ALT in the aqueous extract treated group IV and ethanolic extract treated group V.

Over all, this study revealed antibacterial activity of the ethanolic extract of *Moringa oleifera* on test micro-organisms. The ethanolic and aqueous extract of *Moringa oleifera* also exhibited immunomodulatory activity in albino rats. Positive effect was observed on haematological and biochemical parameters in both the aqueous and ethanolic extract treated groups.

STUDIES ON PHARMACOKINETICS OF CEFUROXIME SODIUM AND ITS INTERACTION WITH MELOXICAM IN BARBARI GOATS

Dr. R.K. Sharma
(Advisor)

Kshemankar Shrman
(Researcher)

ABSTRACT

Cefuroxime sodium belongs to the cephalosporin group of antibiotic and is commonly used in both human and veterinary medicine with good results in prophylaxis and treatment of bacterial infections. It is widely used in the therapeutic practices due to its wide antibacterial spectrum (active on both gram positive and gram negative bacteria) and stability against beta-lactamase. In India, in the year 2011, this cefuroxime sodium has been approved for the treatment of mastitis in milking cows. Meloxicam is a commonly used NSAID, frequently used for treatment of clinical conditions in animals, and usually prescribed along with antibiotics.

The present study was under taken to study the pharmacokinetic of cefuroxime sodium following intravenous, intramuscular and subcutaneous administration in barbari goats. Further, in the study interaction kinetics of cefuroxime sodium with meloxicam was also studied. Safety study of cefuroxime sodium with meloxicam was also conducted to evaluate any possible adverse effect on their long term simultaneous administration in barbari goats. In safety study, hematological and serum biochemical parameters were evaluated in goats.

Initially, the method for detection and quantification for cefuroxime sodium and meloxicam was developed by high performance liquid chromatography until a reproducible and distinguish chromatographic peak was visible in both standard and test sample. Both cefuroxime and meloxicam can qualitatively and quantitatively be estimated using this instrument. In pharmacokinetic study, the cefuroxime sodium was above the minimum inhibitory concentration for 1.5 h and 4h by intravenous and intramuscular route, respectively. On co-administration with meloxicam the peak concentration of cefuroxime sodium is reduced, although variable change observed in duration of action. The pharmacokinetic data shows the alteration in pharmacokinetic parameters on administration of meloxicam in all the three routes, i.e. intravenous, intramuscular and subcutaneous. Likewise the alteration in dose regimen was also observed in all the three administration routes. The dose regimen indicates the requirement to increase the dose of cefuroxime sodium on co-administration with meloxicam, however, the same was not observed by subcutaneous route.

STUDIES ON PREVALENCE, CHARACTERIZATION AND INHIBITORY POTENTIAL OF HERBS ON EXTENDED SPECTRUM BETA LACTAMASE *ESCHERICHIA COLI* IN BROILERS

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Arpita Shrivastav
(Researcher)

ABSTRACT

Studies on the prevalence of ESBL *E.coli* isolates along with the phenotypic and genotypic characterization of the positive isolates were undertaken in the 400 samples of caecal swabs collected randomly from 38 various poultry sale outlets and 10 poultry farms located at the various areas of Jabalpur. Out of 400 samples 135 samples were found to be ESBL *E.coli* positive and 265 samples were negative for the same giving a prevalence rate of 33.5%. For the phenotypic detection three standard methods used were CDDT, DDST and Ezy MIC strip method. Among the three methods CDDT method showed 100% prevalence and maximum sensitivity, DDST method gave isolation per cent of 85per cent and Ezy MIC strip method was found to be least sensitive with the isolation of 62 per cent. Comparative study of the three methods gave ($p<0.01$) a significant difference among each other with maximum sensitivity of CDDT method and minimum sensitivity of Ezy MIC strip method.

Genotypic characterization of the positive isolates were undertaken to see the presence of blaTEM, blaCTX and blaSHV genes through multiplex pcr assay. The genotypic prevalence was 19% .Among the three genes bla TEM was observed in 49 samples(prevalence of 64.47%). Out of 76 samples 15 samples were positive for blaCTX gene with a prevalence of 19.73%. Twelve samples showed the presence of both blaTEM and blaCTX gene giving a prevalence of 15.78% and lowest prevalence of **1.31%** for SHV alone and 2.63% in combination of blaTEM blaSHV genes ($p<0.01$) showing significant difference in the genotypic pattern..

In the present investigation inhibitory potential and per cent inhibition of beta lactamase enzyme with oil of *Syzygium aromaticum fruit* peel juice of *Punica granatum* and fresh leaves juice of *Ocimum sanctum* and one test drug Tazobactum was also undertaken by two methods. In iodometric method the inhibitory potential of oil of *Syzygium aromaticum was* 8.6± 0.28 (Mean±S.E.) and per cent inhibition was 22.9%,in case of fruit peel juice of *Punica granatum* and fresh leaves juice of *Ocimum sanctum* 11.1 ± 0.31(Mean±S.E.) .12.9% and 12.5± 0.33((Mean±S.E.) and 9.9 % of inhibition per cent,($p<0.01$) with maximum effect shown by *Syzygium aromaticum* and minimum effect by fresh leaves juice of *Ocimum sanctum.* Combination *of Syzygium aromaticum* and fresh leaves juice of *Ocimum sanctum* gave 10.4± 0.30(Mean±S.E.)and 28.75% of inhibitory potential and per cent inhibition respectively, where as combination of oil of *Syzygium aromaticum* and fruit peel juice of *Punica granatum* gave per cent inhibition 35.4% and inhibitory potential of 9.6 ± 0.29. *Punica granatum and Ocimum sanctum in* combination gave 12.3± 0.26 to 11.7±0.21 of inhibitoion zone with per cent inhibition of 21 to 27%. Combination of all the three herbs gave maximium per cent inhibition of 53.5% with zone of inhibition of 8.8 ± 0.41(mean ± S.E.)$p<0.01$ showing significant difference.

Inhibitory potential and per cent inhibition was also observed with colorimetric method using CENTA and NITROCEFIN as the chromogenic substrate at the wavelength of 405 and 486nm respectively. Oil of

Syzygium aromaticum showed maximium per cent inhibition and minimum absorbance value (0.4±0.02,28% and 0.41±0.03, 27) ($p>0.05$) with no significant difference with CENTA and NITROCEFIN was observed . *Punica granatum* and *Ocimum sanctum* gave absorbance value and per cent inhibition of 1.72±0.05,14.0and 1.73±0.05,13.9 and 2.03±0.02,10.0and 1.97±0.06,10.0 with CENTA and NITROCEFIN respectively. Combination of Oil of *Syzygium aromaticum and Punica granatum showed* 1.41±0.04,31.9 %,1.38±0.04,31% of per cent inhibition and *with Ocimum sanctum and* Oil of *Syzygium aromaticum* 1.80±0.05,14.5% and 1.76±0.06,14.2 of per cent inhibition was seen Ocimum sanctum and Punica granatum in combination gave 1.54±0.04 to 1.63±0.07 inhibitory potential and per cent inhibition of 11.95 to 11.83.Combination of all the herbs gave maximum effect in both CENTA and NITROCEFIN (0.26± 0.02,49%and 0.26±0.02, 48%) respectively.

Multi drug resistant profile of ESBL E.coli isolates were also observed against 15 antibiotics and found that ampicillin, cefixime , Ceftriaxone showed 100% resistance against the positive samples where as Cefoperazone, Cotrimoxazole, Cefuroxime showed resistance in more than 90% of the isolates. Tetracycline, ciprofloxacin, norfloxacin, netilmicin, gentamicin, levofloxacin showed resistance in almost 50% of the isolates. Chloramphenicol and colistin showed the minimum resistance against the isolates.

A surveillance of 10 poultry farms was also undertaken and information was gathered related to the use and misuse of antibiotics. Most of the farmers are using antibiotics for both prophylaxis as well as for the treatment purpose. Only 50% farmers are going for some alternative medicines in case of disease condition. Maximum farmers reported that medicines do not work in the disease condition even given in the high doses. This shows the presence of antibiotic resistance in healthy poultry. To overcome it, antibiotics should be used strictly for treatment purpose and herbs could be a better alternatives to antibiotics.

PHARMACOKINETICS AND SAFETY EVALUATION OF MOXIFLOXACIN IN COW CALVES

Dr. Neetu Rajput **Dr. Archana Raje**
(Advisor) **(Researcher)**

ABSTRACT

The present study was carried out to investigate the pharmacokinetics of moxifloxacin (5 $mg.kg^{-1}$ b.wt.) in healthy cow calves after i.v. and i.m. administrations. Based on these results, an appropriate dosage regimen of moxifloxacin was calculated for its clinical use in cow calves. In addition, safety assessment of moxifloxacin was also conducted following i.m. administration of moxifloxacin (5 $mg.kg^{-1}$ b.wt., repeated at 24 h interval) for 5 days in cow calves.

The concentrations of moxifloxacin in plasma were estimated at different time intervals by microbiological assay technique and the various pharmacokinetic parameters were calculated from plasma concentration-time data of moxifloxacin after its single dose i.v. and i.m. administration, by software PK solution (version 2.0) using non-compartmental method of analysis.

After a single i.v. administration of moxifloxacin in healthy cow calves, the peak plasma level was 11.6 ± 0.21 $\mu g.ml^{-1}$ obtained at 1 min and the drug was detected above MIC in plasma upto 4 h of injection. The $t_{1/2\alpha}$, $AUC_{0-\infty}$, Vd_{area}, $t_{1/2\beta}$ and Cl_B were 0.16 ± 0.02 h, 13.36 ± 0.286 $\mu g.ml^{-1}.h$, 1.35 ± 0.028 $L.kg^{-1}$, 2.50 ± 0.011 h and 0.375 ± 0.008 $L.kg^{-1}.h^{-1}$, respectively. Following single i.m. administration of moxifloxacin in healthy cow calves, the peak plasma level (4.01 ± 0.10 $\mu g.ml^{-1}$) was attained at 45 min and the drug was detected above MIC in plasma upto 6 h. The $t_{1/2\ ka}$, $AUC_{0-\infty}$, Vd_{area}, $t_{1/2\beta}$ and Cl_B were 0.470 ± 0.017 h, 11.27 ± 0.200 $\mu g.ml^{-1}.h$, 1.53 ± 0.021 $L.kg^{-1}$, 2.38 ± 0.025 h and 0.444 ± 0.008 $L.kg^{-1}.h^{-1}$, respectively. The systemic bioavailability of moxifloxacin was 88.14 ± 2.72 per cent, after i.m. injection.

On the basis of pharmacokinetic data, an appropriate dosage regimen of moxifloxacin to be repeated at 8 h intervals would be 6.21 followed by 5.53 $mg.kg^{-1}$ b.wt. and 7.82 followed by 7.06 $mg.kg^{-1}$ b.wt. by i.v. and i.m. route, respectively, in healthy cow calves.

There is no significant alteration in the values of haematological and serum biochemical parameters following multiple i.m. doses of moxifloxacin in cow calves. It indicated that its repeated a

DETERMINATION OF RESIDUES OF CHLORPYRIFOS AND CYPERMETHRIN IN MEAT, EGG AND FEED OF POULTRY

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(Advisor) **(Researcher)**

ABSTRACT

The present study was undertaken to determine the residues of chlorpyrifos and cypermethrin in meat, egg and feed of poultry. The surveillance study was conducted on the basis of questionnaire for using pesticides/insecticides at poultry farms (n=50) located in and around Jabalpur city. The study revealed that 68 per cent (n=34) poultry farmers were not using pesticides routinely, however 32 percent (n=16) poultry farmers were using insecticides as spray in and around flocks. However in agriculture chlorpyrifos and cypermethrin were predominantly used. The present study was therefore aimed to determine the residual concentration of chlorpyrifos and cypermethrin in meat, egg and feed samples of poultry. The effect of boiling on residual concentration of chlorpyrifos and cypermethrin in edible tissues of broiler chicken meat was also studied.

Sample operating procedure for quantification of chlorpyrifos and cypermethrin was developed, until a reproducible, accurate and distinguish chromatographic peak was obtained at lowest concentration in standard and fortified samples. The calibration curve was straight (linear) for chlorpyrifos and cypermethrin with 0.9998 and 0.9997 correlation coefficient, respectively. The limit of detection (LOD) for chlorpyrifos was found as 14.0 ppb and limit of quantification (LOQ) as 46.30 ppb whereas cypermethrin showed LOD as 18.0 ppb and LOQ as 59.50 ppb in fortified samples of meat, egg and feed.

A total of 150 meat samples including muscle, liver and kidney for each insecticide were analyzed by using UHPLC. The residual concentration of chlorpyrifos and cypermethrin was not detected in samples of muscle, liver and kidney. Similarly 150 egg samples analyzed for residual concentration of chlorpyrifos and cypermethrin, did not show residual concentration of the insecticides. A total 100 poultry feed samples were analyzed for residual concentration of chlorpyrifos and cypermethrin in which 7 samples were found positive for residual concentration of chlorpyrifos. Out of 7 positive feed samples of chlorpyrifos, 3 samples were detected above Maximum Residual Limit (MRL) as recommended by WHO/FAO Codex Alimentarius Commission. However the residual concentration of cypermethrin was not detected in feed samples.

The study was further extended to determine the effect of boiling on residual concentration of chlorpyrifos and cypermethrin in chicken meat samples. The findings revealed that the residual concentration of chlorpyrifos and cypermethrin was reduced to 93.34 per cent and 85.76 per cent, respectively. The boiling significantly reduced the residual concentration of both the insecticides in chicken meat samples.

"ANTIBACTERIAL ACTIVITY OF ENDOPHYTIC BACTERIA ISOLATED FROM *MORINGA OLEIFERA* (MUNGA) and *CYMBOPOGON CITRATUS* (LEMONGRASS) LEAVES"

Dr. R.K. Sharma **Ritu Raj Kewat**
(Advisor) **(Researcher)**

ABSTRACT

Over the period of time, the research on endophytes has taken a long leap but the basic definition given by various researchers remain more or less the same i.e. "Microbes that exist within the living tissues of plants intercellularly or intracellularly, at least for a part of their life cycle without causing any harm to their host are known as endophytes. Endophytes in Greek means "within plant" (Endo = within, Phytes = plants). The term endophyte was first coined by De Bary in 1866. The endophytic microorganisms can be bacteria, fungi, actinomycetes and form a range of relationships with host plant including symbiotic, mutualistic, commensalism, parasitic etc. The present study was conducted to isolate and identify endophytic bacteria from leaves of *Moringa oleifera* (Munga) and *Cymbopogon citratus* (Lemongrass) and *in vitro* antibacterial activity was observed on gram positive and gram negative bacteria.

Twenty leaves samples each from *Moringa oleifera* and *Cymbopogon citratus* were taken. The leaves were sterilized and incubated into King's B agar medium and then again sub-cultured into blood agar and then transferred into BHI broth. The morphological, biochemical and molecular characteristics of endophytic bacteria isolated from *Moringa oleifera* and *Cymbopogon citratus* were studied.

The growth characteristics of endophytic bacteria isolated from leaves of *Moringa oleifera* on King's B media were circular in shape with raised elevation on petri plate, margin of the colonies were entire, the surface of the growth was smooth, opaque and white in colour. The endophytic bacterial isolates from the leaves of *Cymbopogon citratus* were irregular in shape, flat elevation on petri plate, entire colony margins, the surface of the growth was smooth, opaque and white in colour.

The biochemical characterization of endophytic bacterial isolates had shown that all the endophytic bacterial isolates from *Moringa oleifera* and *Cymbopogon citratus* were catalase positive, oxidase positive and coagulase negative. Various other biochemical tests like VP (Voges Proskauer), ONPG (Ortho nitrophenyl β-galactoside), Urease, Arginine utilization and sugar utilization tests (Sucrose, Maltose, Lactose) were also conducted using identification test kit for all the endophytic bacterial isolates from *Moringa oleifera* and *Cymbopogon citratus*. The endophytic bacterial isolates from *Moringa oleifera* had shown positive reaction to ONPG, urease and sugar utilization tests and negative reaction to VP and arginine utilization tests. The endophytic bacterial isolates from *Cymbopogon citratus* had shown positive reaction to one of the sugar utilization test (Maltose) and negative reaction to VP, ONPG, urease and arginine utilization tests. Various enzymic activity tests were conducted and all the isolates had shown negative reaction to the enzymic activity tests.

Molecular characterization was done by Polymerase chain reaction for 16S rRNA gene which revealed that the endophytic bacterial isolates from *Moringa oleifera* and *Cymbopogon citratus* belongs to Xanthomonadales and Bacillales order, respectively. The predominant bacterial endophytes across *Moringa oleifera* were found to be *Stenotrophomonas pavanii* and that of *Cymbopogon citratus* were *Bacillus zhangzhouensis*.

The antibacterial activity was observed against *Bacillus cereus*, *Staphylococcus aureus*, *Streptococcus pyogenes*, *Escherichia coli*, *Klebsiella pneumoniae* and *Salmonella* Typhimurium. The endophytic bacteria isolated from *Moringa oleifera* had shown antibacterial activity as 75 per cent of isolates inhibited the growth of *Staphylococcus aureus* and 85 per cent of isolates inhibited the growth of *Salmonella* Typhimurium.

The endophytic bacteria isolated from *Cymbopogon citratus* presented antibacterial activity as 80 per cent of isolates inhibited the growth of *Staphylococcus aureus* and 85 per cent of isolates inhibited the growth of *Bacillus cereus*.

“STUDIES ON BIOENHANCING EFFECT OF PIPERINE ON PHARMACOKINETICS OF ENROFLOXACIN IN SIROHI GOATS”

Dr. Kshemankar Shrman **Prakash Singh**
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ABSTRACT

Enrofloxacin is a broad spectrum antibacterial agent related to second generation fluoroquinolones and is commonly used in veterinary medicine with good results in prophylaxis and treatment of bacterial infections. It is widely used in therapeutic practices due to its wide antibacterial spectrum (aerobic gram-negative and gram-positive bacteria and other pathogens such as mycoplasma, chlamydia and rickettsia). It is mainly indicated for gastrointestinal, urogenital, skin and respiratory tract infections in various domestic animal species. Bioavailability enhancing agent or bioenhancer are the agent that increases the bioavailability of drugs and nutrients. Bioenhancer reduces the doses and shortens the treatment duration thus reducing the chances of development of drug-resistance. Piperine is a pioneer alkaloidal component of *P. nigrum* and *P. longum*. Piperine is a pungent alkaloid and is main therapeutically active constituent of black pepper fruit

The present work was conducted to study pharmacokinetic interaction of the enrofloxacin (intramuscularly) with piperine and *Piper nigrum* (orally). Safety study of piperine was also conducted to evaluate any possible adverse effect on its long term administration in sirohi goats. In safety study, haematological and serum biochemical parameters were evaluated in goats.

Initially, the method for detection and quantification for enrofloxacin was developed by ultra high performance liquid chromatography until a reproducible and distinguish chromatographic peak was visible. In pharmacokinetic study, in comparison to enrofloxacin alone treated group, in enrofloxacin along with piperine and enrofloxacin along with *P. nigrum* (black pepper) treated group, the concentration was found to be reduced. More prominent reduction was seen in enrofloxacin along with *Piper nigrum* treated group. Significant reduction was seen in area under concentration curve, mean resistance time and elimination half life in piperine and *P. nigrum* along with enrofloxacin treated group.

Safety study reveled no significant alteration in important liver and kidney parameters, however, slight alterations were seen in eosinophil, lymphocyte and monocyte count in haematological study.

ANTI DIABETIC OF ABROMA AUGUSTA ULALKAMBAL AND POTENTILLA FULGENS BAJRADANTI IN STREPTOZOTOCIN INDUCED DIABETIC RATS

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(Advisor)

Neha Waskel
(Researcher)

ABSTRACT

The fulgens on streptozotocin induced (50 mg/kg b.wt., i.p.) diabetes in albino rats. The anti-diabetic activity of both indigenous plants was evaluated on the basis of body weight and biochemical alterations in streptozotocin (STZ) induced diabetic rats. In addition, acute toxicity study was also conducted to calculate the ALD_{50} of aq. and alc. exts. of *A. augusta* and *P. fulgens*. The ALD_{50} of *A.* augusta and *P. fulgens* were >1500 and >1250 mg/kg b.wt., respectively, orally in rats.

The study revealed that STZ produced a significant decrease in body weight from 186.7gm to 177.1 gm (day 14) which was maintained to 173.0 gm (day 21) and 167.1 gm (day 28) post treatment. Rats treated with aq. and alc. exts. of *A. augusta* and *P. fulgens* exhibited significant ($p<0.05$) increase in body weight on day 14 which was further increased on day 21 and returned to normal on day 28. Alc. exts. of indigenous plants showed more potent effect in terms of increase in body weight as compared to their respective aq. exts.

Similarly, STZ produced a significant rise in blood glucose level from 89.6 mg/dl to 294.9 mg/dl (day 0) which was maintained to 323.7 mg/dl (day 7), 333.7 mg/dl (day 14), 351.1 mg/dl (day 21) and 365.4 mg/dl (day 28) post treatment. Rats treated with aq. and alc. exts. of *A. augusta* and *P. fulgens* exhibited significant ($p<0.05$) reduction in hyperglycemia on day 7 which was further reduced on day 14 , day 21 and returned to normal on day 28 post treatment. The biochemical parameters namely, triglycerides, cholesterol, blood urea nitrogen and creatinine levels in serum were also found to be reduced significantly in rats treated with aq. and alc. exts. of *A. augusta* and *P. fulgens*. The reduction in the level of blood glucose, triglycerides, cholesterol, LDL, BUN and creatinine were more prominent in rats treated with alc. exts. of *A. augusta* and *P. fulgens* as compared to their respective aqueous extracts. The findings further revealed a significant rise in HDL in rats treated with aq. and alc. exts. of *A. augusta* and *P. fulgens*.

Based on the findings of the present study, it can be concluded that glibenclamide, a standard anti-diabetic drug, exhibited maximum anti-diabetic effect followed by alcoholic extracts of *A. augusta* and *P. fulgens* and lastly aqueous extracts of *A. augusta* and *P. fulgens* in albino rats against streptozotocin-induced diabetes.

"CLINICAL EVALUATION OF *ANNONA SQUAMOSA* (CUSTARD APPLE) AND COW URINE FOR WOUND HEALING IN DOGS"

Dr. Vidhi Gautam **Manish Kumar**
(Advisor) **(Researcher)**

ABSTRACT

A wound is defined as the disruption of the cellular and anatomic continuity of a tissue and may occur due to physical, chemical, thermal, microbial or immunological tissue trauma. Topical or oral antibiotics and chemotherapeutic agents can reduce wound infections, but they also carry certain limitation like destruction of tissue by irritation, allergy or development of resistant microbes. The fundamental principles of traditional Indian medicines successfully eliminate harmful side effects without losing beneficial medicinal properties.

The present study was undertaken for clinical evaluation of *Annona squamosa* (Custard apple) and cow urine for wound healing in dogs**.** The experiment was planned to isolate and identify *Staphylococcus aureus* from contaminated wounds of dogs presented at T.V.C.C., College of Veterinary Science and Animal Husbandry, Jabalpur (M.P). The antibacterial activity of *Annona squamosa* and cow urine ark was evaluated against isolated *Staphylococcus aureus* then the wound healing activity of *Annona squamosa* and cow urine ark was evaluated on contaminated wounds of dogs.

The study was undertaken in four groups of dogs consisting six in each group. Group 1 was kept as standard and the wounds were dressed with 5 per cent povidone iodine, in group 2 the wounds were dressed with 10 per cent aqueous extract ointment of *Annona squamosa,* in group 3 the wounds were dressed with cow urine ark and in group 4 the wounds were dressed with fresh leaves paste of *Annona squamosa*.

The collected swab sample were streaked on mannitol salt agar plates then the colour of mannitol salt agar was changed to metallic yellow colour which indicated the presence of *Staphylococcus* species. Biochemical characterization was done by using Hi Staph Identification Kit, where 14 samples were biochemically positive out of 15 gram positive samples.

In vitro antibacterial activity of *Annona squamosa* and cow urine ark against isolated *Staphylococcus aureus* was evaluated by antibiotic sensitivity test. *Annona squamosa* showed the zone of inhibition against the isolated *Staphyloccus aureus* but the zone of inhibition was lesser than standard antibiotic ciprofloxacin.

The wound healing activity of *Annona squamosa* and cow urine ark was evaluated on contaminated wounds of dogs. The granulation tissue score and contraction of wound area were studied by Visual Analog Score card. Clinically, the granulation tissue score and contraction of wound area was similar in group 1 and 2 followed by group 4. However, the granulation of tissue and contraction of wound area were very less observed in group 3 which was treated with cow urine ark.

The mean per cent healing of different treatment groups was 47.28, 49.25, 25.75 and 36.69 per cent for povidone iodine, 10 per cent ointment of *Annona squamosa*, cow urine ark and fresh leaves paste of *Annona squamosa* respectively on day 7 of treatment. The result showed non significant difference between group 1 and 2 which were treated with povidone iodine and 10 per cent ointment of *Annona squamosa* respectively. However the mean per cent healing of cow urine ark treated wounds was significantly lower than other treatment groups.

"EVALUATION OF PANCHGAVYA WITH *NIGELLA SATIVA* AND *ASPARAGUS RACEMOSUS* AS *IN VITRO* ANTIBACTERIAL AND GROWTH PROMOTER IN POULTRY"

Dr. Y.P. Sahni (Advisor)

Kamal Kishor (Researcher)

ABSTRACT

In recent times, the scientific research has received a great concern about the use of antibiotics as growth promoter in poultry which leads to emergence of multiple drug resistance. Panchgavya, formulation of cow milk, curd, ghee, urine and dung has been claimed as growth promoter. Similarly indigenous herbs like *Nigella sativa* and *Asparagus racemosus* have been recommended as growth promoter and antibacterial. The present study was conducted to investigate *in vitro* antibacterial and growth promoter activity of Panchgavya, *Nigella sativa* and *Asparagus racemosus* in poultry. The study was conducted on 96 healthy Narmada Nidhi day-old chicks, divided into 8 groups consisting 12 chicks with 2 replicates each. The diet of birds was supplemented with Panchgavya, *Nigella sativa* and *Asparagus racemosus* daily for 56 consecutive days.

The results indicated that Panchgavya, *Nigella sativa, Asparagus racemosus* and their combinations exhibited *in vitro* antibacterial activity against *Staphylococcus aureus, Bacillus cereus, Escherichia coli* and *Salmonella* Typhimurium. The bioactive components in *Nigella sativa* and *Asparagus racemosus* were analyzed using UHPLC which indicated chromatogram of Thymoquinone at retention time of 6.8 minutes with concentration of 1.43 mg/g of *Nigella sativa*. *Asparagus racemosus* depicted the presence of Shatavarin-IV at retention time of 3.7 minutes with concentration of 0.08 mg/g.

The study was further extended to evaluate the efficacy of Panchgavya, *Nigella sativa* and *Asparagus racemosus* on growth promoter, haematological and biochemical parameters in birds. The feed supplementation of Panchgavya, *Nigella sativa, Asparagus racemosus* and their combinations improved body weight, Total Erythrocytes Count and haemoglobin in birds. The total protein was also increased significantly with supplementation of Panchgavya, *Nigella sativa, Asparagus racemosus* and their combinations, however the serum cholesterol was reduced significantly with various treatments.

The cost economics of dietary supplementation of Panchgavya, *Nigella sativa* and *Asparagus racemosus* was calculated to be Rs. 59.90, 52.99 and 63.10 per kg body weight as compared to basal diet of Rs. 52.24 per kg body weight in birds.

It may be concluded that Panchgavya, *Nigella sativa, Asparagus racemosus* and their combinations exhibited *in vitro* antibacterial activity against gram positive and gram negative bacteria and their dietary supplementation for 56 consecutive days also improved overall growth performance in birds.

EFFECT OF HEPATIC DYSFUNCTION ON PHARMACOKINETICS AND DOSAGE REGIMEN OF CEFQUINOME IN GOATS

Dr. Neetu Rajput **Amit Kumar Pandey**
(Advisor) **(Researcher)**

ABSTRACT

The present study was carried out to investigate the pharmacokinetics of cefquinome (2 $mg.kg^{-1}$ b.wt.) in goat following its i.v. and i.m. administration and to investigate the effect of hepatic dysfunction on pharmacokinetics and dosage regimen of cefquinome (2 $mg.kg^{-1}$ b.wt.) in goats after i.v. administration. Based on these results, an appropriate dosage regimen of cefquinome was calculated for its clinical use in healthy and hepatic dysfunctioned goats.

The concentrations of cefquinome in plasma were estimated at different time intervals by microbiological assay technique and the various pharmacokinetic parameters were calculated from plasma concentration-time data of cefquinome after its single dose i.v. administration in healthy and hepatic dysfunctioned goats by two-compartment open model and after its i.m. administration in healthy goats by one- compartment open model.

After a single i.v. administration of cefquinome in healthy goats, the peak plasma level was 14.99 ± 0.23 $\mu g.ml^{-1}$ obtained at 1 min and the drug was detected above MIC in plasma upto 18 h of injection. The $t_{1/2\alpha}$, AUC, Vd_{area}, $t_{1/2\beta}$ and Cl_B were 0.20 ± 0.01 h, 38.04 ± 0.72 $\mu g.ml^{-1}.h$, 0.23 ± 0.01 $L.kg^{-1}$, 3.00 ± 0.05 h and 0.053 ± 0.01 $L.kg^{-1}.h^{-1}$, respectively. Following single i.m. administration of cefquinome in healthy goats, the peak plasma level (8.64 ± 0.11 $\mu g.ml^{-1}$) was attained at 1 h and the drug was detected above MIC in plasma upto 12 h. The $t_{1/2\ ka}$, AUC, Vd_{area}, $t_{1/2\beta}$ and Cl_B were 0.24 ± 0.01 h, 25.25 ± 0.22 $\mu g.ml^{-1}.h$, 0.24 ± 0.01 $L.kg^{-1}$, 2.13 ± 0.03 h and 0.080 ± 0.01 $L.kg^{-1}.h^{-1}$, respectively.

After a single i.v. administration of cefquinome in hepatic dysfunctioned goats, the peak plasma level was 13.09 ± 0.11 $\mu g.ml^{-1}$ obtained at 1 min and the drug was detected above MIC in plasma upto 8 h of injection. The $t_{1/2\alpha}$, AUC, Vd_{area}, $t_{1/2\beta}$ and Cl_B were 0.15 ± 0.01 h, 25.55 ± 0.39 $\mu g.ml^{-1}.h$, 0.22 ± 0.01 $L.kg^{-1}$, 1.90 ± 0.05 h and 0.078 ± 0.01 $L.kg^{-1}.h^{-1}$, respectively. The AUC and $t_{1/2\beta}$ were significantly decreased and the Cl_B is significantly increased in hepatic dysfunctioned goats as compared to healthy goats following i.v. administration.

On the basis of pharmacokinetic data, an appropriate dosage regimen of cefquinome to be repeated at 12 h intervals would be 0.92 followed by 0.87 $smg.kg^{-1}$ b.wt. and 3.05 followed by 3.00 $mg.kg^{-1}$ b.wt. for i.v. and i.m. route, respectively, in healthy goats while the dosage regimen of cefquinome to be repeated at 10 h interval would be 2.13 followed by 2.07 $mg.kg^{-1}$ b.wt. for i.v. route, in hepatic dysfunctioned goats.

VETERINARY PARASITOLOGY

HAEMOPROTOZOAN INFECTIONS WITH SPECIAL REFERENCE TO TRYPANOSOMOSIS AND ITS MOLECULAR DIAGNOSIS IN DAIRY ANIMALS

Dr. G. Das **Vivek Agrawal**
(Advisor) **(Researcher)**

ABSTRACT

A total of 291(138 cattle and 153 buffaloes) dairy animals were screened for haemoprotozoan infections over a period of 12 months from January 2015 to December 2015 in and around Jabalpur. Out of these dairy animals, 86(29.55%) were found positive for haemoprotozoan infections. Overall prevalence of *T. annulata*, *T. evansi*, *B. bigemina* and mixed infection of *T. annulata* with *T. evansi* was found to be as 14.43, 13.40, 1.72 and 2.06%, respectively. The prevalence of haemoprotozoan infections was 39(28.26%) in cattle and 47(30.72%) in buffaloes. However, the prevalence of *T. annulata* was significantly higher ($p<0.05$) in cattle (20.29%) as compared to buffaloes (9.15%) whereas, revderse trend was observed in *T. evansi* where significantly higher ($p<0.01$) prevalence was observed in buffaloes (20.26%) as compared to cattle (5.80%). There was highly significant difference ($p<0.01$) in the prevalence of haemoprotozoan infections between clinically suspected (36.99%) and non clinical (18.64%) dairy animals. Also a significantly higher ($p<0.01$) prevalence of *T. annulata* was recorded in clinically suspected animals (20.23%) as compared to non clinical animals (5.93 %). In male (3.75%), significantly ($p<0.01$) lower prevalence of haemoprotozoan diseases was recorded as compared to the female (39.34%) animals. The same pattern has been recorded in theileriosis and trypanosomosis also. Like-wise statistically significant ($p<0.01$) effect of seasons [monsoon (59.22%), summer (23.33%) and winter (1.56%)] on prevalence of haemoprotozoan infections in dairy animals was seen. Similarly, animals above 5 years of age (53.85%) were having significant ($p<0.01$) effect on prevalence of haemoprotozoan infections in dairy animals as compared to animals below 5 years of age (30.29%). Prevalence of haemoprotozoan infections in pregnant dairy animals was significantly ($P<0.01$) higher as compared to non-pregnant (67.65 vs 30.19%) animals. Further prevalence of haemoprotozoan infections in 0-2 months post partum animals (43.40%) was higher than that recorded in more than 2 month post partum animals (14.29%), with statistically significant ($P<0.01$) difference.

PCR conditions were standardized with parasitologically positive blood sample for *T. evansi, T. annulata and B. bigemina* to amplify the 227bp, 721bp and 278bp fragment, respectively.

It has been found that the predominant clinical signs observed in *T. evansi* infected animals were reduced milk yield (100%), anorexia (95.24%), anaemia (90.48%), excitement (85.71%), respiratory distress (71.43%) and fever (61.90%). While predominant clinical signs observed in *T. annulata* infected animals were tick infestation (100%), reduced milk yield (100%), swollen pre scapular lymph node (93.33%), fever (86.67%) and anorexia (63.33%).

Out of 291 blood samples screened, significantly ($p<0.01$) higher percentage of animals were diagnosed positive for *T. evansi* with PCR (13.40%) followed by BCT (4.47%), blood smear (4.12%) and WBF (1.03%). Similarly, for *T. annulata* also significantly ($p<0.01$) higher percentage was diagnosed positive by PCR (14.43%) than smear method (5.8%). Like wise blood smears revealed 0.34% animals positive for *B. bigemina* but when the total samples were subjected to PCR, 1.72% were found to be positive for *B. bigemina* infection. Sensitivity and specificity of WBF (7.69% and 100%), BCT (33.33% and 100%) and blood smear (30.76% and 100%) of *T. evansi*, BS of *T. annulata* (40.47% and 100%) and BS of *B. bigemina* (20.00% and 100%) was also recorded in the present study and it was observed that PCR is more sensitive than the conventional method of examination.

DETECTION OF BENZIMIDAZOLE RESISTANCE IN *HAEMONCHUS CONTORTUS* OF GOATS

Dr. G. Das **Alok Kumar Dixit**
(Advisor) **(Researcher)**

ABSTRACT

In the present investigation, out of the total 2441 goats examined, 2189 (89.68%) were positive for gastrointestinal parasites. Among various infections, maximum prevalence was of coccidia (77.67%) followed by strongyles (41.21%), *Moniezia* spp. (14.58%), amphistomes (10.57%), *Trichuris* spp. (4.75%), *Strongyloides* spp. (1.15%) and *Fasciola gigantica* (0.57%). The overall prevalence of nematodes (47.12%) was significantly higher ($p<0.01$) as compared to trematodes (11.15%) and cestodes (14.58%) at Jabalpur. When prevalence was compared in goats maintained at field and farm conditions, significantly higher infection ($p<0.01$) was observed at farm (92.10%) as compared to field (82.75%) conditions. Strongyle, *Trichuris* spp. and coccidia were also significantly higher at farm as compared to field whereas amphistomes were significantly higher ($p<0.01$) at field as compared to farm. Year wise prevalence at Jabalpur revealed that a decreasing trend was observed in overall prevalence rate of gastrointestinal parasites as well as in coccidia and *Fasciola gigantica* infections whereas increasing trend was observed in amphistomes. Significantly higher ($p<0.01$) parasitic infections were observed at Jabalpur in winter (94.91%) and summer (90.41%) season as compared to monsoon (85.77%). Strongyle infections were maximum in winter (58.95%) followed by monsoon (40.63%) and summer (29.24%). The seasonal difference in prevalence was also significant ($p<0.01$). Significantly higher ($p<0.01$) *Trichuris* spp. were observed in winter (7.39%) season as compared to summer (4.56%) and monsoon (3.28%). Amphistomes were significantly higher ($p<0.01$) in summer (18.83%) season as compared to winter (6.40%) and monsoon (5.94%). *Moniezia* spp. was maximum in monsoon (18.42%) followed by summer (13.57%) and winter (9.85%). The seasonal difference in prevalence was also significant ($p<0.01$). Significantly higher ($p<0.01$) coccidial infections were observed in winter (86.21%) season as compared to summer (77.43%) and monsoon (72.57%). Overall agewise prevalence at Jabalpur revealed that the gastrointestinal parasitic infection was slightly higher in adults (89.76%) than in young animals (89.22%). However the difference in prevalence was not statistically significant. Significantly higher ($p<0.01$) *Moniezia* infection was observed in kids whereas strongyles were significantly higher in adults**.** Significantly higher ($p<0.05$) *Trichuris* infection was also observed in kids (10.86%) as compared to adults (6.36%) under farm conditions.

The results of FECRT revealed that *Haemonchus contortus* of goats of Amanala farm, Jabalpur were resistant to fenbendazole, while there was no evidence of resistance to closantel and doramectin. The yield of aqueous leaf extract from *Azadirachta indica, Annona squamosa* and *Nicotiana tabacum* was 21.96%, 34.21% and 68.19%, respectively. Compared with controls, no significant reductions in FEC were observed for any of the groups treated with herbal anthelmintics 10th day post-treatment. EHA revealed an ED50 value of 0.335 µg thiabendazole/ml which confirmed resistance to benzimidazoles.

The nested PCR amplicon size was about 820 bp and the *Rsa*I RFLP digested fragments showed major fragments of 550 bp, 170 bp and 100 bp. Amplification of nested PCR amplicon with *Haemonchus* specific primers in allele specific PCR confirmed the species as *H. contortus.* The results of allele-specific PCR (AS-PCR) showed that 62% of *H. contortus* larvae were homozygous resistant (rr), 24% heterozygous (rS) and 14% homozygous susceptible (SS). The genotypic frequencies of three genotypes (rr, rS and SS) were significantly ($p<0.01$) different. The prevalence of benzimidazole resistance allele (r) was also significantly ($p<0.01$) higher (74%) as compared to susceptible allele (S) (26%). The results of our study indicated that in organised farm due to frequent use of BZ group of drugs, resistant population is increasing and susceptible population is decreasing. Heterozygous population has also increased drastically and in due course of time, completely resistant population may develop. The suitable measures like targeted selective treatment (TST) by applying FAMACHA need to be implemented urgently to minimise spreading of anthelmintic resistance.

STATUS OF GASTORINTESTINAL NEMATODES AND ANTHELMINTIC RESISTANCE IN GOATS

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(Advisor)

Priyana Shakya
(Researcher)

ABSTRACT

Gastrointestinal parasitism in animals is a common and one of the major problems in India causing recurring economic losses to livestock production system. For treatment of these parasites, anthelmintics are widely used but anthelmintic resistance is being reported from different parts of the country. Although several reports are available from different parts of country, but reports on anthelmintic resistance are lacking from Malwa region of Madhya Pradesh. Therefore, the present study was designed with the objective to study the incidence of gastrointestinal nematodes of goats in and around Mhow and assess the status of anthelmintic resistance in goats..

The present investigation was carried out for a period of nine months. Every month, 100 faecal samples of goats were collected from Mhow and its adjoining areas. In order to analyse the status of resistance against albendazole, levamisole and ivermectin, faecal egg count reduction test was performed in goats naturally infected with gastrointestinal nematodes.

Faecal sample examination of goats revealed the incidence of strongyle, *Strongyloides papillosus*, *Tricihuris* spp. and mixed infection from the study area. Highest infection of gastrointestinal nematodes was evidenced in the month of July with highly significant variation in month-wise incidence. Similarly, highest incidence was witnessed in monsoon followed by summer and winter seasons with highly significant difference in season-wise incidence. Significantly higher infection rate was documented in >1 year-old-goats than <1 year-old-goats. Non-significantly higher infection was noted in females than that of males.

Findings of faecal egg count reduction test revealed, gastrointestinal nematodes of goats from the study area have developed resistance against levamisole and albendazole while ivermectin was found to be cent per cent effective against these worms.

STUDIES ON BENZIMIDAZOLE RESISTANCE IN GASTROINTESTINAL NEMATODES OF GOATS

Dr. G. Das **Kusum Lata**
(Advisor) **(Researcher)**

ABSTRACT

The present investigation was undertaken to study the prevalence of gastrointestinal parasites in goats of Jabalpur**,** prevalence of Benzimidazole resistance in gastrointestinal nematodes of goat in and around Jabalpur and to know the efficacy of *Azadirachta indica* (Neem) seed powder, Fenbendazole with Piperonyl Butoxide and Methimazole.

Out of 1675 faecal sample of goats examined, 1224 (73.07%) were found positive for different gastrointestinal parasites. The maximum prevalence recorded was of Strongyles (61.43%) followed by Coccidia (25.97%), Amphistomes (9.73%), *Moniezia expansa* (8.66%), *Trichuris sp.* (2.03%), *Strongyloides sp.* (1.79%) and *Fasciola gigantica* (0.66%)**.** When prevalence was compared in goats maintained at field and farm conditions, significantly higher infection (P<0.01) was observed at farm (85.90%) as compared to field (67.22%) conditions. Age wise prevalence at Jabalpur revealed that the infection was higher in adults (73.83%) than in young goats (69.71%). Overall age specific species prevalence showed strongyles infection was significantly higher (P<0.01) in adult (64.25%) as compared to young (48.86%) whereas Coccidia and *Moniezia expansa* infection was observed significantly high in kids than adult goats. Significantly higher infection (P<0.01) were observed in monsoon (81.20%) and post-monsoon (76.66%) seasons as compared to spring (62.60%) and winter (59.47%) seasons. Strongyle infections were significantly higher (P<0.01) in post-monsoon (69.69%) and monsoon (68.74%) seasons. In field condition, *Strongyloides* and coccidia were significantly high (P<0.01) in monsoon 4.48 and 30.12 per cent, respectively, whereas non-significant in farm condition. Intensity of strongyle infection (EPG) was higher in August (1204.6) followed by September (990) and lowest in the month of January (163.1). Coproculture revealed generic composition of infective nematode larvae in goats of Jabalpur was highest for *Haemonchus* (50.18%), followed by *Trichostrongylus* (29.80%) and *Strongyloides* sp. (10.71%).

Prevalence of benzimidazole resistance was detected by using *in-vivo* FECRT, revealed goats reared in farm condition were resistance to BZ anthelmintic as compared to field. The percent reduction in FEC of Adhartal and Amanala farm was 67.97% and 76.00%, respectively which was less than 95% as well as their lower confidence limits were also below 90% which indicated resistance. Faecal culture revealed *Haemonchus contortus* was the major nematode exhibiting resistance. *In-vitro* EHA showed resistance in strongyles of farm as compared to field conditions. Log probit analysis revealed ED_{50} value of 0.238 µg TBZ/ml in Amanala farm and 0.149 µg TBZ/ml in Adhartal farm confirmed the existence of BZ resistant nematodes. EHA in field conditions observed ED_{50} value of less than 0.1µg TBZ/ml which shows benzimidazole drugs were effective in goats of field conditions.

In order to study the comparative efficacy, Group-I and II were treated with neem seed powder @ 2 g/kg b.wt. and 4 g/kg b.wt. single dose orally, respectively with mean EPG on day 0 was 1500±323 and it increased on 10th day to 2000±532 whereas in Group-II, the mean EPG on day 0 was 1442.85±374 and it reduced to 1171.4±448. The rates of reduction were 0 and 20.4%, respectively which revealed slight efficacy of this dose in Group-II goats. Group-III and Group-IV goats were treated with FBZ+PBT @ 7.5mg/kg and 63 mg/kg b.wt. and FBZ+MTH@ 7.5mg/kg and 3 mg/kg b.wt., respectively. The mean EPG of Group-III and Group-IV on day 0 was 1671.43±337 and 1628.57±297 whereas on day 10 it reduced to 28.57±18 and 657.14±266, respectively. The rates of reduction was higher for Group-III with 98.5% FECR as compared to Group-IV and Group-V with 65.6% and 80.60%, respectively indicated high efficacy of FBZ+PBT combination against gastrointestinal nematodes resistance to only Fenbendazole treatment.

Observation on *In vitro* egg hatch assay (EHA) corroborating with the results of FECRT. ED_{50} for egg hatch of Group-IV and Group-V was 0.458 and 0.445 µg TBZ/ml, indicating BZ resistance. No strongyle eggs were detected in 10th day faeces after treatment with Group-III *i.e*, FBZ and PBT combination, showed high efficacy.

Larval compositions of gastrointestinal nematodes in pooled faecal samples of goats receiving different treatment subjected to FECRT revealed dominant nematode exhibiting resistance was *Haemonchus* sp. followed by *Trichostrongylus* sp. *and Strongyloides* sp.

To conclude, prevalence of gastrointestinal parasites was significantly higher under farm than in field, seasonal prevalence was significantly higher in monsoon and post monsoon season, prevalence of BZ resistance was detected against gastrointestinal nematodes of goats in farm conditions and *Haemonchus*, *Trichostrongylus* and *Strongyloides* sp. were the nematode exhibiting resistance, Gastrointestinal nematodes, resistance to BZ group of anthelmintic can be successfully treated by combination of Fenbendazole and Piperonyl Butoxide

"EVALUATION OF THE EFFECT OF SARACA ASOCA BARK AND AZADIRACHTA INDICA SEEDS AGAINST GASTROINTESTINAL NEMATODES OF GOATS"

Dr. G. Das **Siddhant Bendigeri**
(Advisor) **(Researcher)**

ABSTRACT

Anthelmintic resistance is an emerging issue in modern times owing to the relentless use of synthetic anthelmintics. The use of herbal anthelmintics has therefore gained momentum in order to combat this issue of resistance.

Bark of *Saraca asoca* and seeds of *Azadirachta indica* were collected, dried and ground into crude powder. Aqueous and methanolic extracts of the powder were made. Trichostrongylid eggs were isolated from anaerobically collected faecal samples for egg hatch assay (EHA) using various concentrations of the extracts. Aerobically collected faecal samples were cultured and strongyle larvae were recovered for larval paralysis test (LPT). Adult mortality test (AMT) was performed on adult *Haemonchus contortus*, collected from gastrointestinal (GI) tracts of slaughtered goats using various concentrations of the extracts. For *in-vivo* trials, goats having EPG ≥ 300 were divided into 7 groups. Groups I and IV were treated with crude powder of *S. asoca* bark and *A. indica* seeds, respectively whereas groups II and III were treated with aqueous and methanolic extracts of *S. asoca* bark, respectively. Groups V and VI were treated with aqueous and methanolic extracts of *A. indica* seeds, respectively. Group VII was kept as control. Faecal egg count reduction test (FECRT) was performed to assess the *in-vivo* anthelmintic efficacy of selected plant materials. Phytochemical analysis was performed on the extracts to detect phytoconstituents.

In EHA, aqueous extracts of *S. asoca* bark and *A. indica* seeds gave better ED50 value (ED50=0.156 and 0.344 mg/ml, respectively) than methanolic extracts (ED50=0.357 and 0.638 mg/ml, respectively). In case of both the plants, aqueous extracts showed better efficacy at lower doses than methanolic extracts in EHA. In LPT, methanolic extracts of *S. asoca* and *A. indica* gave better ED50 value (ED50=0.552 and 0.398 mg/ml) than aqueous extracts (ED50=3.050 and 0.605 mg/ml). In case of both the plants, methanolic extracts showed better efficacy at lower doses than aqueous extracts in LPT. In AMT, *S. asoca* bark showed an overall percent corrected mortality of 66.43% whereas *A. indica* seeds showed an overall percent corrected mortality of 57.14% against adult *H. contortus*. In *in-vivo* study, highly significant reduction ($p<0.01$) in faecal egg count was observed in groups III (75.00%), V (77.42%) and VI (65.63%) on days 14, 21 and 14, respectively. Moreover, significant reduction ($p<0.05$) in faecal egg count was also observed in groups III, IV, V and VI. The extractability of *S. asoca* bark aqueous and methanolic extracts was 3.72% and 4.29%, respectively, whereas that of *A. indica* seeds was 11.95% and 6.14%, respectively. Phytochemical study revealed the presence of reducing sugars, tannins, saponins and fixed oils in the aqueous and methanolic extracts of *S. asoca* bark, whereas, the methanolic extract had alkaloids as an additional component. The aqueous and methanolic extracts of *A. indica* seeds revealed the presence of alkaloids, tannins and sterols as common constituents, whereas, the methanolic extract had resins and flavonoids as additional components.

In conclusion, the aqueous extracts of both *S. asoca* bark and *A. indica* seeds showed better egg hatch inhibition than methanolic extracts whereas the methanolic extracts showed better efficacy against larvae than the aqueous extracts. The methanolic extracts of *S. asoca* bark and *A. indica* seeds showed better effect on adult *H. contortus* worms *in-vitro* than their aqueous counterparts. Goats treated with aqueous extract of *A. indica* seeds and methanolic extracts of *S. asoca* bark and *A. indica* seeds showed significant reduction in faecal egg count. These extracts are therefore promising in the treatment of GI nematodosis in goats.

"EPIDEMIOLOGICAL STUDIES ON GASTROINTESTINAL PARASITES IN BUFFALOES WITH SPECIAL REFERENCE TO AMPHISTOMES"

Dr. Vivek Agrawal **Rakesh Singh Yadav**
(Advisor) **(Researcher)**

ABSTRACT

Twenty faecal samples of buffaloes were collected every month from different regions of Malwa viz. Indore, Dhar, Jhabua, Dewas, Ujjain, Ratlam, Shajapur and Agar in M.P. from July 2018 to February 2019 i.e. total 1280 faecal samples in an individually labeled polythene bags and were carried to the laboratory for further study and also separately twenty faecal samples of buffaloes were collected randomly from slaughter house Mhow every month i.e. total 160 samples during eight month of study. Hence total 1440 faecal samples were collected from different district of Malwa and slaughter house, collectively. Overall prevalence of gastrointestinal parasites was 35.63% and 38.13% in different district of Malwa region and slaughter house of Mhow, respectively.

The overall prevalence of GIP in different district of Malwa recorded in July, August, September, October, November, December, January and February was 45.63%, 43.13%, 39.38%, 36.63%, 33.13%, 36.25%, 17.50% and 34.38%, respectively. The highly prevalent gastro-intestinal parasite was strongyle (12.27%) followed in order by *Eimeria* spp. (7.58%), amphistomes (6.95%), *Fasciola* spp. (5.31%), *Toxocara* spp. (4.45%) *Moniezia* spp. (2.27%), *Trichuris* spp. (1.48%) and *Strongyloides* spp. (0.78%). In month of July, August, September, October, November, December, January and February prevalence of strongyles was recorded to be i.e.14.38%, 13.13% , 10.63%, 12.50%, 10.63%, 16.25%, 8.13% and 12.5%, respectively. While in the month of July prevalence of amphistomes (10.00%) was found to be highest. Least prevalence was recorded in the month of January that of strongyle (8.13%) followed by *Fasciola* spp. (6.88%), amphistomes (1.88%), *Toxocara* spp. (1.88%), *Moniezia* spp. (1.88%), respectively. Prevalence rate of GIP was significantly ($p<0.01$) higher during the monsoon season (42.71%) followed by the post monsoon (34.38%) and winter (29.38%) seasons. Sex do not have significant influential role in the prevalence of GI Parasites but apparently higher percentage of infection was recorded in males (41.22%) than females (34.99%). The prevalence of *Strongyloides* spp. (0.78% Vs 0.76%), amphistomes (6.96% Vs 6.87%) and *Fasciola* spp. (5.57% Vs 3.05%) was higher in female than male. A significant ($P<0.05$) relationship between age group and prevalence of parasitism was observed in the present study. The results indicated overall higher prevalence rate in adults than young buffaloes. While *Toxocara* infection and coccidiosis were significantly higher in young ones than adults and *Toxocara vitulorum* ova were exclusively identified in below-one-year age buffaloes. The overall prevalence (42.50%) of GIP was recorded significantly high ($p<0.05$) in Ratlam district. Prevalence of strongyle (15.63%) was non significantly higher in Jhabua while prevalence of amphistomes (11.88%) and *Fasciola* (10.00%) were significantly ($p<0.01$) high in Sajapur district. *Eimeria* spp. (14.38%) was significantly ($P<0.05$) high in Agar district. The overall prevalence (38.13% % Vs 35.63%) was higher in slaughter house than district of Malwa. No *Toxocara* egg was reported from slaughter house. The prevalence of *Eimeria* (7.58% % Vs 6.88%) was higher in district of Malwa than slaughter house. The EPG/OPG in most

of the fecal samples was in the range of 100-300. The EPG in the most of the studied animals indicated moderate infection that warrants treatment. Different genera of strongyle species found in buffaloes in descending order of their prevalence were *Haemonchus* spp. (82.54%), *Trichostrongylus* spp. (8.36%), *Oesophagostomum* spp. (4.26%), *Nematodirus* spp. (2.31%), Cooperia spp. (1.43%) and *Ostertagia* spp. (1.10%). Two genera of amphistome found in buffaloes in descending order of their prevalence were *Paramphistomum cervi* (53.24%) and *Cotylophoron cotylophoron* (46.67%). The infected buffaloes in this study showed a highly significant reduction ($p<0.01$) in the mean Hb (8.6±0.15 vs 10.6±0.14), TEC (4.4±0.04vs 5.2±0.06) and PCV (26.6±0.25vs 31.6±0.34). There was a significant increase ($p<0.05$) in the neutrophils count (30.7±0.20 vs 30±0.20) and highly significant increase ($p<0.01$) in eosinophil count (2±0.09vs 1.4±0.09) of infected buffaloes as compared to the non-infected buffaloes. The total leukocyte (8.3±0.08vs 8.1±0.08), monocyte (5.8±0.24vs 5.7±0.23) count and basophil counts (0.3±0.07vs 0.3±0.06) increased non-significantly in infected buffaloes. Lymphocyte count (61.3±0.36vs 62.7±0.35) decreased non significantly in infected buffaloes. There was no significant change in the values of basophil counts (0.3±0.07vs 0.3±0.06) of control (apparently healthy) and infected buffaloes. Widespread destruction of the stratum cornium with thickening and cellular infiltration in the underlying layers in rumen where the amphistomes were associated with the mucosal wall. Necrosis, sloughing and some hypertrophy of the stratum cornium was also observed in the mucosal wall of the rumen.

VETERINARY MICROBIOLOGY

ISOLATION AND MOLECULAR CHARACTERIZATION OF *STAPHYLOCOCCUS AUREUS* IN BOVINE MILK IN AND AROUND JABALPUR.

Dr. (Mrs.) Varsha Sharma
(Advisor)

Neeraj Shrivastava
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ABSTRACT

Staphylococcus aureus (*S. aureus*) is a commensal and opportunistic pathogen of bovines. It is the major cause of mastitis. *S. aureus* is a clonal bacteria with strain variations responsible for differences in transmissibility, persistent infections and zoonotic potential. *S. aureus* mastitis incurs significant loss to dairy industry worldwide as it difficult to treat and control.

To study the prevalence of clinical and subclinical mastitis in bovines a total of 721 bovines (cow = 111 and buffaloes = 610) were screened using California mastitis test (CMT) and culture method. On screening of the 188 mastitis quarter/composite milk samples for staphylococci a prevalence of 63.55% and 86.42% of clinical and subclinical mastitis was respectively found in bovines.

To study the phenotypic and genotypic characterization of *S. aureus* in bovine milk, a total of 400 bovine milk samples (188 quarter/composite milk and 212 pooled milk) were screened by bacterial culture method. A total of 191 presumptive *S. aureus* isolates were further characterized. In the *S. aureus* isolates α-haemolysis was the predominant haemolytic pattern in Sheep blood agar. The genotypic characterization of 191 *S. aureus* isolates revealed that all the isolates (100%) were positive for *spa* and *nuc* gene. None of the isolates were positive for *mecA* and *pvl* gene.

To study the prevalence of MRSA in bovine milk a total of 400 bovine milk samples were screened for MRSA. A total of 57 presumptive MRSA isolates were characterized for species identification and methicillin resistance. In case of MRSA the β-haemolysis was found in 50.88% of the isolates whereas 24.56% isolates showed both α and β-haemolysis. All the isolates (100%) were positive for *spa* and *nuc* gene while only 15.78 % of isolates carried *pvl* toxin gene. A total of 94.73 % were resistant to cefoxitin (30 µg) in disk diffusion assay while 100 % isolates were positive for Penicillin Binding Protein 2a (PBP2a) in LAT. All the isolates carried *mecA* gene as detected by PCR. A prevalence of 14.25% of MRSA was found in bovine milk.

The molecular epidemiology of *S. aureus* isolates was studied by spa typing using Ridom StaphType software version 2.2.1 and BURP analysis was done to determine clonal relatedness of the studied population of 80 *S. aureus.* (37 MRSA + 43 MSSA) isolates. A total of 26 spa types were determined in studied population. Three new spa types t15515, t15871 and t15889 were deposited in the ridom spaserver. The BURP analysis showed that the genetic diversity was more in MRSA population as compared to the MSSA population which was more homogenous and about 50% strains clustered in one spa-clonal complex 7867/2700/4522.

The multi-drug resistance profile of 57 MRSA and 124 MSSA isolates was studied using the recommended panel of 12 anti-microbial agents by disk diffusion assay. All the 57 MRSA isolates were multi-drug resistant by virtue of being resistant to methicillin. Nearly half of the MRSA isolates had intermediate resistance to erythromycin whereas resistance to ciprofloxacin, co-trimoxazole and gentamicin was also high. All the MRSA isolates (100%) were found to carry *blaZ* gene by PCR. A third of the MSSA isolates were pansusceptible for all the 12 anti-microbial agents studied. However, a high proportion of 84.82% were shown to carry *blaZ* gene which is linked to persistent infection and poor prognosis.

ISOLATION AND IDENTIFICATION OF *SALMONELLA* SPECIES OF POULTRY FROM AGROCLIMATIC ZONE V OF MADHYA PRADESH

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ABSTRACT

Poultry are the important reservoir of many zoonotically important pathogens, of which *Salmonella* is of prime importance. Avian Salmonellosis is an important area of study as it not only affects the poultry industry but can also affect humans by consumption of contaminated poultry meat and eggs. In the past decade, there has been an increase in the incidence of salmonellosis in poultry. It causes a large group of acute and chronic diseases in fowls and is the most important cause of mortality and morbidity in poultry birds. Present study was conducted with the objectives of phenotypic and genotypic characterization of *Salmonella* species by conventional and molecular methods and to evaluate biofilm forming capability and antibiotic sensitivity of these organisms.

During the present study a total of 721 samples consisting of cloacal swab, dry faeces, feed, water and egg shells of poultry viz. broilers (297), layers (316) and breeders (108) of all the three seasons from agroclimatic zone V of Madhya Pradesh were collected. For phenotypic isolation of *Salmonella* organism, samples were inoculated in pre enrichment broth, followed by enrichment in Rappaport Vassilidis broth than selective plating on MacConkey agar, brilliant green agar and Xylose Lysine Deoxycholate agar. In Gram's staining pink colour coco bacilli were seen under oil emersion in bright field microscope. A total of 64 isolates were phenotypically characterized by motility, oxidase, catalase, indole, methyl red, Voges Proskauer, triple sugar iron agar, urease and later confirmed by latex agglutination test. All the 64 isolates (100%) were positive for motility test. Biochemically they were detected as *Salmonella* species and further they were confirmed by latex agglutination test (100%). The incidence for Hoshangabad and Narsighpur disctricts were 9.04% and 8.60%, respectively. The overall incidence for agroclimatic zone V was 8.87%. While for broilers, layers and breeders incidence of salmonellosis was 9.09%, 8.54% and 9.20%, respectively. Genotypically these isolates were confirmed and characterized using polymerase chain reaction for four genes 16S rRNA, *inv*A, *Salmonella enterica* ser.Typhimurium and *Salmonella enterica* ser.Gallinarum-Pullorum. All the 64 isolates were positive for 16S rRNA (550 base pair) and *inv*A (284 base pair) gene. The percentage of *Salmonella enterica* ser.Typhimurium (433 base pair) were 70.31%. *Salmonella enterica* ser. Gallinarum-Pullorum (97 base pair) could not be recorded from any of our samples.

Biofilm facilitates the adherence of microorganisms to surfaces and protect them from host immune system. In the present study the 16S rRNA , *inv*A gene, *Salmonella enterica* ser.Typhimurium positive isolates were strongly biofilm producers (62.50 %, 62.50 % and 66.66 %). In antibiogram most resistant antibiotic for broiler, layer and breeder were norfloxacin (81.48%), ciprofloxacin (92.59%) and ampicillin/sulbactum (80%), respectively. Vancomycin was sensitive for all the cases.

The present study suggested that invasive bifilm producer *Salmonella enterica* ser. Typhimurium to be the prevalent serotypes of poultry circulating in the agroclimatic zones V of Madhya Pradesh. In antibiogram most resistant antibiotic for broiler, layer and breeder were norfloxacin (81.48%), ciprofloxacin (92.59%) and ampicillin/sulbactum (80%), respectively. Vancomycin was found to be the sensitive antibiotic for broilers, layers and breeders.

IMMUNOLOGICAL AND MOLECULAR INVESTIGATION OF CANINE PARVOVIRUS IN DOGS”

Dr. S.D. Audarya **Asha Kanesh**
(Advisor) **(Researcher)**

ABSTRACT

Canine population in the region suffered from gastroenteritis. Investigation was planned with following objectives: 1. To demonstrate h aemagglutination in faecal samples collected from dogs suspected for Canine parvoviral gastroenteritis. 2. Haematogical study of dogs suspected for Canine parvoviral gastroenteritis. 3. To detect Canine parvovirus infection by using molecular methods.

In the present study, a total 50 faecal samples/rectal swabs were collected from dogs in 5 ml of Phosphate buffer saline (1x) solution in sterile container. From these dogs, 5 ml of blood was collected aseptically in sterile vials containing anticoagulant. All the faecal samples/rectal swabs collected in the study were tested by using Haemagglutination (HA) test employing pig red blood cells. Blood samples were subjected to haematological study. Out of 50 samples tested in HA, 5 faecal samples were found positive for Canine parvovirus. HA titer of 5 positive samples ranged from 32 to 1024. Five CPV-2 positive dogs in the present study were ranging from 2 months to 1.5 years of age. Out of these five dogs positive for CPV-2 infection in HA, 3 were in between 3-6 months of age. From 33 male dogs in the study, 4 dogs were found positive in haemagglutination test for presence of Canine parvovirus infection. From 17 female dogs in the study, only 1 dog was found positive in haemagglutination test for presence of Canine parvovirus infection. Blood examinations and comparison in between CPV-2 positive and negative dogs in HA test revealed decrease in Haemoglobin concentration (in gm %) and Packed cell volume (PCV) of infected dogs. In Dfferential leukocyte count (DLC in %), Neutrophils, Monocyte and Eosinophils percentages were decreased. However, there was increase in Lymphocyte percentage. A molecular method was employed to detect the gene specific for CPV-2 (VP1/VP2 partial gene of 681 bp). Polymerase chain reaction confirmed the result of involvement of CPV-2 infection in dog suffering from gastroenteritis. The findings of the study will be helpful in understanding the epidemiology of the disease causing gastroenteritis in dogs and its management, prevention and control.

VETERINARY PATHOLOGY

"PATHOLOGICAL STUDIES ON SPONTANEOUS PASTURELLOSIS IN BUFFALO CALVES WITH SPECIAL REFERENCE TO LUNG LESIONS"

Dr. U. K. Garg **Arun Mishra**
(Advisor) **(Researcher)**

ABSTRACT

The present investigation was carried out to study the spontaneous occurrence of *Pasturellosis* in and around Mhow region of (M.P.). With its isolation, identification,incidence of *Pasturella* organism and to study the severity of this organism to cause disease and alteration in lung lesions with possible correlation to haematological and biochemical parameters.

Examination of 130 samples from buffalo calves revealed 4 positive samples of *Pasturella* after confirming through morphological, cultural and biochemical characteristics. On Gram's staining *Pasteurella multocida* appeared as Gram-negative, non-motile, non-spore forming short rod or coccobacillus. The incidence of infected animal from *Pasturellosis* in buffaloes calves in Mhow region was found to be 7.14%. The incidence of carrier animal of *Pasturellosis* was found to be 1.96%.

The clinical manifestations observed in Haemorrhagic septicaemia affected buffaloes included high rise of body temperature (106-107°F), dyspnoea, profuse salivation, nasal discharge, sub-mandibular oedema, respiratory rales and death within 24 hrs in untreated cases. In *Pasturellosis* infected buffalo calves there was increase in Total Leucocyte Count and increase in neutrophils percentage in Differential Leucocyte Count suggested bacterial infection. In biochemical study there was increase in SGOT level while SGPT and Serum Creatinine were within normal range. In carrier buffalo calves of *Pasturellosis*, haematological and biochemical parameter were within normal range.

There were widespread hemorrhages on the surface of the lung and mucous membrane of trachea. Oedematous swelling of the lungs was also found. There was fibrinous pneumonia with thickening of alveolar septa resulted marbling like appearance. Trachea was filled with froathy exudates mixed with blood which was extended to whole trachea.

Histopathology of lungs showed fibrinous pneumonia, congestion and haemorrhage and a variable amount of oedema with severe infiltration of neutrophils, lymphocytes, plasma cells and oat cells. There was hemorrhages noticed in the tracheal mucous membrane with infiltration of neutrophils, necrosis and denudation of mucosa.

"DETECTION AND IDENTIFICATION OF TUBERCULOSIS IN BOVINE"

Dr. A.B. Shrivastav (Advisor)

Varun Bassessar (Researcher)

ABSTRACT

Mycobacterium bovis infection has been confirmed in a wide range of mammal hosts throughout the world. The confirmatory diagnosis of tuberculosis sometimes requires several weeks, after collection of suspected tissues. It was envisaged that a well planned study to compare all the diagnostic methods, incorporating the novel molecular diagnostic tools will be beneficial in formulating an early accurate diagnosis of the infection and also provide important links in establishing epidemiology of *M. bovis* infection in wild and domestic animals.

Clinical examination of 125 animals, between the age group of 1-10 years, 50 at Livestock farm Adhartal, Veterinary College Jabalpur and 75 animals at Dayadoya was done to observe lymphadenopathies, loss of muscle mass, and/or production loss, intermittent pyrexia, udder infection and dry cough. From these animals 10 ml. of blood was collected aseptically from jugular vein and faecal pinch was collected from rectum in 100 animals only taking care to include both clinically healthy and unhealthy animals showing respiratory distress. Samples were also collected from the carcasses of cattle that were subjected to necropsy at Livestock farm Adhartal and organised dairy farms in and around Jabalpur and in the Department of Veterinary Pathology., Veterinary College Jabalpur. .

Tuberculin testing was done in all the 100 animals, and 36 animals (36%) were found positive with an increase of 4.00 mm or more in skin fold thickness at 72 hours. The tests performed using the blood samples comprised Rapid diagnostic assay, *M. bovis* antibody enzyme linked immunosorbent assay and *M. bovis* gamma interferon ELISA for cattle.

Out of the total 100 animals screened, 31 animals (31%) were positive for the *M. bovis* antibody in serum by using antigen Rapid bovine TB test kit, 30 (30%) animals were positive for the *M. bovis* antibody in serum by using *M. bovis* antibody ELISA, 22 (22%) animals were positive for bovine tuberculin and 2 (2%) animals were positive for avian tuberculin *Mycobacterium bovis* gamma interferon ELISA for Cattle

Polymerase amplification assay (PCR) by using IS6110 primers was performed on 100 faecal & blood samples. Out of the total 100 faecal samples examined, 39 faecal samples were positive for the insertion sequence IS6110 of *Mycobacterium tuberculosis* complex whereas only four blood samples were positive from the total of 100 samples examined. PCR was also done on the faecal and samples of the 100 animals by using *Mycobacterium tuberculosis/bovis* complex PCR kit. A total of 12 (12%) faecal samples were positive and all the blood samples were negative

The faecal samples from all 100 animals were processed for isolation and cultivation of *Mycobacterium spp.* in the laboratory by using the standard Modified Petroff's method. Out of the total 100 faecal samples, only 12 samples produced any visible colonies on the L-J medium with pyruvate and two in L-J medium with glycerol after 8 weeks of incubation at 37^0C.It was confirmed by the morphological characteristics and biochemical tests that the bacterial isolates contained 12 colonies of *M. bovis* and 2 colonies of *M. tuberculosis.* In impression smears stained by Ziehl Neelsen (ZN) stain a total of 22 (22%) faecal samples were positive for the presence of acid fast bacilli out of the 100 animals screened.

During the study period, 12 necropsy cattle were found to have lesions suggestive for pulmonary tuberculosis. The impression smears of the affected tissue from these were stained by ZN stain and 9 were positive for acid fast staining. All the samples were positive by PCR for the *Mycobacterium tuberculosis* complex using IS6110 sequence and eight cases were found to be positive through *Mycobacterium tuberculosis/bovis* kit. Faecal sample was also collected from these cases and from the 9 cases found positive for acid fast bacilli initially, in only 4 cases acid fast bacilli could be demonstrated in the faecal smear. However, the faecal samples of 11 cases were determined as positive by using IS6110 sequence.

The results suggest that after initial screening of animals by tuberculin and gamma interferon ELISA for cattle, PCR for the *Mycobacterium tuberculosis* complex using IS6110 sequence can be done for early diagnosis and segregation of tuberculous animals.

HISTOPATHOLOGICAL AND IMMUNOHISTOCHEMICAL STUDIES OF BOVINE TUBERCULOUS GRANULOMA.

Dr. (Mrs.) Madhu Swamy **Pooja Goswami**
(Advisor) **(Researcher)**

ABSTRACT

Bovine tuberculosis is an infectious disease of cattle mainly caused by *Mycobacterium bovis* and characterized by progressive development of tubercles in any tissue or organ of the body. Work was undertaken to study the pathomorphology of the tuberculous lesions in bovine and to demonstrate inducible nitric oxide synthase (iNOS) in tubercular granuloma immunohistochemically. For

collection of tubercular lesions the post mortem examination was conducted of 252 bovine carcasses at Slaughter House, Municipal Corporation, Livestock Farm Adhartal of College of Veterinary Science and Animal Husbandry and Organized Dairy Farms in and around Jabalpur. Out of these, 24 cases (9.52%) showed nodular lesions with casseating mass suggestive of tuberculosis. The mean age of the animals with tuberculous lesions was determined as 5 years and maximum number of cases was seen in Sahiwal breed. Eleven cases were in lactating females and in two cases the animals were pregnant. The involvement of lung (pulmonary tuberculosis) was observed in all the 24 cases (100%). The pulmonary tuberculous lesions were prominently observed involving all the lung lobes (16/24, 66.66%), caudal lobe (6/24, 25%) and caudal cranial lobes (2/24, 8.33%). In 20 cases lesions suggestive for tuberculosis were located only in the lungs and regional lymph nodes (prescapular). In two cases tubercles were also observed in the pleura. Only in two animals generalized lesions with involvement of liver, spleen and mesentery along with lungs and regional lymph nodes were noticed. Pathomorphologically, 20 cases (83.33%) comprised miliary-nodular tuberculosis and only 4 cases (16.67%) were determined to be chronic organ tuberculosis. Tubercles were determined in the bronchial, mediastinal and prescapular lymph node in all the 20 cases. The cut section of the enlarged lymph nodes had caseous calcified areas.

Impression smear was prepared from the lesions of 24 lung tissues suspected of tuberculosis and stained by Ziehl-Neelsen. From the 24 cases examined only 12 cases showed acid fast bacilli in the impression smear of lung tissue whereas in remaining 12 cases acid fast bacilli were not observed. The impression smear of ten prescapular lymph node also showed acid fast bacilli.

Microscopic sections of 5-6 µ thickness were prepared from different areas of the affected lung and lymph node of all the 24 cases and stained with Haematoxylin and Eosin. The histopathologic findings were evaluated microscopically and classified as positive, inconclusive or negative. The positive cases comprised a classic granuloma as a characteristic lesion of tuberculosis composed of a central caseous necrosis with mantle of macrophages, lymphocytes, plasma cells, epitheloid macrophages and Langhans giant cells and were observed in 18 cases**.** The eighteen positive cases of the pulmonary granulomas were further staged from I to IV. Variable number of all four stages granulomas was seen in the same lung tissue. Inconclusive lesions characterized by irregular unencapsulated clusters of epithelioid macrophages but not Langhan's-type

multinucleated giant cells and necrosis consistent with an initial stage granuloma was observed in 4 cases. Negative features not consistent with tubercular granuloma including significant eosinophilic infiltrates and lymphoid hyperplasia were seen in 2 cases

For better understanding of the pathomorphology of tubercular lesions the sections prepared from different parts of the granuloma were also stained with special stains for demonstration of acid fast bacilli, connective tissue, calcium, iron and fat. Ziehl-Neelsen stained sections revealed the presence of clumps of acid-fast bacilli around the necrotic centre, in the cytoplasm of macrophage and Langhan's type giant cells in only 10 cases. The stage III and IV granulomas exhibited extensive fibrosis as evident from thick bands of collagen around the granulomatous regions whereas in stage I and II granulomas the fibrosis was mild. Maximum calcification, iron and fat indicative of foamy macrophages was observed in the Stage IV granulomas followed by stage III.

Immunoreactivity of inducible nitric oxide synthase (iNOS) was detected on paraffin embedded and cryosections. Positive results were seen as distinct, amorphous, brown staining within the macrophages and multinucleated giant cells. The cryosectios were found better for demonstration of iNOS with less number of non specific reactions. Maximum iNOS expression was observed in the stage I granulomas and the immunoreactivity decreased in the later stages of III and IV granulomas. iNOS was also expressed in the affected lymph nodes within the mononuclear cells.

DETECTION OF TUBERCLE BACILLI IN BOVINE TISSUE BY FLUORESCENT MICROSCOPY AND IMMUNOHISTOCHEMISTRY.

Dr. (Mrs.) Madhu Swamy **Dhanshri Owha**
(Advisor) **(Researcher)**

ABSTRACT

Tuberculosis (TB) is a zoonotic, most important chronic disease with high prevalence among humans, domestic and wild animals in developing countries. The present study was designed to demonstrate the acid fast bacilli in paraffin embedded and frozen bovine tissue samples by the fluorescence microscopy technique and to detect *Mycobacterium tuberculosis* in paraffin embedded and frozen bovine tissue samples by immunohistochemistry.

Total 252 necropsies were conducted. Out of these, 24 animals had lesions suggestive of tuberculosis i.e. caseous nodules in lungs. From these 24 cases, in 20 animals, enlarged prescapular lymph nodes also showed caseous masses. For microscopic study, from each case, impression smears and four corresponding sections were cut, for Hematoxylin-Eosin, Ziehl-Neelsen, Auramine-Rhodamine stains and Immunohistochemisty. Where necessary, additional sections were prepared.

Impression smears were prepared from the center of the casseating mass of lung lesions from all the suggestive 24 cases and the tuberculous lesions from 10 enlarged prescapular lymph nodes and stained by the ZN method. In impression smears from 12 lung samples acid fast bacilli in the form of clumps extra-cellularly and sometimes intra-cellularly in macrophages were observed. In addition all 10 prescapular lymph nodes also showed intracellular acid fast red coloured bacilli in the macrophages and lymphocytes. In Haematoxylin and Eosin stained sections a classic granuloma, as a characteristic lesion of tuberculosis, composed of central caseous necrosis with mantle of macrophages, lymphocytes, plasma cells, epithelioid macrophages and Langhan's giant cells were seen especially in miliary TB. Depending upon the microscopic features of the granuloma observed by light microscope they were placed into three sub groups that is minimal, moderate and maximum. In the present study, there were six cases showing minimal histological activity (6/24), four showing moderate histological activity (4/24) and 14 showing marked histological activity (14/24).

On ZN stained tissues the acid fast bacilli, stained bright red, were observed in lungs for 10 cases which showed acid fast bacilli in direct smears also. In sections of lymph nodes from 10 animals, clumps of acid fast bacilli were observed.

For demonstration of acid fast bacilli in the tuberculous granuloma the fluorescence staining method was standardized in the laboratory. Impression smears were prepared from all twenty four lung tissues and stained by HiFluo Phenol free stain kit and observed under fluorescent microscope using blue filter under oil immersion. Out of these all 12 cases found positive for acid fast bacilli and in addition six new cases in which acid fast bacilli could not be demonstrated showed red-orange fluorescence (rods) against dark background and were considered positive for presence of acid fast bacilli by fluorescent microscopy. Similarly, in cryosections, all 12 cases found positive for acid fast bacilli and in addition six cases in which acid fast bacilli could not be demonstrated showed red-orange fluorescence (rods) against dark background and were considered positive. Fluorescent microscopy was also done on the impression smears and the tissue sections of 10 lymph nodes and in all of these red-orange fluorescence (rods) against dark background were observed and they were considered positive for acid fast bacilli by fluorescent microscopy.

Immunohistochemistry was done for the localization of antigens of *Mycobacterium tuberculosis* in the granuloma by using an indirect streptavidin-biotin method on 18 lungs and 10 lymph nodes tissue sections which were found positive for acid fast bacilli by ZN and FM staining (12 ZN + fluorescent positive and six only fluorescent positive). In 12 samples of lung tissues presence of red stained *M. tuberculosis* antigens were seen extracellularly and within macrophages and multinucleated giant cells whereas in only six lymph nodes the presence of *M. tuberculosis* antigens could be demonstrated.

Correlation between histological type, ZN staining and Fluorescent microscopy revealed that increased tubercle bacilli were observed in tubercles with maximum histological activity. Fluorescent microscopy was more sensitive in detecting the acid fast bacilli than ZN staining.

M. tuberculosis antigen in maximum cases (12/18) indicates more chances of animal being infected by the human species of *Mycobacteria*.

DISTRIBUTION OF LUNG LESIONS IN GOATS WITH SPECIAL REFERENCE TO PNEUMONIC PASTEURELLOSIS.

Dr. Madhu Swamy **Anuradha Verma**
(Advisor) **(Researcher)**

ABSTRACT

Pneumonia is one of the most common respiratory problems in small ruminants throughout the world. The most frequent causes of respiratory infection and death in goats are *Pasteurella multocida* or *Mannheimia haemolytica* (previously called *Pasteurella haemolytica*). The present study was designed to study the lobe distribution of lung pneumonic lesions in goats and to isolate and characterize *P.multocida* from cases of caprine pneumonia.

Goats of different age groups and either sex bought for post-mortem examination at Department of Pathology or whose necropsy was conducted at Amanala Goat unit of College of Veterinary Science were included in the study. Total 97 post mortem examinations of goats were conducted and pneumonia was observed in 65 (67.03%) animals. Of these, the detailed study was conducted for fifty post mortem cases. In maximum cases (41/50, 82%), both the right and left lungs were affected. Areas of emphysema were observed in 100% cases, congestion in 82 %, consolidation in 66%, pulmonary edema in 46%, pleural adhesion in 08%, lung abscess in 04% and a solitary case (02%) had a nodular growth.

On the basis of gross lung lesions maximum number of bronchopneumonia, 26/50; 52.0%, were diagnosed, followed by 23/50; 46.00% of interstitial pneumonia. Only a single case of granulomatous pneumonia was observed in the left cardiac lobe and no lung lesion fulfilling the criteria of embolic pneumonia was observed.

The distribution of gross lesions in pneumonic lungs was further classified as multifocal, diffuse and local extensive. Maximum cases of pneumonia showed diffuse pattern of lesions and only ten cases were having a multifocal pattern of lung lesions. The lesion of solitary case of granulomatous pneumonia was classified as local extensive. Out of the 26 cases of bronchopneumonia 20 (76.92%) had features of suppurative bronchopneumonia and only 6 (23.07%) were of fibrinous bronchopneumonia.

Tissue samples from most affected lobe of lung and lymph node were collected for histopathology. The distribution of microscopic lesions in the lung tissues comprising emphysema (84%), atelectasis (76%), congestion (70%), haemorrhage (46%), thickness of alveolar septa (84%), leukocytic infiltration (68%), fibrosis (76%) and calcification (04%) were observed. To determine the presence of *Pasturella multocida* in caprine pneumonia direct impression smears were prepared from all 50 cases. Typical bipolar organisms resembling *Pasteurella* spp. were observed in 32 cases. From the 50 cases of pneumonia selected, *P. multocida* was isolated and identified in 34 (68.0%) cases by Blood agar, Mac Conkey agar, Grams Staining and Biochemical tests. Nasal swabs were also taken aseptically from live goats at Amanala Goat unit which were showing symptoms of respiratory distress. Seven isolates of *Pasturella multocida* were obtained from the nasal swabs.

Ten bacterial isolates obtained from pneumonic goats and nasal swabs having the biochemical characteristics of *P. multocida* were further subjected to *in vitro* antibiotic sensitivity test. The antibiogram pattern indicated that maximum percentage of *Pasturella multocida* were sensitive to Cotrioxazole (90%) followed by Gentamicin (80%) and Amoxyclav (80%). Pathogenicity of *P.multocida* bacillus isolated from pneumonic caprine lung was tested in albino rats. Pneumonic lungs were observed in 4/5 animals sacrificed at 48 hours and in 5/5 animals sacrificed at 72 hours. The gross lesions in affected lungs were of bronchopneumonia in all the cases. *P. multocida* was re-isolated from the lung tissue of rats at both the intervals. Dr. Madhu Swamy

CLINICOPATHOLOGICAL STUDIES ON SPONTANEOUS PARASITIC INFECTIONS ON KADAKNATH BIRDS (*GALLUS DOMESTICUS*) WITH SPECIAL REFERENCE TO COCCIDIOSIS

Dr. G.P. Jatav
(Advisor)

Vinod Kumar Yadav
(Researcher)

ABSTRACT

An experiment was conducted to study the clinicopathological alteration on Spontaneous Parasitic Infections in Kadaknath birds (*Gallus domesticus*) with Special Reference to Coccidiosis from various location in Government farm of Kadaknath birds at Dhar and Jhabua districts and farms in surrounding areas. The highest percent incidence of affected birds was observed in other surrounding farms which was 12% followed by Jhabua and Dhar districts. Clinical signs of weight loss, weakness, dullness, depression, closed eyes, inappetance, decreased egg production, high mortality, bloody diarrhea, anorexia and ruffled feathers were recorded in all birds. The lowest mean values of Hb concentration, PCV, TEC, eosinophils, monocytes and basophils count as well as highest mean values for TLC, lymphocytes and heterophils count recorded in other surrounding farms followed by Jhabua and Dhar districts. The highest mean concentration of ALT, AST and ALP as well as lowest mean concentration of TP was recorded on other surrounding farms followed by Jhabua and Dhar districts. Gross lesion of congestion and haemorrhages were observed in liver, lunges, heart, caeca, caecal tonsils, intestine and testicles, whereas fatty changes was noticed in liver and heart. Ballooning of caeca and intestine was also observed. Microscopic lesions of congestion, haemorrhages and mild to severe degenerative changes were noticed in liver, lunges, heart, caeca, caecal tonsils, intestine and testicles. Infiltrating inflammatory cells were noticed in caeca and caecal tonsils, severe schizonts were observed in the epithelial cells. In the experiment birds of other surrounding areas were found to be more susceptible to Coccidiosis than Jhabua and Dhar districts.

"CLINICOPATHOLOGICAL STUDIES ON SPONTANEOUS PARASITIC LIVER LESIONS OF SWINE WITH SPECIAL REFERENCE TO ASCARIASIS"

Dr. U. K. Garg
(Advisor)

Amar Singh Bilganve
(Researcher)

ABSTRACT

The present investigation was carried out to study of incidence and the clinicopathological changes due to parasitic infection of digestive system in and around Mhow and Indore.

For this a total 141 swine were examine and the incidence of GI parasite in swine was recorded to be 46.80% (66/141), among them the incidence of ascaris was highest (14.18%) followed by coccidia (11%), Trichuris (7.8%), Capillaria (7.09) and Mixed infection (6.38%).

The clinical sign observed in the infected pigs were respiratory distress, dullness, depression, decreased boby weight, diarrhoea, loss of appetite and rough body coat. Pigs suffering from ascaris infection showed diarrhoea followed by constipation. Coccidia infected pigs showed diarrhoea and weight loss.

In haematological and biochemical study there was increase in TLC, Neutrophils, Eosinophils and DLC which suggest parasitic infections while other parameter Hb, PCV and TEC were within decrease range. In biochemical study there was increase in SGPT and SGOT, decrease in total protein.

The lesions found in Ascaris infection in liver were petechial haemorrhage, focal necrosis characterised by milk spots. In lung, congestion, haemorrhage and emphysema were noticed. In intestine there were haemorrhages, mucous exudates, focal necrosis area were observed.

In Histopathology there were infiltration of neutrophils, eosinophils and lymphocytes in liver parenchyma surrounded by epitheliod cell and giant cells. There were also multiple area of congestion and haemorrhage in the lung with inflammatory cell. In intestine changes revealed destruction of villi, infiltration of inflammatory cells and necrosis of intestin

STUDIES ON FIPRONIL TOXICITY IN BROILERS (GALLUS DOMESTICUS)

Dr. Nidhi Shrivastava **Jyoti Mittal**
(Advisor) **(Researcher)**

ABSTRACT

An experiment was conducted on 80, one day old broiler chicks to study pathology of fipronil toxicity. All the birds were randomly divided into 4 groups of 20 birds each, i.e. T1, T2, T3 and T4 where T1 was control. T2, T3 and T4 were given fipronil @ 5.85 mg/kg body weight (50% LD_{50}), 2.825 mg/kg body weight (25% LD_{50}) and 1.413 mg/kg body weight (12.5 % LD_{50}) respectively from 7th day of age to 48th day of age (up to 6 weeks). Ten birds from each group were sacrificed on 21st and 42nd day of experiment respectively.

Clinical signs of decreased activity, loss in body weight and increased FCR (Feed Conversion Ratio) were recorded in group T2 and T3. Blood samples were collected from all the groups on 21st and 42nd day post treatment for haematobiochemical changes. Group T2 showed significant decrease in haemoglobin, PCV, TEC and TLC. Serum values of ALT and AST were significantly higher in group T2 than control T1 group. Total serum protein showed significant decrease in T2 group. Serum TSH concentration showed significant increase in group T2. Gross lesions of fatty changes, congestion and haemorrhages were observed in liver, heart and pancreas. Thyroid gland of group T2 showed hyperaemia and enlargement on 42nd day post treatment. Focal areas of haemorrhages and infiltration were seen in cerebrum in T2 group.

Microscopic lesions in liver included fatty changes, multifocal areas of congestion, haemorrhages and leukocytic infiltration. Thyroid gland of group T2 showed hypertrophy of thyroid follicular epithelium, focal haemorrhages, bursting of follicles and squeezing of colloidal solution. Pancreas showed haemorrhages and infiltration of leukocytes. Humoral immune response was evaluated by HI test against NDV (Newcastle disease virus) at 21st and 42nd day post treatment and results were non significant in all the groups at both time intervals. In this experiment liver and thyroid were found to be the major target organs due to fipronil toxicity.

PATHOLOGY OF BOVINE ENTERIC SALMONELLOSIS ASSOCIATED WITH CALF MORTALITY.

Dr. (Mrs.) Madhu Swamy **Ankur Kumar Upadhyay**
(Advisor) **(Researcher)**

ABSTRACT

Diarrhoea is one of the major causes of neonatal calf mortality. The infectious agents capable of causing diarrhoea in the neonatal calf include rotavirus, coronavirus, enteropathogenic *E. coli*, *Salmonella spp.* and Cryptosporidium.

Work was conducted to investigate the infection of calves with *Salmonella spp* in organized dairy farms; to investigate the infection of adult diarrhoeic bovines with *Salmonella spp.* in above farms and to study the enteric pathology in calves with salmonellosis. The study was conducted for a period of seven months from September 2013 to March 2014. For the study rectal faecal swabs were collected from adult cattle and buffaloes as well as cattle and buffalo calves of either sex from organized dairy farms in and around Jabalpur district. Sterile intestinal swabs and intestinal tissues were also collected from necropsy cases having enteritis. Direct smears from faeces and intestinal contents were prepared and stained by Gram's stain for direct examination. The samples were processed for microbiological examination. Commercially available Nutrient agar, Xylose lysine deoxycholate agar and Mueller Hinton agar plates, were used for culture of organisms and antibiogram test. Brilliant green agar was prepared and used as a selective medium for primary isolation of bacteria.

During the study period faecal swabs were collected from 82 calves, both cattle as well as buffalo from 05 organized dairy farms. Out of the 82 samples collected from calves *Salmonella spp* was isolated in 03 samples (3.6%). Of these 02 samples (2.4%) were from diarrhoeic cow calves and 01 (1.2%) was from diarrhoeic buffalo calf. 50 faecal swabs were also collected from adult animals. Amongst these 01 sample (2%) from adult non –diarrhoeic cattle was found positive for enteric Salmonella. In the study 41 intestinal swabs, collected from bovine post mortem cases with enteritis, 09 cattle calves and 32 buffalo calves, were processed for isolation of *Salmonella spp.* Out of 09 intestinal swabs from cattle calves, 04 (44.44%) were positive for *Salmonella spp*. whereas from 32 samples collected from buffalo calves, 06 (18.75 %) were found positive for *Salmonella spp.*

Total incidence of *Salmonella spp* was determined as 8.09 % (14/173) in the bovines at organized dairy farms. The total 14 isolates recovered from animals were further characterized by biochemical tests. The 14 isolates of presumptive colonies of *Salmonella sp* were also subjected to Latex Agglutination test designed to identify *S typhimurium ,S enteretidis, S typhi, and S cholerasuis.* Latex agglutination test identified *S cholerasuis* in 01 isolate only. The remaining 13 isolates were not found positive for any of the four species.

Antibiotic sensitivity test conducted for six isolates of *Salmonella* spp revealed that isolates were highly sensitive (100%) for cephalexin ,ciprofloxacin, norfloxacin, enrofloxacin, chloramphenicol, nitrofurantoin and gentamicin followed by tetracycline (83.3%), amoxycilin, and trimethoprim (50%). All the Salmonella isolates were found resistant to ampicillin.

To know the seroprevalence of Salmonella in bovines, blood was collected from 101 animals including 48 diarrhoeic and 53 non diarrhoeic animals. Slide micro agglutination test revealed maximal seroprevalence in diarrhoeic adult buffalo (50%). Agglutination was observed in 14.5% diarrhoeic cases comprising 02, 03, 01 and 01 cases from cattle calf, buffalo calf, adult cattle and adult buffalo, respectively. Agglutination was observed in 22.6% non -diarrhoeic apparently healthy animals comprising 06, 02, 03 and 01 cases from cattle calf, buffalo calf, adult cattle and adult buffalo, respectively.

Gross and histopathological studies were done in total 10 cases from which *Salmonella spp* were isolated. These included 04 cattle calves and 06 buffalo calves. In maximum cases small intestine was congested and mild erosions were present on mucosa. Microscopic examination of duodenum revealed catarrhal enteritis with infiltration of polymorhonuclear cells in the lamina propria. Ileum showed consistent mucosal thickening with increased exudates and necrosis of villi. Caecum and colon revealed villi atrophy with proliferative reaction in the crypts.

PREVALENCE AND PATHOLOGY OF GASTROINTESTINAL PARASITES ASSOCIATED WITH CALF MORTALITY IN BOVINE

Dr. (Mrs.) Madhu Swamy **Archana Bharti**
(Advisor) **(Researcher)**

ABSTRACT

The present study was undertaken to study the prevalence of naturally occurring enteric parasites in calves of Jabalpur region and the pathological effects produced by them contributing to calf mortality. The faecal samples for present study were collected mainly from animals of two organized dairy farms in Jabalpur whereas the intestinal contents were collected from dead calves from different organized dairies in and around Jabalpur.

Calves at two organized dairy farms of Jabalpur were screened for a period of 8 months covering the monsoon and winter season. To know the prevalence of gastro intestinal parasites total 128 faecal samples were collected from both diarrhoeic as well as non diarrhoeic calves during the study period of 8 months. Of these 108 were cattle calf and 20 were buffalo calf**.** Apart from this the intestinal contents from 40 dead calves with gross post mortem lesions of enteritis, were collected and examined for presence of parasites. Thus, total 168 samples were examined for parasitic infections by the direct smear, flotation and sedimentation techniques.

From the total 128 faecal samples collected from live calves 110 (85.33 %) were found positive for parasitic infections. In the 40 cases of intestinal samples collected from dead calves, 32 (80.0 %) were positive for parasitic infections. The overall prevalence of gastrointestinal parasitic infection was determined to be 84.52 per cent (142/168) in calves of Jabalpur. Maximal prevalence was recorded in the month of August with 91.42 per cent samples found positive for entero-parasite(s). Amongst the ante-mortem faecal samples 49/61 samples collected from calves with diarrhoea and 61/67 samples collected from non-diarrhoeic calves were found positive for parasites. A significant association was found between presence of entero-parasite infection and diarrhoea in calves.

In the present study maximum faecal samples (105/168, 62.5 %) were diagnosed with mixed parasite infection comprising *Eimeria,* strongyles, *Strongyloides, Toxocara, Trichuris, Moniezia, Fasciola* and *Paramphistomum.* A large number of samples collected from calves, 99/168 (58.92 %) were found positive for *Eimeria* oocyst. A significant association between clinical finding of diarrhoea and presence of *Eimeria* oocyst was found. In the study, 02, 03 and 16 samples had an O.P.G. of >10000, 5000 and 1000 respectively for coccidian oocyst.

In the present study 54.76 per cent of gastrointestinal helminths were observed. Amongst the gastrointestinal helminths highest prevalence (30.35 %) of strongyle was recorded in calves. Mostly, strongyle was observed in association with one or two gastro-intestinal parasites. In one post mortem case with an E.P.G. above 1000. *Strongyloides* egg in our study was observed in 15/168 (8.92 %) calves having no symptoms of diarrhoea. *Toxocara* eggs were observed in total 23/168 (13.69 %) samples. The prevalence of *Trichuris* in calves was determined to be 5.35 per cent in calves. In the present study *Moniezia* eggs were found in 2.38 per cent faecal samples with only 01 case as a single infection and remaining 03 as mixed infections. A single faecal sample revealed heavy infestation of *Fasciola*. The case was diagnosed in 2 month diarrhoeic cattle calf and comprised a dual infection of *Eimeria* along with *Fasciola.*

Prevalence of *Cryptosporidium* in calves was found to be 38.29 per cent. No association between clinical finding of diarrhoea and presence of *Cryptosporidium* oocyst in faeces of animal was observed

In the present study the gross and microscopic gastrointestinal pathology was noted for the calves (n=31) whose intestinal contents tested positive for parasitic infections. Maximal cases (n=20) in present study were of mixed parasitic infections. Liver, abomasums and intestine of these animals had gross pathological changes mainly comprising congestion, haemorrhages and areas of coagulative necrosis. The carcasses of animals with *Eimeria* infection had pale mucous membranes with congested to haemorrhagic intestine. In these animals haemorrhagic enteritis was observed predominantly affecting the caecum and colon. The intestinal mucosa was eroded and covered with inflammatory exudates. The schizonts, in varying stages of maturity, were present within the cytoplasm of the endothelial cells lining the central lacteals, toward the tips of the villi. In two animals only *Toxocara* eggs were recovered from the intestinal contents. In these animals lungs were pneumonic, liver were swollen and pale and *Toxocara* were observed in the intestinal lumen. Microscopic liver changes comprised degenerated hepatic cells with focal areas of necrosis whereas intestinal mucosa was denuded with congested blood vessels in lamina propria. Pathological changes in animal found positive for cryptosporidiosis were mainly observed in the abomasums and intestine. Within and attached to the striated border of the villous epithelium ovoid *Cryptosporidium* organisms were observed.

However, in all the cases since the animals could be harboring bacterial or viral infections also along with the parasites the pathological lesions could probably be the result of two or more concurrent infections.

PATHOLOGY OF GASTROINTESTINAL PARASITIC INFECTIONS IN YOUNG BOVINE.

Dr. U.K. Garg
(Advisor)

Priyanka Marskole
(Researcher)

ABSTRACT

The present study was carried out with two objectives, study the prevalence of gastrointestinal parasitic infections and study the pathological lesions associated with gastro intestinal parasites in young bovine. The study was conducted for a period of eight months from August 2014 to March 2015. Buffaloes and cattle of both sex and different breeds, from Livestock Farm, Adhartal (LSF) and different dairies in and around, Jabalpur were used for the study purpose. To achieve the Ist objective fecal contents were collected directly from rectum of 120 bovine (44 buffaloes and 76 cattle) and processed for parasitological examinations by standard procedure. For IInd objective total 21 bovine carcasses comprised of 9 buffaloes and 12 cattle were received during the study period and used for study. Detailed postmortem examination was conducted for all 21 animals. Intestinal contents of these animals were also collected for parasitological examination. Tissues (liver, intestine, mesenteric and hepatic lymph nodes) showing lesions associated with parasitic infections were collected at the time of necropsy in 10% buffered formalin and processed by standard techniques for histopathological examinations.

Prevalence of gastrointestinal parasitic infections was calculated as 73.33% in bovine. Prevalence rate 73.25% and 73.52% were recorded in LSF, Adhartal and in other dairy farms, respectively. Sex wise prevalence of GI parasites showed that the male animals were more susceptible than female animals (83.33% male and 70.83% female). Animals above 2 years of age were more affected (77.5%) when compared to animals of 6 months to 2 years of age (65 %).

The single parasitic infection of GI parasites was determined as 45.83 %. A total of seven spices of helminthes were identified of them trematode 3.33% were *Fasciola* spp 1.66% and Amphistome 1.66%, nematode 30.83% were (Strongyle 25.00%, *Strongyloides* 2.5% , *Toxocara* spp 1.66% and *Trichuris* spp 1.66%) and protozoa was found only as *Eimeria* spp 10%. However, 27.50% prevalence of multiple parasitic infections were recorded in combination with trematode and nematode 3.33%, trematode and cestode 2.5%, nematode and cestode 3.33% and nematode and protozoa 18.33%.

Maximal percent of parasitic infection in bovine were recorded in the month of September 2014 (81.81%) followed by March 2015 (80%) and least parasitism was observed in December 2014 (61.11%). The highest number of strongyle eggs that ranged from 201-300 egg per gram was counted in fecal samples of bovine.

During the detailed post mortem examination the gross pathological lesions associated with parasitic infection were found 76.19% intestinal content positive for eggs of different parasites. Lesions associated with the presence of parasites were observed as *Fasciola* spp 19%, Amphistome 4.76%, Hydatid cyst 14.28%, *Trichuris* spp 9.52%, *Moniezia* spp 14.28% and *Eimeria* spp with other nematodes 23.80% cases.

Significant gross lesions associated with *Fasciola* spp were confined to the liver. The affected livers showed haemorrhgic migratory tract and lodgment of the parasites in the thickened bile ducts. Microscopically, hemorrhagic migratory tracts formed from degenerated hepatocytes, erythrocytes and infiltration of polymorphs, eosinophils, and mononuclear cells. Portal area showed newly formed bile ductules with infiltration of inflammatory cells and fibrosis. Part of parasite was embedded in the lumen of bile ducts associated with hyperplasia in the lining epithelium with polyps formation and periductal inflammatory cell infiltration.

Macroscopically large numbers of small flesh coloured mature and immature Amphistome flukes were observed free and also attached to the mucosa of rumen. Mucosa of the upper part of the intestine was thickened, congested and covered with catarrhal exudates. Histopathologically, Necrosis of mucosal epithelium was observed at the point of attachment of fluke and firino catarrhal inflammation was observed in the intestine.

Fluid filled variable sized hydatid cyst were protruded on the surface and embedded deep in the liver parenchyma. Microscopically hydatid cysts capsule was thick having from inside out a highly cellular zone rich in mononuclers and fibroblasts with or without scolex and an outer thick fibrous zone of concentrically arrange bundles.

Grossly, thickened caecum with numerous trichuris worms were attached to the congested mucosa. Sections of caecum revealed necrotic debris, mucus, eosinophils, neutrophils, lymphocytes and parasites embedded in mucosa. Inflammatory cells infiltration also extended into the muscularis mucosa and submucosa and double-operculated eggs of Trichuris-like worm were also observed.

The lumen of intestine was packed with moniezia and mucus exudates, mucosal surface were congested. Sections of intestine revealed congestion, necrosis and parasites in the lumen.

Grossly, intestine was congested and lumen contains fluid mixed with mucus and fibrin. Section of intestine revealed villous atrophy, hyperemia, hyperplastic epithelium, infiltration of mononuclear cells in mucosa and submucosa. Various development stage of eimeria was also observed in the lamina properia.

STUDIES ON ENTERIC ROTAVIRUS INFECTION IN BOVINE

Dr. Yamini Verma **V. Sthevaan**
(Advisor) **(Researcher)**

ABSTRACT

Neonatal calf mortality is one of the most common animal health concerns for dairy industry. Amongst gastroenteric infectious agents, Rotavirus, Corona virus, *Cryptosporidium*, and *Escherichia coli* are collectively responsible for 75-95% of infection in neonatal calves worldwide and especially rotavirus alone accounts for about 27-36%. Thus, the present study was carried out to detect bovine Rotavirus infection in diarrhoeic and non-diarrhoeic bovine calves and adult animals. Correlation of Bovine Rotavirus infection with intestinal lesions and incidence of calf mortality due to Rota virus infection in and around Jabalpur were also studied.

The study was conducted for a period of seven months from September 2013-March 2014. Buffalo and cow calves as well as adult animals, of both sex and different breeds, in and around Jabalpur were included in the study. The mortality percent determined for buffalo calf during the study period was 45.31% and for cow calf 23.07%. Average age of calf mortality for buffalo calf was determined as 1.24 months and for cow calf as 26 days. The mortality percent for male and female calves at Adhartal livestock farm was calculated as 55.26% and 44.73%, respectively. Maximum incidence of diarrhoea in buffalo calves was recorded in the month of December (41.17%) and January (41.17%).

In the study period 92 faecal contents/scraps were collected per rectal using sterilized gloves and samples were placed in polythene bags which were labeled and sealed properly for identification of the animals. Contents from different parts of the intestine were collected aseptically from duodenum, ileum and jejunum or colon from 41 postmortem cases having gross lesions of enteritis for virological study**.** Blood (5ml) was collected in sterile container for haematological and serological studies. All faecal samples and intestinal contents were suspended in 10% (W/V) phosphate buffered saline (PBS, pH 7.2), clarified by centrifugation at 8000 x g for 10 min at 4°C and supernatants were collected and stored at – 20°C till further use. Supernatant was used for determining the presence of Bovine rotavirus antigen by Lateral Flow Assay (LFA) and antigen Enzyme Linked Immunosorbent Assay (ELISA).

Detection of Bovine Rota viral infection in diarrhoeic and non-diarrhoeic bovine calves and adult animals by LFA showed positive results in 32.26% of diarrhoeic animals, 0% of non diarrhoeic animals and 17.14 % of intestinal contents from post mortem cases. The rotavirus antigen positivity of diarrhoeic cow calves, buffalo calves, adult cattle and adult buffalo by LFA was determined to be 44.44%, 33.33%, 12.50%, and 40%, respectively. The positivity of post mortem cases of cow calves, buffalo calves, adult cattle and adult buffalo were 12.50%, 26.31%, 0% and 0% for rotavirus by LFA.

Antigen ELISA showed positive result in 5.26% diarrhoeic samples, 0% non-diarrhoeic samples and 24.32% intestinal contents of post-mortem cases. The presence of bovine rotavirus antigen by ELISA in diarrhoeic sample of cow calves and buffalo calves was observed in 4.76% and 8.33% cases respectively, whereas no sample was found to be positive in adult animals. The positivity for rotavirus antigen in intestinal contents of cow calves and buffalo calves were 25% and 33.33% respectively, whereas no sample was found to be positive in adult animals.

Sensitivity and specificity of LFA when compared with ELISA for detection of rotavirus antigen were determined as 45.45% and 83.33% respectively.

The prevalence of bovine rotavirus antigen in dairy animals as determined by ELISA in areas adjoining Jabalpur district was found to be maximum 15.63% (10/64) in Jabalpur followed by 14.29% (1/7) in Katni. Rotavirus antigen was not detected in the faecal sample from Umaria, Damoh, Seoni and Shahdol.

ELISA was also performed to detect rotavirus antibody in 90 serum samples collected from bovine population in and around Jabalpur. 82.22% serum samples were found positive for rotavirus antibody with more positive cases in diarrhoeic animal. The sero-prevalence of bovine rotavirus in dairy animals in areas adjoining Jabalpur district was also highest in Jabalpur (85.19%) followed by Katni (82.35%), Damoh (81.25%), Seoni (80%), Umaria (70%), and Shahdol (60%).

All the haematological parameter evaluated in the peripheral blood of rotavirus positive animals remained within the normal ranges.

Total 54 carcass comprising 44 calves and 10 adult animals were received for post-mortem examination during the study period. Detailed postmortem examination was conducted for all 54 animals. Gross findings revealed enteric lesions in 41 (75.92%) animals comprising 06 cow calves, 31 buffalo calves.

To correlate rotavirus infection with intestinal lesions in bovines the pathological findings in 09 animals with positive Lateral flow immunoassay and antigen ELISA in the intestinal content were studied. The gross lesions in these animals comprised haemorrhages and congestion in entire gastro-intestinal tract . Duodenum, jejunum, ileum were filled with bloody exudates and caecum was haemorrhagic. The main histological lesion comprised pronounced villi atrophy observed throughout the small intestine. Erosion of areas of epithelium in the ileum and jejunum accompanied by polymorphonuclear infiltration in the lamina propria and on the epithelial surface with stunting and thickening of villi in ileum and jejunum was observed. The epithelium covering the villi was mainly cuboidal. Depletion of lymphocytes in mesenteric lymph nodes and mild degenerative changes in liver was observed.

Rotavirus antigen was found in the intestinal content of 31.03% necropsy cases. However, since multiple etiologies may be present it is difficult to attribute mortality due to rotavirus alone.

PATHOLOGY OF RESPIRATORY TRACT LESIONS IN GOATS WITH SPECIAL REFERENCE TO PASTEURELLOSIS"

Dr. U.K. Garg **Preeti Barde**
(Advisor) **(Researcher)**

ABSTRACT

In the present study, 300 goats slaughtered at Cantonment Board slaughterhouse, Mhow were examined for respiratory tract lesion.

The prevalence of respiratory tract lesions was found to be 56.66% (170/300). Based on observation of gross lesions and histopathological examinations of tissue sections of trachea, lungs and bronchial lymph nodes. Out of 170 cases incidence of respiratory tract lesions of *Pasteurella* organisms origin was 9.41%. *E. coli* (11 cases, 30.55%) was the most frequently isolated pathogen followed by *Pasteurella multocida* (7 cases, 19.44%).

In pasteurellosis infected goats there was increase in total leucocyte count and increase in neutrophils percentage suggested bacterial infection. In biochemical study there was increase in SGPT, SGOT, BUN, total serum protein and fibrinogen lavel.

In most of the cases trachea contained frothy exudates. Extensive petechial and ecchymotic haemorrhages were observed on the mucous membrane of trachea. Three types of pneumonia observed basically bronchopneumonia, pleuropneumonia and interstitial pneumonia.

ASSESSMENT OF LEAD TOXICITY IN BOVINES

Dr. Amita Dubey
(Advisor)

Arya Anil
(Researcher)

ABSTRACT

The present study was undertaken to assess the lead level in the blood, serum, liver and kidney of bovines in Jabalpur, to study the correlating gross and histopathological changes in the tissues as well as to ascertain the extent of oxidative stress in tissues with high lead level. The samples for present study were collected from bovines reared near highways and water bodies of Jabalpur containing lead levels above maximum permissible limits. A total of 63 blood samples (49 cattle and 14 buffalo) and 56 tissue samples (45 cattle and 11 buffalo) of liver and kidney were collected. These samples were acid digested in a microwave digester for estimation of lead level by Atomic Absorption Spectrophotometer.

Lead level in blood and serum ranged from 0.31 to 1.44 ppm and 0.38 to 1.12 ppm, respectively and the observed mean concentration of lead in blood and serum were 0.69±0.03 ppm and 0.76±0.03 ppm, respectively. Significant difference was also observed in the lead levels of samples collected from different areas.

The blood and serum of adult animals showed statistically significant high level of lead (0.74±0.04 ppm and 0.80±0.03 ppm) as compared to young animals less than 3 years of age (0.59±0.04 and 0.67±0.05 ppm). Seventy three percent blood samples and forty four percent serum samples had lead levels in the range of mild toxic (0.35-0.8 ppm) while fifty six percent serum and twenty five percent blood samples had toxic lead levels(> 0.8 ppm). The hematological examination revealed reduction in the hemoglobin, TEC and PCV values in animals with high blood lead levels. Occasionally basophilic stippling and nucleated erythrocytes were seen in animals with blood lead level more than 0.8 ppm.

Lead level in tissues ranged from 0.05 to 11.01 ppm in liver and 0.05 to 11.84 ppm in kidney. The mean lead level was 1.15±0.20 ppm in liver and 1.20±0.23 ppm in kidney, with no species difference. Statistically significant high level of lead was recorded in adult bovines (1.21±0.23 ppm in liver and 1.27±0.26 ppm in kidney) as compared to young animals (0.64±0.19 ppm in liver and 0.68±0.20 ppm in kidney). Increased lead concentration was obtained in liver and kidney of males (3.67±2.03 and 3.80±2.20 ppm, respectively) as compared to females (0.90±0.07 and 0.95±0.11 ppm, respectively). Thirty six percent (36%) of liver and kidney had non-toxic lead levels of 0-1 ppm; 61 % liver and 59% kidney showed mild toxic lead levels of 1-5 ppm and 3.6% liver and 5.4% kidney had toxic lead concentration of > 5 ppm. These tissue samples were evaluated for studying the gross, histopathological and immunohistochemical changes with reference to lead concentration.

The post mortem examination revealed prominent gross lesions in the liver, kidneys, reticulum and intestine of bovines with high lead concentration. In liver, congestion, hemorrhage, pale discoloration, multiple necrotic foci, nodules, hepatomegaly and fibrosis were observed. Kidneys showed congestion, hemorrhages, pitted rough surfaces, necrotic foci, fibrosis and adherence of capsule. Mottled and contracted kidneys were also recorded in bovines with high lead concentration. In two animals (3.6%) where the lead concentration was more than 5 ppm in liver and kidney tissues, thickening and blackening of the mucosa of reticulum with presence of metallic as well as non metallic foreign bodies were observed.

Microscopic observation of liver and kidney revealed lead concentration related pathological changes. Liver showed congestion, hemorrhage, moderate degenerative and inflammatory changes along with necrosis and fibrosis in tissues with reference to lead concentration. Nuclear vesiculation, binucleation, mononuclear cell infiltration and hemosiderosis along with bile duct hyperplasia and fibrosis were the prominent findings in

liver with > 5 ppm of lead. Microscopic observation of kidney revealed congestion, inter tubular hemorrhages and swollen tubular epithelial cells in majority of kidney samples. Severe pathological and lead concentration correlated changes were noted in the tubules of the kidney like dilatation, degeneration, desquamation and hyalinization of the tubules. Tubular and interstitial nephritis besides the infiltration of inflammatory cells and fibrosis noted in kidney exposed with lead concentration. Atrophic, sclerotic glomeruli and plasma cell infiltrations were the important observations in kidney tissues with > 5 ppm of lead.

Immunohistochemical study revealed increased expression of oxidative stress marker Malondialdehyde (MDA) antibody in liver and kidney tissues with high lead level which was visualized by increased number of brown colored cells as compared to less number of brown colored cells in tissues with low lead level.

To conclude, significantly high lead level was observed in the blood, serum, liver and kidney of bovines of Jabalpur. The pathological and histochemical examination indicated oxidative stress and tissue damage due to lead toxicity.

PREVALENCE AND PATHOLOGY OF CHRONIC RESPIRATORY DISEASE IN BROILERS.

Dr. (Mrs.) Madhu Swam **Poorna Chandhar**
(Advisor) **(Researcher)**

ABSTRACT

The study was carried out to determine the prevalence of respiratory lesions, prevalence of Chronic Respiratory Disease (CRD) caused by *Mycoplasma gallisepticum* (MG) and prevalence of other bacterial infection in complicated cases of CRD in broilers of Jabalpur region.

The prevalence of respiratory lesions in broilers of Jabalpur region was determined as 30.67%, with maximum number of birds with respiratory lesions were observed in month of February. The nasal passage was affected in all the broilers with respiratory lesions followed by trachea (79.84%), airsacs (78.84%), lungs (68.26%) and sinuses (57.00%).

The overall prevalence of MG in broilers with respiratory lesions was determined as 13.33% by polymerase chain reaction. Amongst these, 75% of birds found positive for MG were less than three weeks of age and 25% of samples positive for MG were from birds of seven to eight weeks of age. Maximal prevalence of CRD was observed in the month of January (30.76%). Seroprevalence of MG from broiler flocks was estimated as 54.00% by rapid slide agglutination test. Highest seroprevalence of MG was observed in December with 85.71% positive cases.

All birds affected with CRD had concurrent other bacterial infection. Microbial culture of the samples showed, 75% of positive CRD cases were concurrently infected with *E.coli* organism, whereas the percentage of other bacteria occurring along with CRD were found to be 62.50%, 37.50%, 25.00% and 12.50% for *Klebsiella sp*, *Salmonella sp*, *Pasteurella sp* and *Pseudomonas sp*, respectively. Synergistic pathological effect of *Mycoplasma gallisepticum* was observed with other bacteria in complicated cases of CRD.

PATHOLOGY AND ASSESSMENT OF CADMIUM TOXICITY IN BOVINE

Dr. Amita Dubey **Poornima Gumasta**
(Advisor) **(Researcher)**

ABSTRACT

The present study was undertaken to assess the cadmium level in the blood, liver, kidney, and lung of bovine in Jabalpur, to study correlating gross and histopathological changes in the tissues and to ascertain the extent of oxidative stress in blood and tissues with reference to cadmium level. The samples were collected from bovine reared near highways, industrial, urban and rural areas of Jabalpur. A total of 65 blood samples (40 cattle and 25 buffalo) and 62 tissue samples (51 cattle and 11 buffalo) of liver, kidney and lung were collected. These samples were acid digested in a microwave digester for estimation of cadmium level by inductively coupled plasma optical emission spectroscopy.

Blood cadmium concentration ranged from 0.099 to 0.685 ppm, and the observed mean concentration of cadmium in blood was 0.260±0.012 ppm. There was no significant difference observed in cadmium concentration between species, sex and age. Significant high blood cadmium levels were noted in bovine from industrial and urban areas as compared to rural areas. The results further indicated that 35 per cent bovine had moderate toxic blood cadmium concentration in range of 0.2-0.29 ppm and 34 per cent bovine had high toxic blood cadmium (>0.3 ppm). The hematological parameters were within the normal range of species.

Cadmium level in tissues ranged from 0.040 to 3.952 ppm in liver, 0.050 to 3.949 ppm in kidney and 0.020 to 3.134 ppm in lung. The mean cadmium concentration was 0.792±0.109 ppm in liver, 0.893±0.126 ppm in kidney and 0.622±0.087 in lung. No appreciable difference was observed in tissue level of cadmium with respect to species, sex and age. Cadmium concentration was normal in 66, 65 and 74 per cent of liver, kidney and lung tissues respectively and 26, 22 and 21 per cent of liver, kidney and lung tissues respectively had cadmium concentration within 1-2 ppm (low risk). Cadmium level of >2 ppm (high risk) observed in 8, 13 and 5 per cent liver, kidney and lung tissues respectively. No tissue sample had toxic concentration of cadmium.

Prominent gross lesions in the liver, kidney and lung of bovine were noted during the detailed postmortem examination of the animal. Microscopically, degenerative, inflammatory, circulatory and necrotic changes observed in liver, kidney and lung tissues of bovine with high cadmium concentration.

Increased oxidative stress was found in relation to cadmium concentration. Increased lipid peroxidation to 7.615±0.228 nmol/ml of RBC and decreased reduced glutathione to 0.567±0.032 mmol/ ml of RBC were determined in blood with high cadmium concentration. Immunohistochemical expression of malanodialdehyde and metallothionein was also observed more in tissues with higher cadmium concentration.

To conclude, blood cadmium concentration was alarmingly higher than the minimal toxic level of cadmium. Though tissues did not have toxic concentration of cadmium, but the study determined that a reasonable proportion of bovine tissues are under risk of cadmium accumulation. The various degenerative and inflammatory changes observed in target organs like kidney, liver and lung could be correlated with high cadmium concentration. Although, a frank increase in blood and tissues oxidative stress markers were noticed in present study.

PATHOMORPHOLOGY AND INCIDENCE OF DIFFERENT AFFECTIONS IN KADAKNATH BIRDS"

Dr. Supriya Shukla **Sushma Chakravarti**
(Advisor) **(Researcher)**

ABSTRACT

The present experiment was designed to study the Pathomorphology and incidence of different affections in kadaknath birds at poultry farm of college of veterinary science and animal husbandary Mhow.The duration period was April 2017–March 2018 in which 361 birds were found positive for various type of disease conditions out of a flock size of 1787.

The annual mortality due to different diseases out of a total 361 birds found dead included coccidiosis (38.50%), colibacillosis (15.51%), heatstroke (13.01%), enteritis (12.46) and others. The agewise highest incidence of 25.26% was recorded in adult birds and lowest incidence was obtained in chicks as 11.20%.The highest incidence of 23.37% was recorded in rainy season and lowest incidence was observed in winter season as 15.92%.Sexwise mortality in male birds as 21.38%,was equally comparable to female birds as 19.25%.Gross and histopathological lesions in kadaknath birds were simlilar to broilers, however, on cytology and histopathology the cell-mediated inflammatory response appeared to be stronger.

PREVALENCE ANDPATHOLOGY OF CAPRINE SUBCLINICAL PARATUBERCULOSIS

Dr. (Mrs.) Yamini Verma **Maneesh Jatav**
(Advisor) **(Researcher)**

ABSTRACT

Paratuberculosis or John's disease (JD) is one of the major economically important diseases of small ruminants has a worldwide distribution. The disease is caused by *Mycobacterium avium* subsp. *paratuberculosis* (MAP). The present study was carried out to determine the prevalence of subclinical paratuberculosis in goats of Jabalpur region and the associated enteric pathology of paratuberculosis in goats. The study was conducted for a period of eight months from July 2017 to February 2018. Goats of either sex, above 6 months of age, belonging to different breeds, and apparently healthy were selected for the ante mortem study. These comprised faecal samples collected directly from rectum of 160 animals belonging to Goat farm Amanala and private goateries in and around Jabalpur. The tissue samples from Intestine and Lymph nodes, comprising total 70 cases, were also collected from the slaughter house and the post mortem cases received during the study period. Detailed postmortem examination was conducted for all 70 goats and gross changes were recorded. All the samples for molecular diagnosis were kept at -20^{0}C for molecular diagnosis and tissues were preserved in neutral formalin for histopathological examination.

Smears from faecal samples along with intestinal scrapping and lymph node impression smear were prepared, dried and heat fixed. The smears were stained for presence of typical pink colour, rod-shaped acid fast bacilli (AFB) as individually or in clumps by Ziehl Neelsen staining method. Faecal and tissue samples were further processed for molecular detection of MAP genome by IS*900* PCR as per standard procedure. Tissue sections were stained with Haematoxylin and Eosin and Acid Fast Stains.

The antemortem prevalence of subclinical paratuberculosis was determined as 5 per cent (8/160) by Ziehl Neelsen staining and these goats were detected as AFB shedder whereas by molecular method only 1.25 per cent (2/160) faecal samples were found positive for MAP genome and these animals were considered infected with paratuberculosis.

Six goats (03.75 %) of Amanala farm followed by one (06.66 %) goat of Padwar village and one (06.25 %) goat of Barela village were found to be AFB shedders whereas MAP genome was detected in one (01.17 %) goat of Amanala and one (06.66 %) goat of Padwar village. Month wise highest prevalence was recorded in month of October.

Postmortem prevalence was recorded in 07.14 (5/70) per cent goats by Ziehl Neelsen staining of the intestine and lymph node smear and MAP genome was detected in intestine tissue of 04.28 (3/70) per cent goats. Out of 70 goats carcasses examined only three slaughtered goats were found positive for MAP infection by PCR. The associated enteric pathology of paratuberculosis in these cases was observed. Externally, body conditions of goats were observed as fair to normal healthy. Grossly, intestinal tract revealed distended, congested and watery to mucoid semisolid intestinal contents in the lumen. Mild to moderate thickening of intestine wall and focal to generalized mucosal corrugations were found. The associated mesenteric lymph nodes were pale, oedematous, enlarged with rounded borders and carded appearance. Cut surface observed as hemorrhagic and white gray foci on cortex regions of lymph nodes.

Microscopically, sections of small intestine revealed flattened, fused and club shaped villi, mild thickened congested mucosa due to infiltration of lymphocytes, polymorphs, plasma cells and macrophages in the mucosa. The epithelioid macrophages with foamy cytoplasm were also present few in number intermixed with lymphocytic infiltrations in the lamina propria and submucosa. Mild thickening of tunica muscularis with the presence of few lymphocytes in between the muscle fiber was observed**.** Infiltrations of mononuclear inflammatory cells and plasma cells were observed in between the crypt. Dilatation of crypt and lacteals and few multinucleated giant cells were also observed in submucosa. The serosa was oedematous and infiltrated with inflammatory cells**.** Peyer's patches revealed focal granulomas. Duplicate sections of intestine stained with Ziehl Neelsen staining revealed acid fast bacteria (AFB) laden epithelioid macrophages scattered in lamina propria and submucosa.

Sections of mesenteric lymph node (MLN) and ileo-caecal lymph nodes revealed mild thickening of capsule and trabeculae due to fibrous connective tissue proliferation. Infiltration of mononuclear cells and epithelioid macrophages with abundant, slightly foamy, pale cytoplasm and large nuclei were scattered in the subcapsular, cortical and paracortical areas**.** Duplicate sections stained with Ziehl Neelsen staining revealed acid AFB laden epithelioid macrophages scattered in the cortical area.

PREVALENCE AND PATHOLOGY OF COMPLICATED INFECTIOUS CORYZA IN DOMESTIC FOWL

Dr. Madhu Swamy **Sandeep Dwivedi**
(Advisor) **(Researcher)**

ABSTRACT

The present study was carried out to determine the prevalence of Avian Infectious Coryza caused by *Avibacterium paragallinarum,* prevalence of other bacterial infections in complicated cases of Avian Infectious Coryza and Pathology of multisystemic lesions in complicated Avian Infectious Coryza.

The study was carried out for a period of 8 months, from the beginning of July (2017) to February (2018). The screening of live birds for coryza was done in seven poultry farms in and around Jabalpur. The birds from these seven farms were randomly selected for clinical examination of coryza. Total 347 dead birds received at Department of Veterinary Pathology, Phoenix Diagnostic Laboratory and private poultry farms in and around Jabalpur were also examined for gross lesions of Coryza. Total 16 samples from the live birds of 07 different flocks were collected for determining the prevalence of *Avibacterium paragallinarum (*AP) by Polymerase Chain Reaction (PCR). Sixty pooled nasal, tracheal, conjunctival and infraorbital sinus swabs were collected from the dead birds with lesions of coryza and were subjected to PCR and 58 samples were processed for microbial culture. Tissues from the affected birds were collected for histopathological examination. Blood samples (n=50) were collected randomly from retail outlets for determining seroprevalence by slide agglutination test.

Ante mortem screening of the flocks revealed 40.74 % prevalence of coryza, maximum positive cases (60%) were recorded in flocks of Dharmpura region. Post mortem examination of total 347 carcasses of birds revealed lesions of coryza in 112 birds. The overall postmortem prevalence of coryza in and around Jabalpur was determined as 32.27%, with maximum (42.50%) positive cases recorded in the month of July. Maximum positive cases of coryza (18.75%) were recorded in Dharmpura region. The prevalence of coryza was observed significantly more in layers (57.89%) as compared to broilers (30.79%). The age wise study revealed 23.21% positive cases of coryza in starters whereas similar (38.39%) positive cases were recorded in growers and adult birds.

Ante mortem cases found positive for *Avibacterium paragallinarum* by PCR were 12.50% whereas postmortem positive cases were 13.33%. Maximum number of positive cases of Infectious coryza caused by *Avibacterium paragallinarum* were recorded in the month of December (42.80%). Overall prevalence of AP in birds having coryza was determined as 13.15% by PCR. Serological survey of AP revealed high positivity rates (66.66%) in the months of July and September with an overall seroprevalence of 44%.

From all the confirmed positive cases of AP, *E.coli* and *Klebsiella* were recovered from 62.50% of cases whereas *Salmonella* and *Pseudomonas* were present in 25% and 12.50% of cases respectively. Due to the concurrent bacterial infections all cases were considered as complicated Infectious coryza. For studying pathological lesions the positive cases were placed in four groups as per the concurrent bacteria isolated. Group 1 comprised birds with AP and *E coli*; Group II included birds with AP, *E coli a*nd *Klebsiella*; Group III had AP, *Klebsiella* and *Salmonella* and Group IV had AP and *Pseudomona*s.

Gross respiratory lesions of oculonasal discharge, conjunctivitis, swollen head, face, infraorbital sinuses, wattles and exudates in trachea were observed in all the birds. The severity of respiratory lesions was attributed to multiple bacterial infections and lesions were observed in visceral organs also in complicated infectious coryza.

Microscopic study revealed degeneration of surface epithelium of choanal folds, tracheitis along with cellular infiltration and hypertrophy of the tracheal mucous glands. Accumulation of fibrinous exudate in the parabronchial lumen and hyperplastic epithelium with increased number of goblet cells in lungs were observed. Haemmorhages, periportal necrosis and congested central vein along with foci of infiltration was observed in liver. Examination of the sections of heart revealed multifocal clusters of mononuclear cells around blood vessels and scattered within the muscle bundle. Renal tubular degeneration, glomerulopathy and cellular infiltration were observed in the microscopic sections of kidney in most of the cases.

COMPARATIVE STUDIES ON STRESS MYOPATHY IN RUMINANTS AND BIRDS

Dr. Madhu Swamy **Abhishek Sharma**
(Advisor) **(Researcher)**

ABSTRACT

The present study was designed with the objective to compare the stress myopathy and to evaluate oxidative stress in ruminants and birds with myopathy. The study was conducted for the period of 9 months (May 2018 to January 2019). The animals included in study comprised cattle and buffaloes, cattle calves, buffalo calves, goat, chital and chicken. Blood and tissue samples from large ruminants were collected from necropsy cases with non traumatic muscle lesions and minimal visceral organ gross pathology. Goat's samples were collected from slaughtered animals with a history of long transportation whereas samples from chital were collected from animals with history of dog chase. For domestic fowl (chicken) the samples were collected from birds in summer season with high ambient temperature and relative humidity. The collection of blood was done from the carcass at the time of necropsy for large and wild ruminants and at the time of slaughter for goats and chicken. The skeletal muscle tissues were collected from the shoulder (Trapezius) and hind limb (Gracilis) of animals and from breast bone (Pectoral muscle) of birds.

Muscle injury markers creatine kinase (CK), lactate dehydrogenase (LDH) and aspartate aminotransferase (AST) were estimated in serum samples using a semi automatic biochemical analyzer with commercially available kits. Formalin fixed tissues were processed for histological examination. Estimation of oxidative stress markers malondialdehyde (MDA) and reduced glutathione (GSH) in tissue homogenate was done following standard procedures. Concentration of vitamin E in the form of α tocopherol was estimated by Ultra High Performance Liquid Chromatography (UHPLC). Data gathered from the study were tabulated and analyzed using statistical descriptive analysis comprising mean, standard error and standard deviation with correlation coefficient.

The levels of all the three muscle injury markers were increased in serum of the animals and birds with muscle lesions. In cattle LDH was found to be the most efficient marker of myopathy whereas in buffaloes CK was found to be a more efficient marker to diagnose muscle degeneration. Interestingly, in goats both CK and AST were found to have a strong correlation with muscle injury. In chital the serum concentration of CK, LDH and AST were found to be raised in all the animals with capture myopathy when compared to that reported by earlier workers for healthy animals. There was a significant difference in serum concentration of CK and LDH between the birds with heat stress myopathy and healthy birds ($p \leq 0.01$). However, in birds with heat stress the muscle injury markers CK, LDH and AST were found to be weakly correlated with muscle lesions.

The serum vitamin E concentration in ruminants with myopathy was determined to be within the normal range. In all the domestic ruminants the serum vitamin E concentration showed insignificant variation between the healthy animals and animals with myopathy and no correlation was determined between the serum concentration of vitamin E and muscle lesions. However, in birds a significant decrease in serum vitamin E was observed in birds under heat stress. Moreover, a strong correlation was determined between serum concentration of vitamin E ($p \leq 0.01$) and heat stress myopathy.

Microscopic lesions of myopathy in domestic ruminants comprised non inflammatory muscle degeneration with fragmentation of muscle bundles. Fibrosis was negligible and regenerating foci were seen. Infection of sarcocyst in the muscle tissue with varying intensity was found in the large ruminants. In wild ruminants capture myopathy comprised mainly inflammatory muscle lesions with hyalinisation and fragmentation. Regenerating foci with multiple nuclei were also observed. The heat stress myopathy of chickens was observed to be largely necrotic and non regenerating in nature.

Oxidative stress marker GSH was found to be decreased in the muscles of all the affected ruminants and birds whereas the MDA concentration was increased in all the injured muscle tissue. Thus, it is concluded that oxidative stress present in damaged muscle tissue of domestic and wild ruminants and birds, whether, as a causative factor or is simply a by-product of muscle degeneration remains to be established.

ASSESSMENT OF LEAD, CADMIUM AND NICKEL TOXICOPATHOLOGY IN GOATS

Dr. Amita Dubey **Neha Shukla**
(Advisor) **(Researcher)**

ABSTRACT

The present study was undertaken to assess the lead, cadmium and nickel level in blood, liver, kidney, lung and muscles of goats in Jabalpur, to study the correlating gross and microscopic changes in tissues, to estimate the concentration of δ-aminolevulinic acid in serum and oxidative stress in tissues with reference to metal level.

A total of 67 blood and 57 tissue samples were collected from goats reared near highways, industrial areas, urban and rural areas of Jabalpur from organized and unorganised goat farms, slaughter house and post-mortem cases. The samples were subjected for acid digestion in a microwave digester and concentration of lead, cadmium and nickel were analysed by Inductively coupled plasma optical emission spectroscopy (ICP/OES). Representative samples of liver, kidney, lung and muscle fixed in 10% formalin for histopathological examination with reference to metal concentration.

The blood lead, cadmium and nickel level ranged from 0.140 to 2.884 ppm, 0.005 to 0.324 ppm and 0.083 to 7.158 ppm respectively. Mean blood lead, cadmium and nickel level recorded in the goats were 0.772±0.077 ppm, 0.121±0.008 ppm and 0.560±0.135 ppm respectively which were higher than the normal acceptable limit of respective metal. In present study significant and highest level of lead and cadmium recorded in studied industrial area followed by urban and rural areas as compared to the metal level in control goat. There was no significant difference observed in nickel levels between the 3 studied areas. Results reported that 25 percent goats had toxic blood lead level (1 to 5 ppm) and 8% had goats toxic blood cadmium (>0.2) and nickel level (2 to 7 ppm). The haematological parameters were within the normal limit of species and there was no association found between the metal concentrations and feeding practices followed by the farmers. There was no significant difference observed in metal levels between sex and age. There was decrease in body-weight of goats with reference to blood lead level.

The lead, cadmium and nickel concentration in tissues ranged from 0.361 to 5.849 ppm, 0.017 to 0.869 ppm and 0.0351 to 2.407 ppm respectively in liver. In kidney tissues, the concentration ranged from 0.134 to 8.290 ppm, 0.034 to 1.216 ppm and 0.072 to 2.474 ppm respectively for lead, cadmium and nickel. The concentration of metals ranged from 0.820 to 6.234 ppm, 0.000 to 1.055 ppm and 0.260 to 2.055 ppm in lung, whereas in muscle ranged from 0.217 to 5.653 ppm, 0.049 to 0.905 ppm and 0.135 to 1.806 ppm for lead, cadmium and nickel respectively.

The mean concentration of lead was higher in tissues than acceptable normal concentration up to 1 ppm (2.137±0.211, 2.025±0.250, 3.061±0.463 and 2.075±0.296 ppm). In present study, 8 liver, 7 kidney, 4 lungs and 2 muscle tissues showed the toxic concentration of lead >5 ppm. Mean cadmium concentrations in tissues were 0.318±0.032, 0.450±0.047, 0.443±0.070 and 0.356±0.043 ppm for liver, kidney and muscle respectively. 5 kidney and a lung tissue showed the concentration >1 ppm. Mean nickel concentration in liver, kidney, lung and muscle were 0.350±0.050, 0.494±0.053, 0.791±0.115 and 0.552±0.073 ppm respectively recorded in the present study. 2 liver and kidney, 4 lung and 2 muscles had toxic nickel concentration of >1 ppm.

The post mortem examination of the goats revealed various gross lesions in liver, kidney and lungs. Histopathological examination of tissues with toxic concentration of metal revealed hepatocyte vacuolation, fatty changes, necrosis of hepatocytes with inflammatory foci, periportal, inflammation along with haemosiderosis in liver of goats. Kidney showed congestion, dilated tubules with loss of brush border, desqumated epithelium, eosinophillic cast and nephropathic changes. Lung showed emphysema and

microscopic features of the pneumonia with cellular exudates. Occasionally, foci of inflammation noted in muscle tissue.

Increase level of δ-aminolevulinic acid (12.542±2.997 mg/l) in serum and oxidative stress marker Malondialdehyde (MDA) concentration in tissues (87.200±8.362 nM/g) were observed in relation to lead concentration.

PREVALENCE AND PATHOLOGY OF BRUCELLOSIS IN GOATS

Dr. Yamini Verma **Anujna**
(Advisor) **(Researcher)**

ABSTRACT

Brucellosis is a chronic infectious disease of livestock and human beings caused by facultative intracellular coccobacilli of genus *Brucella*. Economic losses due to the disease stem from breeding inefficiency, loss of kids, reduced meat and milk production.

The present study was carried out to determine the prevalence and the associated pathology of brucellosis in goats. The study was conducted for a period of eight months from August 2018 to March 2019. Total of 300 goats were screened. For serodection serum samples were collected from a total of 110 goats comprising of 50 goats with history of abortion and reproductive disorders and 60 samples randomly without any history of reproductive disorder. Milk sample was collected aseptically from 13 goats with a history of abortion. For isolation of organisms vaginal swabs were collected from 50 live goats with the history of abortion and other reproductive disorders. Uterine swabs from 25 goats (04- necropsy cases and 21- slaughtered animals) were collected. Stomach contents of foetuses (03- aborted, 22- slaughter house) were collected aseptically during PM examination. For pathological study representative tissue samples like uterus, spleen, lymph node and liver from 25 adult goats (04- necropsy cases and 21 - slaughtered animals) and liver, lung, kidney and spleen from 25 aborted foetuses (03- aborted, 22- slaughter house) were collected during post-mortem examination and fixed in 10 percent formal saline.

For serodetection of *Brucella abortus* antibodies Rose Bengal Plate Test (RBPT), Standard Tube Agglutination Test (STAT) and Milk Ring Test (MRT) was performed. The prevalence rates of brucellosis in goats was determined as 05.45 percent (06/110), 03.63 percent (04/110) and 30.76 percent (04/13) by RBPT, STAT and MRT respectively. A total of 07 *Brucella* isolates were obtained from 100 samples comprising of vaginal swabs, 03/50 (06 percent), from uterine swabs of adult goats 03/25 (12 percent) and stomach content swabs of aborted goat foetuses 01/03 (33.33 percent). The isolates suspected for *Brucella* produced characteristic small, pinpoint, glistening, smooth, circular colonies on *Brucella* Agar Medium with hemin and vitamin K1, no growth on MacConkey agar and non haemolytic colonies on blood agar. The isolates suspected for *Brucella* were further identified based on morphology as Gram negative coccobacilli by Gram's staining and red/pink coccobacilli by modified Ziehl- Neelsen staining and biochemical characteristics. *In-vitro* antibiotic sensitivity test was carried out and all the isolates showed 100 percent sensitivity for rifampicin, ceftriaxone and enrofloxacin conversely all the isolates were resistant to oxytetracyclin and penicillin. Also 57.14 percent of the isolates were sensitive to gentamicin and 42.85 percent were sensitive to streptomycin.

Grossly pathology of the 03 cases (01- necropsy case and 02- slaughtered animals) from which the isolates were obtained revealed thickened uterine wall, mucosal congestion, inflamed caruncles, hemorrhage and exudation in the lumen of the uterus. Microscopically, sections of uterus revealed infiltration of mononuclear inflammatory cells, periglandular and perivascular fibrosis, necrosis and sloughing of the superficial layer of mucosa, oedema in the endometrium, vacuolation of the smooth muscle cells. Microscopically supramammary lymphnode showed lymphoid depletion with infiltration of neutrophils and histiocytes, lymphoid depletion in the white pulp of spleen along with thickening of connective capsule and trabaculae. Hemorrhage and leucocytic infiltration in the liver was evident.

Grossly in the aborted foetus positive for *Brucella* isolate (01), lesions like moderate amount of hemorrhagic fluid in the body cavity, fibrinous perihepatitis, focal hemorrhagic areas on the surface of the lung and sub capsular hemorrhage on kidneys were observed. Microscopic lesions included mononuclear and polymorphonuclear cell infiltrations, degeneration and necrosis of hepatocytes in liver and diffuse tubulo-interstitial hemorrhage and leucocytic infiltration in kidney was observed, in the lungs thickened interlobular septa and alveolar lumen filled with inflammatory cells, and lymphoid hyperplasia and multifocal neutrophilic infiltration in spleen was evident.

STUDY ON FEMALE REPRODUCTIVE TOXICOPATHOLOGY ASSOCIATED WITH LEAD IN BOVINE

Dr. Amita Dubey **Mariya Lal**
(Advisor) **(Researcher)**

ABSTRACT

The present study was undertaken to assess the lead level in the blood, milk, uterus and ovary of bovine in Jabalpur, to study correlating gross and histopathological changes in the tissues and to determine the concentration of oxidative stress marker Malondialdehyde (MDA) in tissues, concentration of δ-aminolevulinic acid in serum with reference to lead level. The samples for study were collected from bovine reared near highways, industrial, urban and rural areas of Jabalpur. A total of 53 blood/milk samples (20 cattle and 33 buffalo) and 50 tissue samples of uterus and ovary (34 cattle and 16 buffalo) were collected, where 10 animals were healthy control and remaining were the bovine that was showing reproductive disorders. These samples were acid digested in a microwave digester and lead concentration is estimated by atomic absorption spectroscopy (AAS).

Blood lead level ranged from 0.30 to1.12 ppm with mean±SE of 0.58±0.025 ppm, which is quite higher than the minimal toxic level (0.35 ppm) in bovine. Significant high blood lead levels were noted in bovine from industrial and urban areas as compared to rural areas, indicated that 81 per cent bovine had moderate toxic blood lead concentration in range of 0.44-0.60 ppm and 9.5 per cent bovine had high toxic blood lead (>0.80 ppm). The haematological parameters were within the normal range of species. There was no difference observed in lead level between species and age.

Milk lead concentration ranged from 0.1 to 0.65 ppm with mean of 0.364±0.022 ppm, which is higher than acceptable standard of minimal toxic level of 0.1 ppm in milk.

Lead level in tissues ranged from 0.55 to 1.24 ppm in ovary and 0.64 to 1.35 ppm in uterus. The mean lead concentration was 0.812±0.028 ppm in ovary and 0.880±0.024 ppm in uterus. Lead concentration was normal in 54 per cent of ovary and uterus tissue and 30 per cent of ovary and uterus tissues had lead concentration within 0.81 to 1 ppm (low risk). Lead level of >1 ppm (at risk) observed in 16 per cent ovary and uterus tissues. There were good correlation in between the lead concentration in uterus and ovary. In the present study, bovine showed reproductive disorder and pathology had high lead concentration as compared to healthy control bovine.

Prominent gross lesions in the ovary and uterus of bovine were noted during the detailed post-mortem examination. Microscopically, ovary tissue revealed multiple follicular cyst, hyalization of corpus luteum, degeneration of luteal cells along with atretic follicles and fibrosis. Uterus tissues showed vacuolation, haemosiderosis and degenerative changes on endometrium with glandular hyperplasia and inflammatory cell infiltration. Inflammatory and fibrotic lesions observed in myometrium and perimetrium of the uterus.

Malondialdehyde (MDA) was found to be higher in tissues with high lead concentration indicating the increased oxidative stress. Higher level of δ-aminolevulinic acid in serum with high concentration of lead was found in present study.

“STUDIES ON THE INCIDENCE AND PATHOLOGYOF CANINE NEOPLASMS USING CONVENTIONAL AND ADVANCED DIAGNOSTIC TECHNIQUES”

Dr. Supriya Shukla
(Advisor)

Aditya Sharm
(Researcher)

ABSTRACT

The present study was designed to study the incidence and pathology of canine neoplasms using conventional and advanced diagnostic techniques. Fifty eight tumour samples were collected from dogs irrespective of their sex,breed, age and were grouped in three categories viz.Mammary,Skin and Visceral tumours.Overall incidence of tumours based upon their location was maximum in case of Skin (50%) followed by Visceral (25.86%) and Mammary (24.13%).Histopathologically,incidence was maximum for Fibrosarcoma (10.34%) followed by others. Malignant tumours accounted for 62.06% of all cases.

Haematological parameters of animals with malignant tumours revealed increased total leucocyte count and neutrophilia but a significant to mild decrease in Hb and PCV as compared to benign counterparts. In case of serobiochemical parameters, CRP was found to be elevated significantly in malignancy.

Cytology performed in 30 freshly incised tissues revealed 14 samples as benign and 16 to be malignant. Histopathological examination of 58 tumours revealed different histogenic patterns of different tumours and 1 benign, 13 malignant mammary, 12 benign and 17 malignant skin and 9 benign, 6 malignant visceral tumours were recorded.

Immunohistochemistry was applied in 30 tumour samples for confirmatory diagnosis. A panel of different markers such as F8, PCK, SMA, S-100, HER-2 etc. were used which further aided in knowing about the genesis of tumours.

Real time PCR was employed to study the overexpression of ERBB2 gene in tumour tissues. Six mammary, six skin and two visceral tumours were subjected to real time PCR. Overexpression of ERBB2 was found only in 2 skin tumours namely Fibrosarcoma and Apocrine adenocarcinoma in a range of 10 and 112 folds respectively.

DEPARTMENT OF VETERINARY PUBLIC HEALTH

PREVALENCE AND MOLECULAR CHARACTERIZATION OF *ESCHERICHIA COLI* FROM MILK AND ITS PRODUCTS

Dr. R.V. Singh
(Advisor)

Pragya Nema
(Researcher)

ABSTRACT

Milk and milk products are an important part of human diet as it contains many nutrients which are essential for maintenance and growth of the body. As milk and its products are also a good source of nutrients for the pathogens, so contamination of these products with the infectious agents may cause infections to humans and thus lead to food born diseases. Among bacterial pathogens, studies on *E. coli* had shown significant presence of virulent strains in different foods of animal origin which can cause food borne poisoning to life threatening complications.

Therefore, the present study was undertaken to assess the prevalence of *E. coli* in milk and milk products. The study also includes characterization of *E. coli* on the basis of amplification of strain specific genes with PCR and antibiogram profile. A total of 244 samples of milk and milk products comprising of 83 raw milk, 56 pasteurized milk and 105 milk products (53 ice cream and 52 shrikhand) were collected and screened for the presence of *E. coli* on the basis of various morphological and biochemical characters. An overall prevalence of 29.09% (71/244) was recorded in which highest prevalence was found in raw milk (53.01%) followed by pasteurized milk (21.42%), ice cream (20.75%) and shrikhand (7.69%) which showed the highly significance difference ($P < 0.01$) among the samples of raw milk, pasteurized milk, ice cream and shrikhand for *E. coli* contamination.

In molecular characterization, DNA was extracted by boiling and snap chilling method and used as template in PCR reaction for the detection of strain specific genes of *E. coli*. The results showed that a total of 9 (12.6%), 3 (4.2%), 6 (8.4%) and 2 (2.8%) isolates harbored *stx, eae, elt* and *est* genes, respectively.

Further, the *E. coli* isolates were subjected to antibiogram assay to observe the antimicrobial sensitive/resistance pattern against 16 antimicrobial agents. *E. coli* isolates exhibited sensitivity to streptomycin, chloramphenicol, netillin, gentamicin, norfloxacin, ciprofloxacin and ofloxacin, co-trimoxazole, amikacin, kanamycin and ceftazidime. The *E. coli* isolates were 100% resistant to nitrofurantoin followed by cefotaxime, ampicillin, nalidixic acid and tetracycline.

In conclusion, the study revealed that the milk and milk products used for human consumption in study area were contaminated with *E. coli* which indicates hygienic practices followed in dairies, by vendors, retailers etc wasn't satisfactory. The presence of virulent *E. coli* is also of concern due to their potential to cause infections ranging from mild diarrhea to life threatening cases viz. haemorrhagic colitis and haemolytic uremic syndrome.

PREVALENCE OF STAPHYLOCOCCUS AUREUS IN MILK PRODUCTS

Dr. R.V. Singh
(Advisor)

Savyasanchi Tripathi
(Researcher)

ABSTRACT

Milk and milk products are an important part of human diet as it contains many nutrients which are essential for maintenance an growth of the body. As milk its products are also a good source of nutrients for the pathogens, so contamination of these products with the infectious agents may cause infections to humans and thus lead to food born diseases. Among bacterial pathogens, studies on *S. aureus* had shown significant presence of virulent strains in different foods of animal origin which can cause food borne poisoning to life threatening complications.

Therefore the present study was undertaken to assess the prevalence of *S. aureus* in milk products. The study also includes characterization of *S. aureus* on the basis of amplification of strain specific genes with PCR and antibiogram profile. A total of 250 samples of milk products examined, 35 isolates of *S. aureus* were obtained showing an overall prevalence of 14%. The highest prevalence was observed in barfi (22%) followed by paneer (20%), dahi (12%), ice-cream (10%) and pasteurized milk (6%). The study in paneer revealed occurrence to be 30.0 % in local samples and 13.3 % in brand-I and brand-II. In dahi, local samples had higher presence of *S. aureus* (12.5%) followed by branded samples (10.0%). The examination in pasteurized milk displayed the presence of 9.0, 5.5 and 0 percent *S. aureus* in brand-I, brand-II and brand-III, respectively. The presence of *S. aureus* in local ice-cream was higher (15.0%) than branded items of ice-cream (11.1%).

The molecular study revealed that all the *S. aureus* isolates were positive for 16s ribosomal RNA (rRNA) of 228bp. Out of 35 isolates of *S. aureus*, none of the isolates were found to be positive for coagulase gene.

In vitro antibiogram study of all the isolates of *S. aureus* against 16 different antimicrobial revealed sensitivity to lincomycin and amikacin (80.0%), netlimicin (77.1%), chloramphenicol (74.2%), oflaxacin (74.2%), ciprofloxacin (68.5%), vancomicin (62.8%), erythromycin (57.1%) and ceftazidime (57.1%). *S. aureus* isolates showed resistance to amoxicillin (37.1%), tetracycline (37.1%), gentamycin (34.2%) and cefalexin (31.4%).

In conclusion, the study revealed that the milk product used for human consumption in study area were contaminated with *S. aureus* which indicates hygienic practices followed in dairies, by vendors, retailers, retailers etc wasn't satisfactory.

The presence of virulent *S. aureus* is also of concern due to their potential to cause intoxication within short incubation period (1-6h) symptom include nausea, vomiting with or without diarrhea to life threatening cases toxic shock syndrome.

ASSESSMENT OF BACTERIOLOGICAL QUALITY OF WATER IN AND AROUND JABALPUR CITY

Dr. R.V. Singh
(Advisor)

Bhawana Rani
(Researcher)

ABSTRACT

Water is a primary necessity of life. In its absence man and animals would survive for no more than a few days. Fresh water is approximately 3%, which is available for humans and animals use. As much as 70-75% and more than 90% of mammals and aquatic fauna are made up of water, respectively. Water is contaminated with various chemicals and infectious pathogen leading to 1.7 million deaths worldwide particularly in developing countries. The condition of waterborne diseases is further worsened due emerging pathogens like enteropathogenic or verotoxigenic *E. coli* and *Salmonella spp.*

Therefore, the present study is done to assess the bacteriological quality of water by standard plate count (SPC) and coliform count. The study also included prevalence of *E.coli* and *Salmonella spp.* in different drinking water sources and characterization of *E.coli* and *Salmonella spp.* on the basis of amplification of strain specific genes with PCR and antibiogram profile. Bacteriological quality of water by SPC, out of 135 water samples 17(12.59%), 41(30.37%), 20(14.81%), 12(8.88%) and 45(33.33%) samples had count >100 cfu/ml, 100-1000 cfu/ml, 1000-10000 cfu/ml, 10000-100000 cfu/ml, >100000cfu/ml respectively. None of the samples of Narmada river had count <100cfu/ml. Assessment of bacteriological quality of water by coliform count, out of 135 samples 8(5.93%), 65(48.0%), 18(26.0%), 17(12.6%), 11(8.15%) and 16(11.85%) had count 0-<3 MPN/100ml, 3-100 MPN/100ml, 100-200 MPN/100ml, 200-400 MPN/100ml, 400-1100 MPN/100ml and 1100- >2400 MPN/100ml respectively. All the samples of Narmada river had count >200MPN/100ml. The samples of tap water/public place water (4.0%), Narmada river water (60%) and panipuri water (35.0%) had count >2400MPN/100ml.

E.coli and *Salmonella spp.* on the basis of various morphological and biochemical characters revealed that, an overall prevalence of *E.coli* and *Salmonella spp.* 11.85% & 8.88% respectively highest prevalence was found in panipuri water (30%) for *E.coli* and in household purifier water (13.33%) for *Salmonella spp.*

The molecular characterization was done by boiling and snap chilling method and used as template in PCR reaction for detection of strain specific genes of *E.coli* and *Salmonella spp.* The result showed that, all samples were positive for *uspA* gene, a total of 1 (6.25%), 3 (18.75%) and 5 (41.66%) isolated harboured *stx1*,*stx2* and *invA* genes respectively.

Further, the isolates were subjected to antibiogram assay to observe the antimicrobial sensitive/ resistance pattern against 16 antimicrobial agents. *E.coli* and *Salmonella spp.* isolates exhibited sensitivity to chloramphenicol, streptomycin, kanamycin, co-trimoxazol, amikacin, ceftazidime, ciprofloxacin, netillin and oflaxacin. Isolates were resistant to tetracycline and nalidixic acid.

In conclusion, the study revealed that the drinking water used for human consumption in study area were contaminated with *E.coli* and *Salmonella spp.* indicates hygienic practice was not satisfactory. The presence of virulent of *E.coli* and *Salmonella spp.* are also of concern due to their potential to cause infections ranging from mild diarrhea to life threatening cases viz haemorrhagic colitis, haemolytic uremic syndrome, typhoid paratyphoid etc.

ASSESSMENT OF BACTERIOLOGICAL QUALITY OF MILK AND MILK PRODUCTS WITH SPECIAL REFERENCE TO *E.COLI* AND *SALMONELLA* SPP.

Dr. R.V. Singh **Pooja Singh**
(Advisor) **(Researcher)**

ABSTRACT

The present study was undertaken to assess the quality of milk and milk products through standard plate count (SPC) and coliform count. During SPC, 4.76 %, 64.2% and 30.9 % raw milk showed the count < 2lakh, between 2-10 lakh, and > 10lakh, respectively. Out of 42 Khoa samples 16.0%, 57.14% and 26.19% had displayed the count < 25,000, 25-75,000 and 75,000 respectively. 88.0 % and 11.9% ice-cream samples had shown count <250000 and > 250,000 respectively. 66.6% of flavored milk didn't show colony while 23.8% showed the count between 30-50,000. In dahi, 57.1% and 42.8% displayed the count between < 30000 and between 30– 50,000 respectively. Similarly, during coliform count, 64.2% raw milk, 35.71% ice-cream, 28.57% dahi, 21.4% flavored milk, 19.0% and khoa failed the standard of fssai.

A total of 210 samples of milk and milk products comprising of 42 raw milk and 168 milk products (42 khoa, 42 flavored milk, 42 ice-creams and 42 dahi) were examined for bacteriological quality and prevalence of *E. coli* and *Salmonella* spp. The overall prevalence of *E. coli* (23.33%) was recorded with the highest prevalence in raw milk (40.07%) followed by ice cream (28.57%), khoa (21.42%), dahi (16.66%) and flavored milk (9.52%). *Salmonella* spp. had shown prevalence of (7.61%), with (11.90%) in raw milk and dahi, followed by ice-cream (9.52%) and khoa (4.76%). Flavored milk was found negative for salmonella.

During molecular study, *uspA, stx1 and stx2 and invA genes were studied respectively* for *E. coli* and *Salmonella* spp. The results showed that a total of 55.1% (27/49) *E. coli* were positive for *uspA* Out of 27 *uspA* positives, 3(11.1%) and 8(29.62%) were possessing *stx1*and *stx2* respectively and 1(3.7%) had both *stx1* and *stx2* gene. Among salmonella isolates, 31.25% (5/16) had shown presence for *invA* gene.

Antimicrobial profile study against 16 antimicrobial agents revealed that *E. coli* isolates exhibited sensitivity to netillin 95.9% (47/49), gentamicin 87.7% (43/49), amikacin and chloramphenicol 77.5% (38/49), ofloxacin 71.4% (35/49), kanamycin 65.3% (32/49), norfloxacin 63.2% (31/49) and ciprofloxacin 59.1% (29/49) and resistant to nitrofurantoin 81.6% (40/49), ampicillin 75.5% (37/49), cefotaxime 71.4% (35/49), tetracycline 61.2% (30/49) and ceftazidime 55.1% (27/49). Salmonella isolates were found sensitive to netillin 100% (16/16), ofloxacin 87.5% (14/16), norfloxacin, ciprofloxacin and nalidixic acid 62.5% (10/16), streptomycin and amikacin 56.2% (9/16) and resistant to nitrofurantoin 81.2% (13/16), tetracycline 75.0% (12/16), co-trimoxazole 68.7% (11/16), ampicilline 56.2% (9/16) and cefotaxime 50.0% (8/16).

The study revealed that the milk and milk products used for human consumption in study area were contaminated with *E. coli and salmonella* spp. with poor microbiological quality which indicates unhygienic practices during production and handling of milk and milk products. The presence of virulent *E. coli* and *Salmonella* spp is also of concern due to their potential public health hazard to cause infections ranging from mild diarrhea to life threatening cases viz. hemorrhagic colitis, hemolytic uremic syndrome and gastroenteritis and typhoid in humans.

ANALYSIS OF WATER QUALITY IN JABALPUR CITY

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ABSTRACT

Water is a vital element for life. When water gets polluted, it not only affects the environment but also affects human and animal health. Due to unplanned urbanization and industrialization, water is getting contaminated with various impurities (microorganisms and chemicals like heavy metals, pesticides, etc).This alters the physic - chemical and biological parameters of water, resulting in various diseases. Various water resources around Jabalpur receive a large amount of domestic wastes, sewage, agricultural and industrial effluents daily. An immediate attention is required to determine the physical, chemical and bacteriological quality of water resources in Jabalpur. Thus, in the present study, a total of 117 samples from various sources like different banks of river Narmada (20), ponds (35), hand pumps (21), tube well (21), public taps (20) were collected and screened, out of which 111 (94.87%) sources had pH range between 6.5 - 8.5, 6 (5.12%) have had pH > 8.5. Forty five samples (38.46%) had total hardness > 6 mEQ/L i.e. very hard while 72 (61.53%) had range between 3 - 6 mEQ/L i.e. hard**. T**he coliform bacteria have been found in all samples tested. Out of 117 samples tested, 40 (34.18%) showed satisfactory result i.e. most probable number (MPN) count < 3, 38 (32.47%) were suspicious and rest 39 (33.33%) were unsatisfactory, as per recommendations of central pollution control board, **An overall prevalence of *E.coli*** was recorded 15.38% (18 / 117) with higher prevalence in samples of ponds - 34.28% (12 / 35), followed by **different banks of river Narmada –** 15.00% (3 / 20), public tap water – 10.00% (2 /20), hand pumps - 4.76% (1 / 21) and 00.00% in water from tube well. The molecular study revealed that *usp*A gene was detected in 15 out of 18 isolates i.e. 83.33%. *In vitro* antibiogram assay revealed that all the *E. coli* isolates were resistant to multiple drugs. Most of the isolates were sensitive to norfloxacin (94.44%), netillin (94.44%) and nalidixic acid (88.88%). The study of 117 water samples for the presence of lead, arsenic and selenium revealed the concentrations of metals between 0.097 - 0.450 ppm, 0 - 0.345 ppm and 1.365 - 2.047 ppm, respectively. The present study indicates wide spread pollution of different water resources with various chemical and biological contaminants. Besides variations were also observed in the recommended physical parameters of water samples. Thus, the study reflects an alarming situation for environment, public and animal health, so, there is need of immediate preventive and corrective measures to preserve wholesome quality of water.

STUDY ON INCIDENCE AND MOLECULAR CHARACTERIZATION OF *CLOSTRIDIUM PERFRINGENS* ISOLATES FROM MEAT IN JABALPUR CITY

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Shakuntala Birla
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ABSTRACT

Clostridium perfringens is one of the most common food borne pathogenic bacteria which have predominant role and importance in medical and food microbiology. *C. perfringens* is a gram positive, anaerobic, spore - forming, non - motile mesophilic rod. It is generally associated with different forms of enterotoxaemia in animals and gas gangrene in animals and man. Based on their ability to produce certain exotoxins, five types are recognized: types A, B, C, D and E. The food-poisoning strains belong to type A, and these strains are generally heat resistant. The food-poisoning strains of *C. perfringens* exist in soil, water, foods, dust, spices and the intestinal tract of humans and other animals and therefore, contaminate the foods particularly meat easily. In the present study, a total of 200 samples (50 each of buffen, chevon, chicken and fish meat) were examined for isolation of *C. perfringens*. Out of which 177 samples (44 buffen, 42 chevon, 44 chicken and 47 fish) showed black colony viz. sulphide producing organisms. On biochemical characterization, the overall incidence of *C. perfringens* was observed to be 23.00%. The highest incidence of *C. perfringens* was found in buffen - 14 (28.00%) followed by fish meat - 12 (24.00%), chevon and chicken each - 10 (20.00%). A total of 46 isolates of *C. perfringens* (buffen - 14, chevon - 10, chicken - 10 and fish meat - 12) were tested for lecithinase activity using egg yolk agar. The results revealed that the 100.00% isolates of buffen, chevon and chicken each while, 91.66% isolates of fish meat showed lecithinase activity. All the *C. perfringens* isolates showed amplified products to 16S rRNA and lecithinase (*cpa*) genes, while none of the isolates displayed enterotoxin (*cpe*) gene. *C. perfringens* isolates were found sensitive to ofloxacin and amoxicillin (82.60%), cefotaxime (65.21%), chloramphenicol (54.34%) and resistant to amikacin (89.13%), co-trimoxazole (69.56%), lincomycin (67.39%) and ceftazidime (63.04%). Sample wise antibiogram study revealed that ofloxacin was found to be 92.85% sensitive to isolates from buffen followed by fish (91.66%) and (70%) for chevon and chicken. Amoxicillin showed 91.66% and 90.00% sensitivity to isolates from fish meat and chicken, respectively, while, cefotaxime was 70.00% and 64.28% sensitive to isolates of chevon and buffen, respectively. Amikacin displayed 100% resistance towards isolates from buffen followed by chevon - 92.85% and chicken - 80.00%.

INCIDENCE AND CHARACTERIZATION OF *CLOSTRIDIUM PERFRINGENS* ISOLATES FROM MILK AND MILK PRODUCTS

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Sujata Meravi
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ABSTRACT

Clostridium perfringens is one of the most important bacterial food-borne pathogen of humans and animals. It is ubiquitous in nature. *C. perfringens* is a Gram positive, anaerobic, spore-forming, mesophilic rod. Based on their ability to produce certain exotoxins, *C. perfringens* is generally categorized as five types – A, B, C, D and E. The enterotoxigenic food poisoning strains mainly belong to type A and sometimes to type C. The food poisoning strains of *C. perfringens* exist in soil, water, foods, dust, spices and the intestinal tract of humans and other animals, therefore, contaminate the foods easily.

In the present study, a total of 250 samples of milk and milk products (50 each of raw milk, pasteurized milk, shrikhand, khoa and lassi) were screened for the presence of *C. perfringens*. The study revealed that 34 samples (raw milk – 11, shrikhand – 9, khoa – 10 and lassi – 4) showed presence of sulphide producing organisms. On biochemical characterization, the overall incidence of *C. perfringens* was recorded to be 8.4% (21/250).The occurrence in raw milk was 16% (8/50), khoa - 12% (6/50), shrikhand – 10% (5/50) and lassi – 4% (2/50). The pathogen was not reported from pasteurized milk. A total of 21 isolates of *C. perfringens* (raw milk – 8, shrikhand – 5, khoa – 6 and lassi – 2) were tested for lecithinase activity using egg yolk agar. The results displayed that 100% isolates each of shrikhand and lassi while, 83.3% isolates of khoa and 75% isolates of raw milk showed lecithinase activity. All the isolates of *C. perfringens* showed the presence of 16S rRNA and lecithinase (*cpa*) gene and 5 isolates (raw milk - 3, shrikhand - 2) showed the presence of enterotoxin (*cpe*) gene.

Antibiotic sensitivity test of *C. perfringens* against 16 antibiotics showed that isolates were found sensitive to ciprofloxacin (95.23%), ofloxacin (76.19%), vancomycin (61.90%) and resistant to amoxicillin (76.19%), ceftazidime (71.42%), co- trimoxazole (47.61%). Sample wise antimicrobial profile revealed that ciprofloxacin was found to be 100% sensitive to isolates from raw milk, khoa and lassi followed by shrikhand (80%). Ofloxacin showed sensitivity to 100% isolates from lassi, 87.5% isolates from raw milk and 80% isolates from shrikhand. Vancomycin showed 100% and 87.5% sensitivity to isolates from lassi and raw milk, respectively. Amoxicillin displayed 100% resistance towards isolates from lassi followed by raw milk - 87.5% and shrikhand - 80%. MAR (multiple antibiotic resistance) index for different isolates revealed that 15 (71.42%) isolates have MAR index greater than 0.2 which indicates high risk source of contamination and 6 (28.57%) isolates have less than 0.2. In conclusion, the findings indicated poor sanitary practices while dealing with milk and milk products viz. a public health threat as the pathogen is food borne zoonotic organism. Therefore, there is need to implement hygienic practices and to apply effective monitoring throughout the food processing and production chain.

INCIDENCE AND CHARACTERIZATION OF *STAPHYLOCOCCUS AUREUS* ISOLATES FROM CHICKEN MEAT AND READY TO EAT CHICKEN PRODUCTS IN JABALPUR CITY

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ABSTRACT

Staphylococcus aureus is leading cause of gastroenteritis resulting from consumption of contaminated food. *S. aureus* is a Gram-positive, non-spore forming organism which can grow at optimum temperature of 30-37°C, pH 7-7.5 and NaCl concentration upto 15-20%. It is a commensal and opportunistic pathogen that can cause wide spectrum of infection from superficial skin infection to severe and potentially fatal invasive diseases. Staphylococcal food poisoning is an intoxication that is caused by the ingestion of food containing pre-formed enterotoxin. Most of the *S. aureus* food poisoning occurrence are caused by A, B, C, D and E enterotoxins. The present study was undertaken to assess the incidence of *S. aureus* in 100 raw chicken meat and 70 ready to eat chicken meat products. The overall incidence of *S. aureus* was observed 38.82% from total 170 chicken meat samples with highest occurrence in raw chicken meat 38.00% and in ready to eat chicken (RTE) products 40.00% with chicken samosa (70%), followed by chicken momos (50%), chicken pattis (30%), chicken tikka (20%) and chicken barbeque(10%). The molecular study revealed that all the *S. aureus* isolates were positive for 16s ribosomal RNA (*rRNA*) of 228 bp. Out of 66 isolates, 3 (7.8%) isolates from raw chicken meat and 6 (21.42%) from ready to eat chicken products were found positive for *nuc* gene by molecular detection method. Out of the total *S. aureus* isolates 27 (71.05%) from raw chicken meat and 12 (42.85%) from ready to eat chicken meat products) isolates were found to be positive for *sea* gene. *In vitro* antibiogram study of all the isolates of *S. aureus* against 16 different antimicrobials revealed sensitivity to vancomycin (95.4%), ceftriaxone (92.4%), cefalexin (87.8%) and amoxicillin (83.3%). *S. aureus* isolates showed resistance to tetracyline (67.6%), lincomycin (51.5%), erythromycin (48.4%) and ceftazidime (43.9%). MAR index of various isolates indicates an overall range from 0.06-0.56 where in raw chicken meat and ready to eat (RTE) chicken products range varies from 0.06 to 0.56 and 0.06-0.37, respectively. Maximum isolates of *S. aureus* were resistant to one (25 isolates, MAR index 0.1) followed by resistance to 3 antibiotics (19 isolates, MAR index 0.3), resistance to 2 antibiotics (11 isolates, MAR index 0.2). In conclusion, the study revealed that the chicken meat and meat products in the study area were contaminated with *S. aureus* which indicates poor hygienic practices in slaughter house and retail outlets.

STUDY ON SEROPREVALENCE OF BOVINE BRUCELLOSIS IN AND AROUND JABALPUR CITY.

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ABSTRACT

Among zoonotic infections, brucellosis is numerouno among global zoonoses and is reported in more than 86 countries in the world including India (FAO, 2006). Brucellosis affects both animals as well as human health and therefore, directly affects animal productivity and human efficiency. The disease is endemic throughout India and there is a loss of 58.8 million US dollar annually. Therefore, a study was conducted to estimate the seroprevalence of bovine brucellosis in and around Jabalpur city by serological tests viz. Rose bengal plate test (RBPT), Standard tube agglutination test (STAT), 2-mercaptoethanol (2-ME) test and indirect enzyme-linked immunosorbent assay (I-ELISA).

A total of 450 sera samples were collected from bovines (cattle- 250 and buffalo-200) from 3 different dairy farms (one government and two private dairy farms) in and around Jabalpur city. In cattle, the seroprevalence was 12.00%, 12.00%, 4.00% and 45.56% by RBPT, STAT, 2-ME and I –ELISA respectively. The seropositivity in buffaloes by RBPT, STAT, 2-ME and I-ELISA was 25.00%, 33.0%, 7.00% and 35.75%, respectively. The overall seroprevalence was 17.77% - RBPT, 21.33% - STAT, 5.33% 2-ME and 55.86% by I-ELISA. The overall seroprevalence observed was highest by I-ELISA, followed by STAT, RBPT and 2-ME. All the RBPT positive samples were also found positive by STAT too (100.00%). Among the 80 RBPT positive samples, (74.75%) samples were positive by I-ELISA and only 3 samples were negative by I-ELISA. Twenty three negative samples in RBPT were also shown positive by I-ELISA. The total number of samples positive in both STAT and I-ELISA were 96. The present study indicates that large number of bovine population (> 15%) in and around Jabalpur city was affected with brucellosis. Since the disease is of zoonotic importance, the study reflects an alarming situation for occupational workers. Therefore, there is need of preventive and control measures in organized and unorganized dairy farm to reduce the occurrence of brucellosis.

ASSESSMENT OF *VIBRIO* SPECIES AND SOME HEAVY METALS IN WATER OF JABALPUR CITY

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ABSTRACT

Water is an important component of our life and when water gets polluted, it not only affects the environment but also affects human and animal health. Due to rapid industrialization and urbanization, water is getting contaminated with various biological and chemical impurities and thus, altering the biological and physiochemical parameters of water and resulting in various diseases. Various water resources around Jabalpur receive a large amount of domestic wastes, agricultural and industrial effluents and influencing water quality. Therefore, the present study was aiming to observe the physic-chemical and bacteriological quality of water. For this, in the present study, a total of 252 samples from various sources viz. different banks of river Narmada (30), ponds (60), hand pumps (60), public tap water (60) and tube wells (42) were collected and screened. An overall incidence of *Vibrio* spp. was 11.90%, with highest occurrence in ponds water (28.33%), followed by water from different banks of river Narmada (23.33%), public taps (6.66%) and hand pumps (3.33%). *Vibrio* spp. was not observed in tube wells water. The molecular characterization showed the presence of *16S rRNA* in 27 (90.00%) isolates and 2 (11.76%) isolates from ponds showed the presence of *Vibrio cholerae* gene. None isolates showed the presence of *toxR* gene which is mostly found in *V. parahemolyticus*. *In vitro* antimicrobial assay of *Vibrio* spp. against 16 antibiotics revealed that isolates were sensitive to ofloxacin (66.66%), norfloxacin (66.66%) and gentamicin (63.33%) and isolates were resistant to ampicillin (76.66%), nitrofurantoin (60.00%) and cefotaxime (60.00%). MAR (multiple antibiotic resistance) index for different isolates revealed that 23 (76.66%) isolates have MAR index greater than 0.2 which indicates high risk source of contamination and 7 (23.33%) isolates have less than 0.2The study of 252 water samples revealed presence of cadmium-69.80%, chromium-72.60%, and nickel-78.17%. The concentrations were between 0 - 0.066 ppm, 0.004 - 0.269 and 0.006 - 0.192 ppm of Cd, Cr and Ni respectively. Of the screened samples, 193 (76.58%) samples had pH in the range of 6.5 - 8.5, remaining 59 (23.41%) had pH >8.5. The total hardness of 217 samples (86.11%) were in the range of 3 - 6 mEQ/L i.e. hard and 35 (13.88%) were very hard having total hardness >6 mEQ/L. In conclusion, the findings indicates poor sanitary practices and effluents contamination in water resources and thus, there is a need of immediate preventive and corrective measures to preserve the wholesome quality of water.

ANIMAL NUTRITION

EFFECT OF FEEDING BYPASS PROTEIN BASED RATION ON PERFORMANCE AND CARCASS TRAITS OF KIDS

Dr. Sunil Nayak **Veer Pratap Singh**
(Advisor) **(Researcher)**

ABSTRACT

The objective of this study was to evaluate the effect of protected ground nut cake (GNC) on performance, nutrient utilization and carcass traits of growing goats. Fourteen healthy goat kids were randomly divided into 2 groups of 07 kids each as uniformly as possible with regard to their age and body weights and maintained on respective isonitrogenous and isocaloric rations. In treatment T_1 (control) kids were given untreated ground nut cake, while in treatment T_2 they were given ground nut cake chemically treated with formaldehyde (1.2 g of formaldehyde per 100 g crude protein) as a source of protein in their concentrate mixtures. Each kid in all the groups were stall fed on concentrate and roughage, in the ratio of 50:50. Feeding trial was conducted for 90 days. Results indicated that the highest ($p<0.05$) body weight (13.93±0.17 kg Vs 12.81±0.23 kg) and Average daily wt. gain (63.22±0.76 g Vs 51.05±0.69 g) were recorded with kids fed on protected GNC based ration (T_2) then control (T_1). Dry matter intake (DMI)of kids was not affected by feeding bypass protein based ration as average daily DMI (g) and DMI (kg) per 100 kg body weight or per kg metabolic body size of kids (0-90 days) on formaldehyde treated GNC based ration were similar to control (T_1). However, feed efficiency ratio (FER) was better in kids fed on formaldehyde treated GNC based ration (0.17±0.00) then untreated GNC based ration (0.15±0.00). DCPI (g) per kg metabolic body size significantly ($p<0.05$) increased (8.04±0.12g Vs 7.19±0.15g) in kids fed on formaldehyde treated GNC based ration then untreated GNC based ration, while intakes of Ca and P were not affected and they were similar to control. Digestibility of DM and all nutrients were significantly ($P<0.05$) higher with tested ration (T_2) than the control one (T_1). Average serum total protein concentration (g/dl) (7.85±0.15 g/dl Vs 7.03±0.19 g/dl) , albumin concentration (4.39±0.13 g/dl Vs 3.96±0.15 g/dl) and serum globulin concentration (g/dl) (3.46±0.16 g/dl Vs 3.07±0.12 g/dl) were significantly ($p<0.01$) and ($p<0.05$) increased in kids fed on formaldehyde treated GNC based ration then untreated GNC based ration, but average blood urea nitrogen concentration significantly ($p<0.05$) decreased (11.05±0.22 mg/dl Vs 13.69±0.12 mg/dl) in kids fed on formaldehyde treated GNC based ration. Dressing percentage of kids fed on formaldehyde treated GNC based ration was significantly ($p<0.05$) higher (46.82%) then control (44.15%).Better proportions (%) of primal cuts of the carcass were found of kids fed formaldehyde treated GNC based ration. Finally from the present study it is concluded that 1.2% formaldehyde treated ground nut cake can be incorporated in the diet of growing kids for better growth rate with low cost of raising.

USE OF PADDY REPLACING MAIZE WITH AND WITHOUT ENZYMES IN BROILERS

Dr. R.P.S. Baghel **Rahul Sharma**
(Advisor) **(Researcher)**

ABSTRACT

This experiment was planned to evaluate the use of paddy instead of maize at graded levels with and without enzymes on the performance, nutrients utilization, carcass traits and economics of broiler production. in broilers. 270, day old chicks were randomly distributed into 15 dietary treatments each with 3 replicates of 6 chicks each. Out of fifteen treatments, treatment one (T_1) and two (T_2) acted as control. The control diets contained 2800 Kcal ME/kg and 22% CP. Remaining 13 treatments were formulated using different levels of paddy replacing maize with and without enzymes. Thus, dietary treatments T_3, T_4, T_5, T_6 and T_7 were formulated using 20, 40, 60, 80, 100% paddy, respectively, replacing maize, without enzymes. While, T_8, T_9, T_{10}, T_{11} and T_{12} were formulated to contain 20, 40, 60, 80, 100% paddy, respectively, replacing maize, with enzymes (30g/ Q feed). Dietary treatments T_{13}, T_{14} and T_{15} were formulated to contain 60, 80, and 100% paddy, respectively, instead of maize with enzymes (50g /Q feed).

Results indicated that 60% paddy instead of maize without enzymes as well as with enzymes (30g & 50g/Q diet) produced significantly ($p<0.05$) higher weight gain in broilers. Among all the treatments, best performance was noted in broilers assigned 60% paddy instead of maize with 50g enzymes/Q diet. Feed intake was significantly higher in broilers allotted T_5 diet. FER was significantly higher in T_2 and T_{13} groups. PI was significantly ($p<0.05$) higher in broilers assigned T_{13} diet. DM retention was significantly higher in broilers allotted T_2 and T_{13} diets while, CP retention in T_{15} diet. Ca as well as P retention was significantly higher in broilers allotted T_2 diet. Dressed, eviscerated and drawn weights were significantly higher in broilers of T_{13} group. Liver and heart weight (%) was significantly higher in groups assigned T_7 and T_{12} diet, respectively. While, gizzard weight (%) were significantly higher in T_7 and T_{12} diet. Spleen weight (%) was significantly ($p<0.05$) higher in T_{13} and T_3, T_5, T_7, T_9, T_{12}, groups. Pancreas weight (%) was significantly higher in T_{15}, T_{11}, and in T_3 groups. Giblet weight (%) was significantly ($p<0.05$) higher in T_7 group. Total processing losses were significantly higher in T_{15} groups while, it was significantly ($p<0.05$) lower in T_9 groups. Net return over feed cost/kg weight gain and net return over feed cost on total weight gain in 5 weeks was significantly ($p<0.05$) higher in T_{13} groups. Group T_{13} was found most economical among all the groups.

On the basis of results, it was concluded that use of 60% paddy instead of maize without and with enzyme (30g/Q and 50g/Q feed) in the diet of broilers improved their performance, nutrient utilization, carcass yield and was found economical. Further, use of 60% paddy instead of maize with 50g enzyme/Q diet was most economical.

AMELIORATIVE EFFECT OF HERBAL BINDER ON EXPERIMENTAL AFLATOXICOSIS

Dr. Sunil Nayak (Advisor)

Shaikh Sumaiya (Researcher)

ABSTRACT

The chicken egg is a cheap source of high quality protein, is readily available and popular among consumers. Iodine supplementation in layer diets could increase the levels of iodine in hen eggs and can lead to prevention of iodine deficiency in humans. Therefore, the objectives of this study were to investigate the effect of supplementation of layer diet with different levels of iodine on performance, iodine content of eggs, egg quality traits and cost of production.

A total of 135 layers of 55 weeks of age were randomly distributed to 5 dietary treatments with 3 replicates and 9 layers in each. T_1 was basal layer diet without iodine enrichment (Control), in which iodine content (I_2) was as per NRC recommendation (0.45 mg/kg). Layer diets T_2, T_3, T_4 and T_5 were same as T_1 except that in these diets iodine was supplemented as calcium iodate Ca $(IO_3)_2$ @ 5, 10, 15 and 20 mg/kg, respectively. Therefore, dietary iodine (I_2) content in diets T_2, T_3, T_4 and T_5 were 3.25, 6.50, 9.75and 13.00 mg/kg, respectively. All the diets were formulated as per NRC recommendation (1994)). The experimental diets were formulated as per NRC (1994) specification. The laying hens were fed the respective experimental diets *ad libitum* during experimental period of ten weeks.

The cumulative performance of laying birds fed on different levels iodine from 55 to 65 weeks period in terms of feed intake, cumulative feed intake, hen day production, average egg weight, feed conversion ratio per dozen eggs and per kg eggs and cost of production was determined and study indicated that inclusion of higher levels of iodine (9.75 and 13.0 ppm) reduced their performance (weight gain, feed intake, percent hen day production and egg weight) significantly ($P<0.05$). However, it was significant ($P<0.05$) only when inclusion level of I_2 was above 6.50 ppm. Hens receiving 3.25ppm to 6.50ppm I_2 (T_2 and T_3) produced better egg quality traits (shape index, albumen index, yolk index and HU), while hens receiving higher levels of iodine (9.75 and 13.0 ppm) showed better egg shell thickness. Significantly ($P<0.05$) higher dry matter utilization as well as retention of nutrients (CP, EE, CF and NFE) where seen in hens receiving 3.25 and 6.50 ppm of iodine. But increase in the level of I_2 above 6.50ppm adversely affected on these parameters and decreased dry matter intake and nutrient utilization significantly.

Increasing iodine levels in diet of hens from 0.45 to 13.0 mg/ kg significantly ($P<0.05$) increased egg iodine concentration, therefore highest concentration of egg iodine was observed for the group fed diet supplemented with 13.0ppm followed by those fed 9.25, 6.50 3.25 and 0.45 mg iodine /kg diet. The levels 3.25 and 6.50 mg iodine / kg diet increased egg iodine concentration without any adverse effect on egg production. Boiling reduces 10-15% iodine content of egg. Therefore, the consumers are ensured to receive the optimal levels of iodine from boiled iodine-enriched eggs.

Among different diets, minimum and significantly lower cost Kg feed per dozen or Kg eggs was noticed in hens allotted T_3 diet (6.50 mg I_2 / kg). However, hens receiving 3.25 and 9.25 mg I_2 / kg diet produced statistically ($P<0.05$) similar cost Kg feed per dozen or Kg eggs as control groups (T1). Further, cost Kg feed per dozen or Kg eggs was significantly increased due to inclusion of higher level of iodine (13.0ppm).

Taking all the production factors of the laying hens from this study it was concluded that an iodine content of 3.25 mg/kg to 6.50 mg/kg in the diet of laying hens are better for production of iodine enriched eggs without any adverse effect on egg production and egg quality.

COMPARATIVE STUDIES ON THE EFFECT OF POLYHERBAL AGENTS, ORGANIC ACID AND ANTIBIOTIC AS FEED ADDITIVES ON THE PERFORMANCE OF BROILERS

Dr. A. S. RANE **Shamim Ali**
(Advisor) **(Researcher)**

ABSTRACT

The present study was under taken to evaluate the comparative effect of polyherbal agents, organic acid and antibiotic as growth promoters on the performance and nutrient utilization in broilers in which one hundred sixty day old "vencob" chicks were randomly distributed into four T0, T1, T2 and T3 groups. Each treatment group thus contained forty chicks with four replicate of ten birds in each groups. The control (T0) group was fed with basal diet only. The (T1) group with basal diet containing polyherbal agents @ 250 g/tn of diet, T2 group was fed the basal diet with organic acids @ 1kg/ton of diet and T3 groups was fed the based diet with antibiotic @500gm/ ton of diet respectively. The weekly body weight, body weight gain, feed consumption, feed conversion ratio, carcass characteristici and nutrient utilization was recorded and subjected to statistical analysis. The result revealed that the feed intake was higher in (T0) control group and least feed intake was recorded in T1 group followed by T2 and T3. The average body weight was highest (1913 gm) in T1 group followed by T2 and T3 groups.

The FCR was markedly better (1.55) in T1 group, 1.63 in T2 and 1.76 in T3 in comparison to T0 group that was 1.85.

The dressing percentage was found to be significantly higher in polyherbal treated group. However the nutrient utilization data did not differ between the treatment groups. Economically the net profit was higher in polyherbal group that was Rs. 26.87 per bird, T2 was Rs. 19.14, T3 was Rs. 12.19 and in T0 group net profit was only Rs. 7.59.

So it may be concluded that polyherbal agent and organic acid can be used instead of antibiotic as growth promoter in boiler to make the meat free from drug residue and to get better market value.

PERFORMANCE OF BROILERS SUPPLEMENTED WITH DIETARY LECITHIN

Dr. M. K. Mehta **Ritesh Rajput**
(Advisor) **(Researcher)**

ABSTRACT

Experiment was conducted to study the effect of supplementation of soya lecithin on broilers performance. For this 160 day old chicks were divided in four groups with 40 birds in each group . the feed was formulated according to NRC 1994 in which 5% soya oil was added in control group and it was replaced by 25%, 50% and 75% in treatments groups. At the end of trial effect of soya-lecithin at different levels in broiler ration, growth rate, feed conversion efficiency, nutrient utilization, blood lipid profile and carcass quality were evaluated.

The results of the experiment implied that, when soya lecithin added in the broilers ration the growth , feed conversion efficiency was significantly ($P<0.01$) improved. There was positive effect on dry matter, crude protein and ether extract utilization while, the utilization of other nutrients was not influenced by different level of soya lecithin in ration, although the crude fiber digestion lowered on treatment group.

The effect of soya lecithin on reducing the serum total cholesterol and serum LDL cholesterol was significant ($P<0.01$), while there was no effect on serum HDL cholesterol. The effect of lecithin supplementation on carcass traits was not much promising, but there was increase in abdominal fat percentage.

EFFECT OF PROTEASE SUPPLEMENTATION ON LOW PROTEIN DIET IN BROILERS

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(Advisor)

Chisty Syed Salman Chisty Syed Sadruddin
(Researcher)

ABSTRACT

The present experiment was conducted to determine the effect of protease supplementation on performance, nutrient utilization and carcass traits of broilers. A total out of 270 day old broiler chicks 216 chicks were randomly assigned to nine dietary treatments and each dietary treatment consisted of three replicates of eight chicks in each. The basal diet (Diet 1) was formulated as per ICAR (1998) specifications and contained 22% CP and 2800 kcal ME per kg diet. Diet 2 was same as basal diet except that in this diet CP content was reduced to 20%. Whereas Diet 6 was also same as basal diet except that in this diet CP content was further reduced to 18%. Diet 3, 4 and 5 were same as diet 2 except that in these diets protease was supplemented @ 100,200 and 300 g/ton. Similarly, Diet 7, 8and 9 were same as diet 6 except that in these diets protease was supplemented @ 100,200 and 300 g/ton. Experiment was conducted for 5 weeks. Individual body weights of chicks and replicate- wise feed intake were recorded at weekly interval. Feed efficiency ratio (FER) and PI was calculated as per formula.

The utilization of nutrients was studied by conducting a metabolic trial at the end of the experiment. For study the carcass traits, two broilers in each replicate were sacrificed on completion of experiment. The overall performance for broilers (0-5 weeks) indicated that broilers fed the basal diet (22% CP) grew better and had a better feed efficiency ratio (FER) than did those fed the lower protein diets (20% and 18% CP). Supplementation of different levels (200% and 300%) of protease to low protein diet (20%CP) improved performance of broilers and retention of protein as compare to supplementation at 100%. However, supplementation of different levels (100% and 200%) of protease to further low protein diet (18%CP) had showed no effect on performance of broilers as compare to higher levels of protein diets (20% and 22% CP). Different levels of protein and supplementation of protease in diets did not show any significant effect on carcass trait. The protein level can be reduced in broiler diet up to 20 percent than standard without any adverse effect on birds for economical broiler production.

It is concluded, that 300 gram protease/ton supplementation had improved overall performance of broilers as well as digestibility of crude protein in different low protein diets.

EFFECT OF ESSENTIAL OIL OF THYME AND CINNAMON ON THE PERFORMANCE OF BROILERS

Dr. R.P.S. Baghel
(Advisor)

Shrikant Dilip Gawande
(Researcher)

ABSTRACT

Present study was planned to see the effect of feeding different levels of essential oils (EO) of thyme (TM), cinnamon (CN) and their combinations (COM) on performance, nutrients utilization, carcass traits, hematobiochemical parameters and economics of broiler production. In the experiment, two hundred and ten, day old broiler chicks were randomly distributed into 7 dietary treatments (T) with 5 replicates of six chicks each. Diets were formulated as per NRC (1994) specifications containing 23% and 20% CP along with 3200 Kcal ME/ kg diet, respectively in starter and finisher diets (T_1). Two different levels of essential oils (200 and 300ppm) were used in the treatments: No EO (T1), 200 (T2) and 300 ppm (T3) EO derived from thyme, 200 (T4) and 300 ppm (T5) EO derived from cinnamon, 100 ppm TM + 100 ppm CN (T6), 150 ppm TM + 100 ppm CN (T7). Experiment was carried out for 5 weeks.

Results showed significantly ($p<0.05$) higher performance (body weight gain, FER and performance index) in broilers supplemented with 300 ppm essential oil of TM (T3) and CN (T5) followed by 200 ppm supplemented groups, except in combination groups in which 200 ppm COM (T6) showed highest performance followed by 300 ppm COM group (T7) compared with control group, which showed lowest performance. The feed intake decreased significantly ($p>0.05$) in TM supplemented groups however, it was significantly ($p<0.05$) higher in cinnamon containing group and in COM diets, initially it increased in T6 but use of higher dose reduced it. Nutrients retention was not affected significantly ($p<0.05$) by use of thyme and cinnamon except DM and EE in T3, T5 T6 and T7 group. Carcass yield (dressed weight, drawn weight and eviscerated weight) of TM and CN essential oil supplementation group were significantly ($p<0.05$) higher in 300 ppm (T3 and T5) supplemented groups. While, use of combination of oils in the diets produced significantly higher carcass yield with 200 ppm supplement group.

In thyme and cinnamon essential oil supplemented groups, maximum weight of liver, pancreas, gizzard and giblet was noted in T3 and T5 followed by T2 and T4 groups in comparison to control. Within, Combination group, organs weights were highest within T6 group. Use of thyme and cinnamon essential oil at 300 ppm level (T3, T5 and T6) in alone and in combination increased various hematobiochemical parameters. While, increase in the level of thyme, cinnamon and combination of EO's, increased the blood constituents significantly (TEC and TLC) and reduced the serum cholesterol and Heterphil to Lymphocyte ratio. In thyme supplemented group (200 and 300 ppm) net return over feed cost/ kg body weight gain was lower in comparison to control (T1). While, use of cinnamon oil as well as combination of thyme and cinnamon oil (T5 and T6) resulted in to higher net return over feed cost/ kg body weight gain.

Hence, it is concluded that supplementation of 300 ppm of cinnamon oil and combination of 100 ppm of thyme and 100 ppm cinnamon oil enhanced the performance of broilers and was most economical.

EFFFECT OF ZINC SUPPLEMENTATION ON GROWTH PERFORMANCE AND IMMUNE RESPONSE IN GOATS

Dr. Sunil Nayak **Lovely Thakur**
(Advisor) **(Researcher)**

ABSTRACT

This experiment was designed to evaluate the effects of supplemental zinc (Zn) on performance, nutrient digestibility, serum mineral profile and immune response in growing goats. Twenty four healthy goat kids were randomly divided into 4 groups of 06 kids each. Kids were fed basal ration (total mixed ration, TMR) consisted of concentrate feed mixture and green berseem to meet the nutrient requirements of goats (NRC, 1981). Each kid in all the groups were stall fed on concentrate and roughage, in the ratio of 50:50. Kids in the group one were fed basal diet which contains 29.02 mg/kg DM zinc from ingredient of ration without any Zn supplement in their minerals mixture. Kids in the 2, 3 and 4 groups were fed the same basal diet of group one with additive 20, 50 and 100 ppm Zn (as $ZnSO_4$) in their diets, respectively. Feeding trial was conducted for 90 days. A digestion trial on kids was conducted for 7 days at end of experiment to know the digestibility of nutrients. Blood samples were collected from all the animals at 0 day and at end of study to estimate certain serum minerals. The effect of Zn feeding on the humoral and cell mediated immunity was also assessed towards the end of feeding trial.

Results indicated that average daily gain (ADG) ($p<0.05$) were increased by Zn supplementation, but at higher level (100.0 mg Zn/kg DM) ($p>0.05$) of supplementation it decreased. Maximum and significantly higher average weight gain was observed in kids fed diet containing 50.0 mg Zn/kg DM. Dry matter intake (DMI) of kids was not affected by supplementation of different levels of zinc on their basal ration, as average daily DMI (g) and DMI (kg) per 100 kg body weight or per kg metabolic body size of Zn supplemented kids were similar to control. However, feed efficiency ratio (0.135±0.01) was better in kids fed diet containing 50.0 mg Zn/kg DM than control (0.086±0.01). Zn supplementation had no influence on digestibility of dry matter, ether extract, crude fiber and nitrogen free extract ($p >0.05$). However, digestibility of crude protein was better in Zn supplemented groups. Serum Zn concentrations were increased ($p<0.05$) by Zn supplementation but serum manganese and copper concentration did not differ ($p>0.05$) among the groups. However, serum Fe concentrations tended to be decreased ($p<0.05$) by Zn supplementation. The Haemagglutination titre of kids sensitized with chicken red blood cells at three different intervals were observed for humoral immune response. Haemagglutinating antibody titre increased to maximum level at 28 day post inoculation. 50 and 100 mg Zn/kg DM has significantly higher immune response as compared to control at all the three intervals. Skin fold thickness of kids sensitized with phytohaemagglutinin-P was conducted to observe the cellular immune response. Skin fold thickness was significantly higher at 24 hours post inoculation indicating improved immunity with 50 and 100 mg Zn/kg DM as compared to control. Thus, on the basis of the present experiment, it may be concluded that supplementation of 50 mg Zn/kg DM as $ZnSO_4$ in the basal diet (containing 29 mg Zn/kg DM) of the growing goats significantly improved their growth rate and digestibility of crude protein and also produced better serum Zn concentrations and cellular and humoral immune response.

EFFECT OF CARBOHYDRASES SUPPLEMENTATION ON THE PERFORMANCE OF BROILERS

Dr. Sunil Nayak **Kumar Govil**
(Advisor) **(Researcher)**

ABSTRACT

The present experiment was conducted to determine the effect of carbohydrases supplementation on performance, nutrient utilization and carcass traits of broilers. A total out of 180 day old broiler chicks 150 chicks were randomly assigned to six dietary treatments and each dietary treatment consisted of five replicates of five chicks in each. The basal diet (Diet 1) was formulated as per BIS (2007) specifications and containing protein and energy 23%CP, 22%CP, 20%CP and 3000kcal ME/kg diet; 3100kcal ME/kg diet 3200kcal ME/kg diet in Pre starter, Starter and Finisher diet, respectively. Diet 2 was also same as basal diet except that in this diet energy is reduced by 100kcal ME/kg. Diet 3, 4, 5 and 6 were same as diet 2 except that in these diets carbohydrases was supplemented. In diet 3, xylanase is supplemented @ 100 g/ton, in diet 4 Mannanase enzyme supplemented @ 100 g/ton**,** in diet 5 Amylase enzyme supplemented @ 80 g/ton. Whereas, diet 6 was combination of carbohydrases enzymes supplemented @: Xylanase @50 g/ton + Mannanase @50 g/ton + Amylase @40 g/ton. Experiment was conducted for 6 weeks. Individual body weights of chicks and replicate-wise feed intake were recorded at weekly interval. Feed efficiency ratio (FER) and PI was calculated as per formula. The utilization of nutrients was studied by conducting a metabolic trial at the end of the experiment, whereas to study the carcass traits, two broilers in each replicate were sacrificed on completion of experiment.

The overall performance for broilers (0-6 weeks) indicated that broilers supplemented with multicarbohydrase grew better and had a better feed efficiency ratio (FER), followed by xylanase supplemented broilers. Supplementation of multicarbohydrase to marginally deficient in energy diet improved performance of broilers and retention of protein and fat. However, supplementation of mannanase had showed no significant effect on performance of broilers. Supplementation of multicarbohydrase in broiler diets had shown significant increase in carcass yields by reducing processing losses. Thus, energy level can be reduced in broiler diet by 100kcal ME/kg than standard while supplementing their diets with multicarbohydrase without any adverse effect on birds for economical broiler production. It is concluded, that multicarbohydrase (Xylanase @50 g/ton + Mannanase @50 g/ton + Amylase @40 g/ton) supplementation had improved overall performance of broilers as well as digestibility of crude protein in low energy diets.

EFFECTS OF VARIOUS ENERGY AND PROTEIN LEVELS ON PERFORMANCE OF KADAKNATH BIRDS

Dr. M. K. Mehta
(Advisor)

Seema Mourya
(Researcher)

ABSTRACT

Kadaknath birds are native to Jhabua district of Madhya Pradesh and are getting popular as meat bird because of better market value than broilers, due to this reason now a days organised poultry farming of Kadaknath birds is increasing. Due to lack of research work the nutrient requirement for Kadaknath birds are not well defined. The Present study was planned with view to find out optimum level of energy and protein in the ration of the Kadaknath birds because they are slow growing birds and attain 1 kg live weight about 6-7 months, it was assumed that they required less energy and protein as compared to standard broiler ration. Accordingly 4 experimental groups of Kadaknath birds namely control, T1, T2 and T3 were formed. Each treatment group was divided into four replicates of 10 birds in each. The experimental birds were offered standard broiler ration to control group and 90%, 80% and 70% of CP & ME of standard broiler to T1, T2 and T3 group respectively.

The result of the experiment indicated that feed intake, body weight gain and FCR was found to be optimum in the control group as compared to other 3 groups as the % of CP and energy content of ration lowered, the performance of Kadaknath birds progressively declined. The observations suggestted that being meat purpose breed inspite of having slow growth their nutrient requirement might be comparable to broilers. The nutrient utilisation and carcass characteristic also suggested similar facts. The economics of production on different rations suggested that by diluting the nutrients although the cost of ration reduced, but due to a compensatory increase in the feed intake and corresponding negative impact on body weight gain resulted into no economical benefit of low cost rations. So this may be concluded that if Kadaknath bird is to be reared for economical meat production they must be given ration rich in protein and energy similar to standard broiler ration.

NUTRITIONAL STUDIES DURING ADVANCED PREGNANCY IN CROSSBRED COWS IN RELATION TO REPRODUCTIVE AND METABOLIC DISORDERS

Dr. R.K. Jain **Pradeep Sharma**
(Advisor) **(Researcher)**

ABSTRACT

The experiments was conducted with the overall objective to evaluate the macro and micro nutrients levels in available feedstuffs and existing feeding practices to know the nutrient status of during advanced pregnancy crossbred cows initially village around the Veterinary College, Mhow, Indore district of Malwa region of M.P. in order to suggest the strategic nutrient supplementation to overcome common reproductive problems and metabolic diseases prevalent in dairy animals. The experiment was conducted in three phases. In phase I, a survey was conducted to find out the existing feeding practices and prevalence of reproductive, metabolic disorders and mastitis in the crossbred cows, around veterinary college Mhow, M.P. Samples of feed and fodder being fed to the crossbred cows, from each village were collected in plastic bags and pooled. Each sample was analyzed in triplicate for proximate principles (DM, CP, EE, CF, NFE, TA and AIA), major elements (Ca and P) and trace elements (Fe, Cu, Mn, Zn and Co). In phase II, out of total advanced pregnant crossbred cows observed during phase-I, twenty identical, healthy adult advanced pregnant crossbred cows were selected randomly. Average feed intake, body weight, nutrient availability of individual animal was compared with the nutrient requirement calculated with the help of feeding standard to work out the nutrient deficiencies/excess. On the basis of result obtained in phase I and II a strategic nutritional supplement, containing deficient nutrients, was evolved. These animals were divided into two groups (un-supplemented and supplement). Each group having ten animals. This study was conducted in last trimester. During this period of study individual animal of both groups were examined for occurrence of common pre and post parturient reproductive (Retention of placenta, vaginal/uterine prolapse) and metabolic disorders (milk fever, haemoglobinuria, downers cow syndrome, ketosis) on the basis of clinical symptoms and mastitis (subclinical and clinical). The body condition score was also measured in both groups of animals during the period of study. Milk yield was also measured for four weeks post calving.

The results of study indicated that available feeds were roughage (wheat straw, gram straw, masoor straw soybean straw) concentrates (wheat bran, cotton seed cake, concentrate mixture) and green roughages.

USE OF FORTIFIED SOYMILK ON GROWTH PERFORMANCE OF BUFFALO CALVES

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(Advisor)

Dharmendra Singh Yadav
(Researcher)

ABSTRACT

The present study was conducted to study the effect of using fortified soymilk as milk replacer on growth performance and economics of raising Murrah buffalo calves. Twenty four Murrah buffalo calves of either sex after colostrum/milk feeding for 5 days were selected and randomly distributed to four different dietary treatments. Treatment-1 (T_1) was control in which calves were fed only buffalo milk. While, in Treatment-2 (T_2) and 3 (T_3), buffalo milk and soymilk fortified with vitamins and minerals (vitamin A + vitamin D_3 + vitamin E + calcium + iodine + sodium + phosphorous + zinc) in 40: 60 and 20:80, respectively were given for feeding. Treatment-4 (T_4) was same as T_3 except in this case fortified soymilk was also supplemented with enzymes (proteinase + xylanase + pectinase). Soymilk was prepared from graded yellow variety of soybean seeds which were grounded and the powder was dissolved in water @ 125 g per litre. Mixture of water and soy powder was boiled at 100°C for 10-15 minutes with constant stirring and after cooling it was strained with fine muslin cloth. During experiment calves were reared under standard managemental practices and were offered measured quantity of feed (milk/soymilk, calf starter and green roughage). Body weights, body measurements (wither height, body length and heart girth) and faecal score of all the calves were recorded at fortnightly intervals. Blood samples of all the calves were collected at monthly interval and subjected to haematological examination (Hb, PCV and DLC). At the end economics of calf rearing was calculated and data recorded was analysed statistically.

The chemical composition of fortified soymilk indicated that it has much lower quantity of fat, lactose, ash and total solids in comparison to buffalo milk. Body weight gain of the calves was statistically similar among different groups during different fortnights. The dry matter intake through milk or fortified soymilk varied significantly ($P<0.05$) depending on the amount of feeding during different periods. Dry matter intake through calf starter and green were non-significant in different groups during different fortnights. Overall dry matter intake in different groups ranged from 1.17 to 1.28 per cent of the body weight and was significantly ($P<0.05$) higher in control group than fortified soymilk fed groups. FCR of different groups was statically similar. Use of fortified soymilk instead of buffalo milk did not influence the body measurements, faecal score and haematological parameters of calves significantly ($P>0.05$). In comparison to whole milk feeding, use of fortified soymilk @ 60 or 80 per cent, reduced the feeding cost significantly ($P<0.05$) and was minimum in calves fed a combination of 80 per cent fortified soymilk supplemented with enzymes and 20 per cent buffalo milk. However, use of enzymes did not produce much significant change. Hence, it was concluded that fortified soymilk can be a very good substitute of buffalo milk and up to 80 per cent of buffalo milk can be saved from calf feeding by using fortified soymilk with 63.93 per cent savings in expenditure.

EFFECT OF PRILL FAT AND PROTECTED CHOLINE SUPPLEMENTATION ON PERFORMANCE OF LACTATING MURRAH BUFFALOES

Dr. Sunil Nayak (Advisor)

Rajesh Kumar (Researcher)

ABSTRACT

Present study was designed to evaluate the effect of prill fat and protected choline supplementation on performance of lactating Murrah buffaloes. Murrah buffaloes (n=18) were divided into three groups of six each, based on milk yield, fat per cent and stage of lactation. All buffaloes were fed similar basal diet, comprising 12-15 kg green fodder, 8-10 kg wheat straw and concentrate mixture. Concentrate mixture was given according to the level of milk production to meet the requirements for maintenance and milk production as per feeding standard given by Kearl, 1982. Buffaloes in group T_1 were daily supplemented with prill fat @ 2.5% of total DMI per animal whereas, buffaloes in group T_2 were supplemented with 54 g protected choline along with prill fat fed @ 2.5% of total DMI per animal. Feeding trial was conducted for 90 days. Observations regarding daily feed intake, daily milk yield, fat per cent etc. were recorded during the experiment. Body weights and body condition score of each buffalo under different groups were recorded at the start and at completion of experiment. Milk samples were collected on 30th day, 60th day and 90th day from each buffalo in different treatment groups and were analyzed for its composition. Blood samples were collected from all the experimental buffaloes at 0 day and at the end of experiment to estimate various blood biochemical parameters including NEFA. Economics of milk production over feed cost was also calculated in different treatment groups.

Average daily dry matter intake (kg/d) and body weight (kg) of buffaloes were not affected by supplementation of either prill fat or prill fat along with protected choline but BCS was improved due to supplementation. After supplementation of with prill fat alone or with RPC the average milk yield (kg) and milk fat (%) of lactating Murrah buffaloes were increased significantly ($p<0.01$) by 0.99 kg and 0.41 units and 1.78 kg and 0.73 units in T_1 and T_2 groups, respectively as compared to the control. The average 4% FCM (kg/d), ECM (kg/d) and fat yield (kg/d) was significantly ($p<0.01$) higher in T_2 followed by T_1 and control groups. There was no difference in milk composition except milk fat (%) and total solids (%) which were improved significantly ($p<0.01$) in supplemented groups. NEFA concentration (mmol/l) in the blood was decreased significantly ($p<0.01$) by 5.0 and 9.0% in prill fat alone and prill fat along with RPC supplemented groups whereas, average blood triglyceride level (mg/dl) of respective groups were increased by 10.98 and 15.39%, as compared to control group. Supplementation of prill fat alone or along with RPC had no influence ($p>0.01$) on blood glucose and cholesterol levels of buffaloes. Net profit/animal/day (Rs.) was 8.25 and 3.12% higher in T_2 and T_1 groups than control. The study revealed that prill fat supplementation in the ration helped in improving performance of early lactating Murrah buffaloes by increasing milk yield and fat percent which can be further enhanced by supplementing the ration with rumen protected choline.

FFECT OF XYLANASE ANDPROTEASE ENZYMES IN DIETS ON PERFORMANCE OF KADAKNATHBIRDS IN DIFFERENT SEASONS

Dr. M.K. Mehta
(Advisor)

Sandeep Gupta
(Researcher)

ABSTRACT

India is home to nineteen breeds of indigenous fowl including onewell-known native breed "Kadaknath" or "Kalamasi" meaning a fowl havingblack flesh. Although the Kadaknath breed has many unique characteristics, it has been neglected because of its poor production potential. In recent trends,the higher use of single activity enzymes like xylanase and protease in commercial poultry feed for improving their performance can also improve performance in Kadaknath breed. The result of enzyme supplementation be season based also. Efforts for attaining higher body weight in short dura tcioannis still a subject of research for this breed. An experiment was conducted withtotal Six hundred chicks which was divided in to three phases for winter,summer and rainy season. Two hundred Kadaknath chicks were randomlydivided into four equal groups with five replicates and each replicate consisted of 10 chicks in each season. Experimental control diet (T_0) for pre starter, starter and finisher birds consisted of maize, soybean meal and feed additives based on BIS (2007) for broilers. Treatment diet one (T_1) was supplemented with 0.1kg/ton xylanase enzyme (min. 16000 bxu/kg) with reducing dietary ME 100 Kcal/kg and 1.75 % CP; treatment diet two (T_2) was supplemented with 0.25 kg/ton protease enzyme (min. 32500 pu/kg) with reducing dietary ME 50 Kcal/kg and 4 % CP and Treatment diet three (T_3) was supplemented with both xylanase and protease on same dose in T_2 and T_3, respectively with reducingdietary ME 150 Kcal/kg and 5.75 % CP. The cost of all The experimental dietswas worked out after considering the cost of ingredients, supplements and costof enzyme supplementation. The average body weight gain and average feed in take were recorded fortnightly. A metabolic trial was conducted during 6th fortnight of growth period. Five birds per treatments were slaughtered after six fortnights of age to study the carcass yield and its composition. The average body weight, feed consumption, FCR and EI were not significantly ($P > 0.05$) different among treatments. Nitrogen retention and crude protein digestibilitywere observed significantly ($P < 0.05$) higher in protease supplemented group in summer season where as crude fat digestibility was recorded significantly ($P < 0.05$) higher in T_2 and T_3 protease supplemented group of different seasons. Dry matter and crude fibre digestibility were observed significantly ($P < 0.05$) higher in T_1 of winter and summer seasons. There was no effect of treatmenton carcass traits and its composition among all treatments in different seasons.The profit per bird was recorded higher in both xylanase and proteasesupplemented group. In the above study, it was concluded that the growth performance was improved in xylanase, protease and combination of both supplemented group in comparison to control group. Combination of xylanase and protease was found more profitable in rearing of Kadaknath birds.

EFFECT OF RATION BALANCING ON PERFORMANCE OF LACTATING BUFFALOES UNDER FIELD CONDITION

Dr. R.K. Jain
(Advisor)

Anil Kumar Yadav
(Researcher)

ABSTRACT

Sixteen identical healthy lactating graded murrah buffaloes were selected from the field and divided in to two equal groups (Group I, un-balanced and Group II, balanced ration groups) eight animals in each on the basis of body weights and milk yield. Group I was fed as per the practice of farmer while the ration of all animals of group II was balanced for DCP, TDN, Ca, P and carotene based on standards for buffaloes. This feeding was continued for 90 days. Weekly DM intake and daily milk yield were recorded. Milk samples were collected fortnightly and analyzed for fat %. The economic impact of ration balancing was also assessed.

Rations of selected buffaloes were adequate in TDN, slightly higher in DCP (+12%) and Ca (+16%) but marginally deficient in P (- 17%) and carotene (vitamin A, (-) 13%). Impact of ration balancing indicated that there was significant ($P<0.05$) increase in DMI in treatment group (balanced ration) as compared to control group (unbalanced ration). The milk yield was significantly ($P<0.05$) higher in treatment group (9.21 ± 0.11 kg/h/d) as compared to control group (8.48 ± 0.14 kg/h/d). The milk fat % was significantly ($P<0.05$) higher during 5th and 6th fortnight in treatment group (balanced ration) in comparison to control (unbalanced ration) group. After ration balancing, there was an average reduction in feeding cost (Rs/kg milk) from 21.68 to 20.65. It was also observed that the ration balancing increased the farmer's daily net income by Rs 23 (Rs 155 to 178) per animal.

EFFECT OF ORGANIC ACID SALTS SUPPLEMENTATION ON THE PERFORMANCE OF BROILERS

Dr. Sunil Nayak (Advisor)

Jitendra Singh Tomar (Researcher)

ABSTRACT

A study was conducted to investigate the effect of dietary supplementation of different organic acid salts, an antibiotic growth promoter and probiotic alone or the probiotic combined with the prebiotic on the performance, nutrient utilization, carcass traits and immune response of broiler chickens fed a corn-soya diet. Two hundred and fifty two, day old Cobb commercial broiler chicks were randomly distributed in to 14 experimental groups, each group consisted of 3 replicates and 6 chicks per replicate. The standard broiler diets (T1) were formulated as per BIS (2007) specifications. There were total 14 dietary treatments. In the control group, birds were fed diets without any organic acid salts (T1) while same diet of experimental groups were supplemented with 2% sodium acetate (T2), 2% calcium sorbate (T3), 2% calcium propionate (T4), 2% sodium butyrate (T5), and 2% sodium lactate (T6). However, Diets T 7, T8, T9, T10 and T11 were same as T 2, T3, T4 and T5 and T6 except that same organic acids were supplemented at higher level i.e. @ 3% of the diet. Further, Diet T12, T13 and T14 were same as control group but supplemented with probiotic (*Saccharomyces boulardii*), Probiotic (*Saccharomyces boulardii*) + Prebiotic (MOS) and Bacitracin Methylene Disalicylate (BMD), respectively. Experiment was conducted for 6 weeks.

The results of present study indicated that the birds feed efficiency, nutrient utilization and immune response were improved ($p<0.05$) by dietary supplementation of tested organic acid salts (sodium acetate, calcium sorbate, calcium propionate and sodium butyrate) at 3% level, when compared with the control. However, use of above organic acid salts had no significant ($p>0.05$) effect on carcass characteristics of broiler chicken. Further, amongst the organic acid salts supplemented groups, best performance, nutrient utilization and antibody response to Newcastle disease vaccine was recorded in broilers fed the diet supplemented with calcium sorbate @ 3%, however, they were comparable to the birds fed on synbiotic and BMD supplemented diets. The order of performance of broiler birds fed on different tested organic acid salts were as follows from higher to lower order: calcium sorbate > sodium butyrate, calcium propionate, sodium acetate > sodium lactate. Similarly, the different feed additives other than organic acid salts, prebiotic + probiotic (synbiotics) and antibiotic growth promoter improved the performance of the birds significantly ($p<0.05$). Significant ($p>0.05$) reduction in the total caecal bacterial count of birds fed diets containing antibiotic and organic acids were also noted. The significant improvement in birds performance when the prebiotic and probiotic were supplemented together suggests a synergism between them.

From the present result it is concluded, that supplementation of calcium sorbate (3%) improved overall performance, digestibility of DM, CP and GE, immune response as well as economical weight gain in broiler chickens.

EFFECT OF DIETARY INCLUSION OF *SACCHAROMYCES CEREVISIAE* (CNCMI-1077) ON NUTRIENT UTILIZATION AND GROWTH PERFORMANCE OF KIDS

Dr. A.K. Patil **Rahul Singh Panwar**
(Advisor) **(Researcher)**

ABSTRACT

This experiment was conducted to study the effect of dietary inclusion of *Saccharomyces cerevisiae* (CNCMI-1077) on nutrient utilization and growth performance of kids. Thus twelve local goat kids of approximately similar age (4-6 months) and body weight were randomly allotted to two equal groups ((n=6). Basal diet consisting gram straw, green peepal leaves and concentrate mixture were fed to both the groups as per requirement given by ICAR, (2013). In addition to basal diet, the animals of treatment group (T_1) were fed *Saccharomyces cerevisiae* (CNCMI-1077) @ 0.5 g/h/d (10 billion cfu) whereas, the control group was remains unsupplemented. The study was conducted for 120 days. Blood samples were collected from each animal at the 0 and 120 days of the feeding trial to study haemato-biochemical profile of kids. After 90 days of experimental feeding a digestion trial of 6 days was conducted to assess the utilization and digestibility of nutrients.

The results indicated significantly higher intake of DM, OM, CP, EE, ADF, NDF and CF in supplemented group while digestibility of all nutrients was similar between both the groups. The feed conversion efficiency was significantly ($P<0.05$) better (8.97) in *S. cerevisiae* supplemented group in comparison to control group (9.02). Similarly, the average daily gain was increased by 5.23 percent in treatment group than group. The haemato-biochemical parameters like Hb, PCV, RBC, WBC, Platelet count, Glucose, TP, Albumin, Globulin, A:G were statistically ($P>0.05$) comparable among both the groups.

From the results it can be deduced that the dietary supplementation of *S. cerevisiae* (CNCMI-1077) tended to improvement in feed conversion efficiency and average daily gain (5.23%) of kids. However supplementation did not have any effect on digestibility of nutrients and haemato biochemical profile of kids.

EFFECT OF SUPPLEMENTATION OF WHEY PROTEIN AND PROBIOTIC ON PERFORMANCE OF BROILERS"

Dr. Sunil Nayak **Shanu Singour**
(Advisor) **(Researcher)**

ABSTRACT

The study was conducted to investigate the effects of dietary supplementation of whey protein and probiotic on performance, nutrient utilization, immune response, serum biochemical Parameters, carcass traits, anti-oxidant property and economics of broiler production. Two hundred and ten, day old Cobb commercial broiler chicks were randomly distributed in to 7 experimental groups, each consisted of 6 replicates of 5 chicks each. The standard broiler diets (T0) were formulated as per commercial chick feed specification (Pre starter: 0-14 days, 22.5%CP and 3000 kcal ME/kg diet; Starter: 15-28 days, 21.0 %CP and 3125kcal ME/kg diet and Finisher: 29-42 days, 19.50%CP and 3250kcal ME/kg diet). Diet T1 was same as T0 but supplemented with 5% Liquid whey / litre of drinking water. Diet T2 and T3 was same as T0 but supplemented with 1.0 g and 1.5 g whey protein concentrate/kg diet, respectively. Diet T4 was same as T0 but supplemented with1g/kg probiotic (*Saccharomyces boulardii*, 2 billion cfu per g). Diet T5 and T6 was same as T2 and T3 diets except supplemented with 1 g/kg probiotic (*S. boulardii*, 2 billion cfu per g). Experiment was conducted for 6 weeks. Individual body weight and replicate-wise feed intake of broilers were recorded at weekly interval and there after feed conversion ratio (FCR) was calculated. The nutrients utilization was studied by conducting a metabolic trial at the end of the experiment. Serum biochemical Parameters were studied in blood. At end of trial (42 days), birds were sacrified for performing carcass traits, breast muscle proximate composition and its anti- oxidant property. Humoral immunity towards Newcastle disease virus was measured by performing Haemagglutination inhibition test.

The results (0-6 weeks) of present study indicated that supplementation of whey protein either as liquid whey (5%) or whey protein concentrate (@ 1gram and1.5 gram/kg diet) to the basal diet of broilers significantly ($P<0.05$) improved their overall performance (live weight, body weight gain, feed intake and feed conversion ratio), nutrient utilization (dry matter digestibility, ether extract digestibility and protein digestibility) and produced better immune status, anti-oxidant status and carcass traits. However, when broilers were fed on supplemented whey proteins in combination with probiotic further improved ($P<0.05$) their overall performance, nutrient utilization, immune status, anti-oxidant status and carcass traits, as compared to those assigned basal diet, 5% liquid whey supplemented diet and whey protein concentrate diets. There were significant effect ($P<0.05$) on total protein, triglyceride, HDL-cholesterol and LDL-cholesterol due to treatments. LDL and triglyceride were significantly decreased with increasing the level of whey protein supplementation. Carcass yield, giblets and abdominal fat percentage of broiler chicks at 6 weeks were affected by dietary treatments.

Similarly, feed additive other than whey proteins, probiotic improved the performance of the birds significantly ($P<0.05$).The order of performance of broiler birds fed on whey proteins were as follows from lower to higher order: 5% liquid whey < whey protein concentrate @ 1gram/kg < whey protein concentrate @ 1.5 gram/kg < whey protein concentrate (@ 1 and 1.5 gram/kg) in combination with probiotic.

It could be concluded that dietary supplementation of whey protein concentrate (@ 1gram/kg) in combination with probiotic (@1gram/kg) could improve growth performance of broiler chickens, induce desirable changes in bird's health and the intestinal tract metabolism, in addition to increase carcass yield, giblets and lowering blood content of cholesterol, which means more healthy product with reduced feed cost per kg weight gain.

DEPATMENT OF ANIMAL GENETICS AND BREEDING

ASSOCIATION OF IL-8R AND LACTOFERRIN GENE POLYMORPHISM WITH MASTITIS IN FRIESWAL CATTLE AND MURRAH BUFFALOES

Dr. S.N.S. Parmar
(Advisor)

Papori Sharma
(Researcher)

ABSTRACT

Bovine mastitis is the most complex disease condition mainly because of multiple causative agents, poor understanding of the early immune response & complexities associated with mammary epithelial cell damage by both agent & the host factors. Additionally, the poor understanding of the underlying phenomenon in subclinical state of the infection complicates the therapeutic interventions.

The milk samples of lactating cows in peripartum period were screened for mastitis by CMT test and confirmed by using somatic cell count of milk. The blood samples from 30 Frieswal cows & 30 buffaloes were collected from Military dairy farm and private dairy farms. About 5-10 ml blood was collected from each cow for extraction of genomic DNA. After PCR amplification of the 3 genes (IL-8R(bovine), bovine Lactoferrin and Bubaline Lactoferrin genes), the bovine genes were subjected to RFLP analysis and the bubaline Lactoferrin gene was subjected to SSCP analysis.

The RFLP analysis of bovine IL-8R and LTF gene exhibited different patterns (genotypes) which were analysed by Chi-square test. The bovine IL-8R gene showed two genotypes AB and BB and two alleles A and B with gene frequency of 0.33 and 0.67.The healthy animals exhibited BB genotypes with a mean $\log_{10}$SCC of 4.81±0.08.The subclinical and clinical animals exhibited AB genotype with mean $\log_{10}$ SCC of 6.23±0.07 and 6.38±0.06 respectively. The AA genotype was found to be missing from the studied population. The Chi-square test of significance revealed that the population was not in Hardy-Weinberg equilibrium ($P<0.01$). The bovine Lactoferrin gene showed 3 genotypes GG,GC & CC and 2 alleles G and C. GG genotype was shown by 5 subclinical mastitic animals, GC genotype was shown by 5 subclinical and 10 clinical mastitic animals with mean $\log_{10}$ Somatic Cell Count (SCC) of 6.23±0.07 and 6.38±0.06 for subclinical and clinical mastitis respectively. All 10 healthy animals showed CC genotype with mean Somatic Cell Count of 4.81±0.08. The allelic frequency of G was 41.67% and 58.33% for allele C .The studied population was found to be in Hardy-Weinberg equilibrium (at 5% level of significance). The Bubaline Lactoferrin (Exon7) gene when subjected to SSCP revealed monomorphic pattern by all three classes.

The present study indicates that the animals of BB genotype for bovine IL-8R gene and CC genotype for bovine Lactoferrin gene were found to be resistant for mastitis with low somatic cell count. Hence, the BB genotype for IL-8R gene and CC genotype for LTF gene should be selected for future breeding. As the Bubaline Lactoferrin gene showed monomorphic pattern, therefore a large sample size will be required in future to study polymorphism pattern in Murrah buffaloes.

GROWTH HORMONE GENE POLYMORPHISM AND ITS ASSOCIATION WITH GROWTH TRAITS IN SIROHI AND BARBARI GOAT

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ABSTRACT

Growth hormone (GH) plays an important role in postnatal longitudinal growth and development, tissue growth, lactation, reproduction, as well as protein, lipid, and carbohydrate metabolism. Effects of GH on growth are observed in several tissues including bone, muscle and adipose tissue. Work was undertaken to study GH gene polymorphism and its association with body weight and body measurements at different ages in kids of Sirohi and Barbari breeds of goat.

Forty kids each of Sirohi and Barbari breeds of goat were included in the study. Genomic DNA was isolated from venous blood as per standard procedure. Purity and concentration of genomic DNA was determined by using Nanodrop spectrophotometer. DNA samples with optical density (OD) ratio1.7-1.9($OD_{260/280}$) diluted with autoclaved milli Q water to contain 30-40 ng DNA /µl of solution were used for PCR amplification. Quality of genomic DNA was assessed by using 0.8% horizontal submarine agarose gel electrophoresis. Good quality genomic DNA samples giving intact bands with no smearing were used for further analysis. The procedure of PCR was standardized by optimizing reaction mixture and time temperature combination for annealing, denaturation and extension. The restriction digestion of PCR product was performed using two enzymes viz. *HaeIII* and *MspI* separately.

The *MspI* digest revealed similar band pattern for all the animals indicating that GH gene locus was monomorphic for this restriction endonuclease. The RFLP pattern for *HaeIII* showed the presence of two bands of 422 and 366 bp. Only two genotypic variants were observed viz., AB showing both the bands and BB showing only band of 422 bp; with their respective frequencies of 0.82 and 0.18 in Sirohi and 0.90 and 0.10 in Barbari goats. The frequencies of A and B alleles were respectively 0.41 and 0.59 in Sirohi and 0.45 and 0.55 in Barbari breed. None of the two breeds was in Hardy-Weinberg equilibrium for these variants.

To determine the association of polymorphic variants of GH with different growth traits the least squares analysis of variance was performed to separate the effect of breed, GH genotype and their interaction. There was no significant effect of GH genotype on body weights and body measurements viz., chest girth, paunch girth, body length and wither height at any age from birth to 180 days. However, the genotype AB was constantly superior for body weights and all the body measurements at different ages across both the breeds. The interaction between breed and GH genotype was also non significant. But the effect of breed was found significant ($p<0.05$) on body weight at birth and at 45 days of age and highly significant ($p<0.01$) from 1st to 4th week of age. The effect of breed was highly significant ($p<0.01$) for all the body measurements at all the ages except at 135 days of age where it was significant ($p<0.05$). It can be concluded that this GH gene locus can not be used for selection of goats for higher body weights and measurements.

STUDIES ON CHROMOSOMAL ABERRATIONS IN RELATION TO REPRODUCTIVE ABNORMALITIES IN CATTLE

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(Advisor)

Sunita Baghela
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ABSTRACT

Present study entitled **"**Studies on chromosomal aberrations in relation to reproductive abnormalities in cattle**"** was conducted to find out the incidence of chromosomal abnormalities in breeding females of cattle exhibiting reproductive disorders. Blood samples were collected from 25 female cattle pertaining to five different dairy farms of Indore district. Out of these five samples were collected from apparently normal female cows / heifers and 20 samples were collected from cows / heifers exhibiting various reproductive disorders. The whole blood culture method of Moorhead, 1960, was adopted. Either Poke Weed Mitogen (PWM) or Phytohaemagglutinin (PHA) was used as mitogen, PWM was found to be superior to PHA and yielded better metaphase spreads.

The karyological screening of animals revealed a diploid chromosome number 60 in which 58 were autosomes and one pair of sex chromosome. All the 29 pairs of autosomes were acrocentric. The X chromosome was a large chromosome and the only bi-armed (metacentric) element in the karyotype. The centromeric heterochromatin in all the autosomes was found to show negative G-staining in contrast to the sex chromosomes. In C-banding, all autosomes of female cattle carried one large and distinct centomeric band . No intercalary heterochomatin was observed in any of the autosomes and sex chromosomes. However, the X chromosome did not show C- bands.

The frequency of gaps, breaks deletions and polyploidy were low and recorded in both normal and reproductively abnormal animals. In reproductively normal animals the frequencies of gaps, breaks, deletions and polyploid cells were 6, 4, 2 and 2 percent, respectively. In reproductively abnormal animals the frequencies of gaps, breaks, deletions and polyploid cells were 5, 4, 3 and 1 percent, respectively. None of the animals from control group revealed presence of Fragmentation, centromeric attenuations and chimerism of aneuploid and polyploid cells.

Screening of one aging heifer of Frieswal genetic group showed fragmentations (7 percent) and centromeric attenuations (8 per cent), one of the repeat breeder female belonging to Frieswal genetic group from Military Dairy Farm showed chimerism of aneuplid and polypliod cells in 12 percent of metaphase plates.

All the animals of both control and reproductively abnormal groups, screened under present study showed incidence of gaps and breaks. Deletions were recorded in 24 per cent of animals whereas, fragmentation, centromeric attenuation, chimerism and polyploidy were recorded in one animal each (25 per cent of animals).

MAJOR HISTOCOMPATABILITY COMPLEX GENE POLYMORPHISM AND EXPRESSION OF CYTOKINE GENES IN RELATION TO COCCIDIAL RESISTANCE IN POULTRY

Dr. S.N.S. Parmar
(Advisor)

Dr. Mohan Singh Thakur
(Researcher)

ABSTRACT

The present research work was conducted on a total of 180 birds comprising sixty each of Kadaknath, Caribro-91(Cari Vishal) and Cobb broiler birds. Isolated genomic DNA of optimum quality and quantity was used for PCR amplification and PCR- SSP analysis which revealed five haplotypes i.e. B_2, B_{13}, B_{15}, B_{19} and B_{21} in the entire sample size of 180 birds. The frequencies of haplotypes B_2 and B_{13} were found to be highest in Kadaknath while B_{15} and B_{19} were highest in Caribro-91. Haplotype B_{21} was absent in Kadaknath population and was highest in Cobb. A total of 14 genotypes were observed in different genetic groups under study. A total of 9, 8 and 10 genotypes were observed in Cobb, Kadaknath and Caribro-91 birds, respectively. The genotypic frequency of $B_{19}B_{19}$ was found to be highest while that of $B_{15}B_{21}$ was lowest amongst the entire genotypes observed under the present study. The genotype $B_{13}B_{21}$ was absent in all the three genetic groups. The population of Kadaknath birds was in Hardy-Weinberg equilibrium (HWE) while Cobb and Caribro-91 birds were not in HWE at this MHC locus. The least squares analysis (LSQ) of variance indicated the effect of breed and dosage of coccidial infection on body weight was highly significant ($p<0.01$) while the effect of genotype was non-significant. The birds with genotype B_2B_{21} gained higher body weight and was least affected by coccidial infection among the all three genetic groups. The data on oocysts per gram (OPG) revealed highly significant ($p<0.01$) effect of breed and dosage of coccidial infection. However, the effect of genotype was non-significant. The OPG count was highest in Cobb followed by Caribro-91 and Kadaknath. The data recorded on day 4, day 7 and day 14 post challenge for lesion score, oocysts index and OPG was analysed by LSQ. The LSQ analysis of variance revealed significant effect ($p<0.01$) of breed, interval, dosage, breed x interval interaction and breed x dose interaction while the effect of interval x dose interaction and breed x interval x dose interactions were non-significant on lesion score. The LSQ of variance on oocysts index revealed highly significant ($p<0.01$) effect of breed, interval, dose and interval x dose interaction while it was significant ($p<0.05$) for breed x interval and breed x interval x dose interactions. However, the effect of breed x dose interaction was non-significant. The LSQ analysis of variance indicated highly significant ($p<0.01$) effect of breed, interval, dose, breed x interval, breed x dose and breed x interval x dosage on OPG among all the three genetic groups. The lesion score, oocysts index and OPG count were highest in Cobb, followed by Caribro-91 and Kadaknath birds. Differential expression of cytokine genes viz. IL-1β, IL-2, IL-6, IL-17 and IFN-γ were measured by relative quantification using Real Time- PCR and were further analysed by LSQ, which revealed highly significant ($p<0.01$) effect of breed in IL1β and IFN-γ. The effect of dose was observed to be significant ($p<0.015$) on IL-6 while the effect of interval was highly significant ($p<0.01$) for all the cytokine genes. Multiple sequence alignment of exon-2 MHC B-Lβ (class II) gene sequence of each of the Cobb, Kadaknath and Caribro-91 with consensus sequence revealed 43 nucleotide sites. Kadaknath had highest (20) base variations while Cobb had the least (2). The phylogenetic analysis for flanking region of MHC BLβ II gene revealed two major clusters. The Kadaknath breed was found in separate second cluster. It can be concluded from the present study that Kadaknath breed was most resistant breed against coccidial challenge while the Cobb was the least resistance one among the three breeds taken up during this study. Therefore, it is suggested that Kadaknath breed may be used in developing new lines/strains in combination with other commercial birds.

“GENETIC STUDIES ON INHERITED DISORDERS IN HOLSTEIN FRIESIAN AND ITS CROSSES”

Dr. S.K. Joshi
(Advisor)

Sherly Ignetious
(Researcher)

ABSTRACT

Present study entitled “Genetic studies on inherited disorders in Holstein Friesian and its crosses” was conducted to standardize Polymerase Chain Reaction - Restriction Fragment Length Polymorphism (PCR-RFLP) technique for the detection of inherent disorders, bovine leukocyte adhesion deficiency (BLAD), deficiency of uridine monophosphate synthase (DUMPS) and bovine citrullinaemia (BC) in Holstein Friesian and its crosses, to find out the prevalence of these inherited disorders and to determine their gene and genotype frequency in the Holstein cattle. The study was carried out on 50 Holstein cattle and its crosses. The DNA was isolated from the blood samples either by John’s method or by using whole blood DNA extraction kit. The samples were genotyped by PCR-RFLP for BLAD, DUMPS and BC. The study demonstrates the genotype frequency of BLAD carriers was 0.04. The gene frequency of dominant allele was estimated to 0.98 and that of recessive allele to 0.02. Out of fifty animals screened, 4% of animals were found to be heterozygous for BLAD in the Holstein population, although at a low frequency. By contrast, carriers of BC and DUMPS were not detected.

PCR-RFLP analysis was used for genomic analyses and was found to be a strong and reliable method for identification of BLAD, DUMPS and BC. The study demonstrates a need for further examination of more Holstein cattle in Madhya Pradesh, preferably by testing the breeding sires to avoid unrecognized spread of genetic disorders.

POLYMORPHISM OF CASEIN GENE VARIENTS AND THEIR ASSOCIATION WITH MILK PRODUCTION TRAITS IN SOME INDIGENOUS AND HF CROSSBREDS CATTLE

Dr. M.S.Thakur **Akhilesh Pandey**
(Advisor) **(Researcher)**

ABSTRACT

The present investigation on casein gene polymorphism was carried out on a total of 200 cow comprising 50 each of Malvi, Nimari, Sahiwal and HF Crossbred cattle by PCR-RFLP method. The amplified PCR products on agarose gel were visualized as a single compact band of 310bp for αS1 (CSN1S1), 1267bp for αS2 (CSN1S2), 121bp for β (CSN2) and 443bp for κ casein (CSN3) genes, which were also confirmed by sequencing. All the PCR products of above mention four gene were digested by *HindIII* restriction enzyme (RE) which did not produce any restriction fragments and showed monomorphic results for αs1 (310bp), αs2 (1267bp) and β (121bp) casein genes. The k-Cn/*HindIII* restriction digestion resulted two genotypes Viz; AA (443/443bp) and AB (443/348/95bp). The PCR products of αs2 and β casein genes were also digested by REs *EcoRV* and *DdeI*, respectively. Enzyme *EcoRV* for αs2 (1267bp) casein gene produced two genotypes viz. AA (1267/1267bp) and AB (1267/1150/117bp) in Malvi, Nimari and HF crossbred animals, whereas only AA (1267/1267bp) genotype was observed in Sahiwal cattle. The PCR-RFLP analysis of β-Cn gene digested with *DdeI* showed monomorphic results in Malvi and Nimari cattle where only A2A2 (121/121bp) genotype was recorded. However, A2A2 (121/121bp) and A1A2 (121/86/35bp) genotypes were observed in Sahiwal and HF crossbred cattle at β-Cn gene locus. At κ-casein gene/*HindIII* locus, AA (443/443bp) and AB (443/348b/95bp) genotypes were observed in the four breeds of cattle. At αs1-Cn gene locus, gene (A) and genotypic (AA) frequency was 1.00 in all four breeds of cattle, whereas at αs2 gene locus, the gene frequency (A) and genotype frequency (AA) was 1.00 in Sahiwal. However, the frequency of A allele and AA genotype was comparatively higher in Malvi, Nimari and HF crossbred cattle. At β-Cn gene locus the frequency A2 gene and A2A2 genotype was comparatively higher in all four breeds whereas at k-Cn gene locus all four breed showed higher A gene frequency and AA genotypic frequency compared to gene B and genotype AB in all four breeds of cattle. At k-Cn gene locus the interaction effect of genotype, breed and parity was found significant. The mean MY, DMY and lactation length (LL) were significantly higher in AB genotype of HF crossbred as compared to Sahiwal, Malvi and Nimari. Fat (%) was significantly higher in Sahiwal, Malvi and Nimari as compared to HF Crossbred, while protein (%), lactose (%) and SNF (%) were found to be significantly lower in Malvi as compared to Nimari, Sahiwal, and HF crossbred cattle. Population of all four breeds of cattle at αS1 and αS2 gene loci were under HWE but the population of HF Crossbred at β-cn and k-cn gene loci were not under HWE. The genetic relatedness among the four breeds of cattle ware determined on the basis of phylogenetic relationship at different casein genes loci. At αS1 gene locus, Nimari and Sahiwal showed more genetic divergence with HF crossbred compared to Malvi. At αS2 gene locus HF crossbred was found to have more genetic divergence, however, at β casein gene locus Sahiwal was found closer to HF as compared to Nimari. At κ-casein gene locus, Nimari and Sahiwal had more genetic relatedness as compared to Malvi with HF crossbred cattle.

KAPPA CASEIN GENE POLYMORPHISM AND ITS ASSOCIATION WITH MILK YIELD AND COMPOSITION IN GIR AND CROSSBRED CATTLE

Dr. S.S. Tomar **Tarun Baghel**
(Advisor) **(Researcher)**

ABSTRACT

The present study was undertaken to explore polymorphism at exon IV of k-casein gene locus and its association with milk yield, fat, protein and solid-not- fat percentage in Gir and crossbred cattle. A total of 80 cows comprising 40 each of Gir and crossbreds were included in the study. Genomic DNA isolation, quantification and standardization of PCR protocol was done as per standard methodologies. The restriction digestion of PCR product was performed using enzymes Hind III and Hae III. Gene and genotype frequencies were estimated using popgene 32 (version 1.32) and the two populations were tested for genetic equilibrium and homogeneity of distribution of genotypes at this locus using chi-square test. Data on lactation yield of cows were collected from the history sheets and records maintained at the farms. Fat, total protein and solids-not-fat percent were determined in freshly collected milk samples of individual cows by Lactoscan (Unitech) milk analyzer. Least Squares Analysis using SPSS software package was employed to study the effects of farm, breed, parity, season of calving and kappa-casein genotype on lactation yield and milk composition parameters.

The RFLP pattern for *Hind III* yielded either the fragment of 935 bp (uncut) or three fragments of 935,520 and 415 bps and *Hae III* yielded monomorphic pattern of 641 and 294 bps in both the breeds. Only two genotypic variants were observed viz., AA showing the one fragment of 935 bp (uncut) and AB showing three fragments of 935,520 and 415 bps, with their respective frequencies of 0.925 and 0.075 in Gir and 0.80 and 0.20 in Crossbred. The frequencies of A and B alleles were 0.9625 and 0.0375 in Gir and 0.90 and 0.10 in crossbreds, respectively. Both breeds were in Hardy-Weinberg equilibrium at Kappa casein gene locus under study and the two breed groups were also homogeneous with respect to distribution of kappa casein genotypes.

Effect of farm ($p < 0.01$), breed ($p < 0.01$), and parity ($p < 0.05$) was significant on lactation yield; while the effect of season of calving and the k-CN genotype was non-significant. However, cows with kappa casein genotype AB recorded higher mean lactation yield by 176 kg as compared to the cows of genotype AA. For Fat% the effect of breed and k-CN genotype was highly significant ($P < 0.01$), while the effect of parity and season of calving was significant ($P < 0.05$). The cows with k-CN genotype AB had significantly higher milk fat % as compared to the cows of genotype AA. For milk protein % and SNF % the only the effect of the k-CN genotype was significant ($P < 0.01$). Mean milk protein % and SNF % were significantly higher for cows possessing k-CN genotype AB in comparison to the cows of genotype AA. It could be concluded that AB genotype was favoured genotype for milk production and milk composition. Kappa-casein genetic variants may be used as a genetic aid through increasing the frequency of desired genotypes to improve the dairy traits.

MELATONIN AND NEUROPEPTIDE-Y GENE POLYMORPHISM AND THEIR ASSOCIATION WITH QUANTITATIVE TRAITS IN JABALPUR COLOUR AND KADAKNATH CHICKEN

Dr. M.S.Thakur
(Advisor)

Pratibha Padwar
(Researcher)

ABSTRACT

The present study was undertaken to explore polymorphism of Melatonin (MTNR1C) and Neuropeptide-Y (NPY) gene and its association with quantitative traits such as age at first egg (AFE), body weight at sexual maturity (BWSM), body weight at 20 (BW20), 30 (BW30) and 40 (BW40) weeks of age, egg production at 40 weeks of age (EP40), egg weight at 40 (EW40) weeks of age in Jabalpur colour and Kadaknath birds. A total of 60 birds comprising 30 each of Jabalpur colour and Kadaknath were included in the study. Data on above quantitative traits of individual bird of Jabalpur colour and Kadaknath were collected from the history sheets and records of birds maintained at All India Coordinated Research Project (AICRP) on Poultry Breeding, Department of Poultry Science, Adhartal, N.D.V.S.U., Jabalpur. Genomic DNA extraction, quantification and standardization of PCR protocol was done as per standard methodologies. The restriction digestion of PCR product of MTNR1C and NPY genes was performed using enzymes *MboI* and *DraI*, respectively. Gene and genotype frequencies were estimated using Popgene 32 (version 1.32) software and the population was tested for genetic equilibrium using Chi-Square test. The effect of breed, genotype and their interaction on different quantitative traits was estimated by least square analysis of variance.

The RFLP pattern for MTNR1C/*MboI* yielded monomorphic fragment of 372 bp (uncut) in all the birds of Jabalpur colour and Kadaknath. However, NPY/*DraI* yielded three fragments of 240,161 and 79 bps in both the breeds (i.e. Jabalpur colour and Kadaknath). At MTNR1C/*MboI* gene locus, only single genotypic variant was observed viz., AA genotype (372 bp) in all the birds of Jabalpur colour (n = 30) and Kadaknath (n = 30) with 100 per cent genotypic frequency. The allelic frequency for allele A was 1.00 and for allele B was 0.00 in all birds. The population of both the breeds were in Hardy-Weinberg equilibrium (HWE) at MTNR1C gene locus. However, at NPY/*DraI* gene locus, three polymorphic variants were observed viz., AA (240 bp), AB (240/161/79 bp) and BB (161/79 bp), with respective frequencies of 0.60, 0.17 and 0.23 in Jabalpur colour and 0.47, 0.37 and 0.16 in Kadaknath birds. The frequencies of A and B alleles were 0.68 and 0.32 in Jabalpur colour and 0.65 and 0.35 in Kadaknath birds, respectively. Kadaknath breed was in HWE for these genotypes, while Jabalpur colour was not in HWE at NPY/*DraI* gene locus.

The results of least square analysis of variance showed highly significant differences among breeds, whereas the effect of genotypes and breed x genotype was found to be non significant. There were no significant association between genotypes and different quantitative traits in both the breeds. Further, least square analysis of variance revealed that there was no significant effect of genotype on quantitative traits. However, AFE, BWSM, BW20, BW30 and BW40 were highly significant ($p < 0.01$) between Jabalpur colour and Kadaknath. In egg quality traits such as EW40 and EP40 were highly significant ($p<0.01$); while the shape index was significant ($p<0.05$) in Jabalpur colour and Kadaknath birds. Although the differences between least square means among various genotypes were non-significant but comparatively higher adult body weight was recorded for AA genotype in Jabalpur colour and AB genotype in Kadaknath birds at 20, 30 and 40 weeks of age. Similarly, AA genotype was marginally superior in Jabalpur colour, while genotype BB exhibited marginal superiority in Kadaknath for egg production at 40 weeks of age.

BOVINE LEUKOCYTE ANTIGEN DRB3.2 GENE POLYMORPHISM AND ITS ASSOCIATION WITH MILK YIELD, COMPOSITION AND SOMATIC CELL COUNT IN HOLSTEIN FRIESIAN CROSSES.

Dr. S.S. Tomar
(Advisor)

Kauvery Tayeng
(Researcher)

ABSTRACT

The present study was undertaken to explore polymorphism at exon 2 of BoLA-DRB3 gene locus and its association with milk yield, fat and protein percentage, and somatic cell count (SCC) in a total of 40 Holstein-Friesian crosssbred cows. Genomic DNA isolation, quantification and standardization of PCR protocol was done as per standard methodologies. The restriction digestion of PCR product was performed using enzymes *Hae III* and *Bst YI*. Gene and genotype frequencies were estimated using popgene 32 (version 1.32) and the population was tested for genetic equilibrium at this locus using chi-square test. Data on lactation yield of cows were collected from the history sheets and records maintained at the farms. Fat%, protein% and SCC were determined in freshly collected milk samples as per standard procedures. Least Squares Analysis of variance using SPSS software package was employed to study the effects of farm, parity, season of calving and BoLA-DRB3.2 genotype on lactation yield, fat %, protein % and SCC.

Digestion with *Hae III* revealed presence of 7 genotypes with frequencies 0.475, 0.225, 0.050, 0.100, 0.050, 0.050 and 0.050 for AA, AB, AE, BB, DD, EE and II genotypes, respectively. The frequencies of allele A, B, D, E and I were 0.6125, 0.2125, 0.050, 0.075 and 0.050, respectively. Similarly, digestion with *Bst YI* yielded 3 genotypes with frequencies 0.050, 0.625 and 0.325 for AA, AB and BB, respectively. The frequencies of allele A and B were 0.3625 and 0.6375, respectively.

Effect of farm ($p < 0.01$) and parity ($p < 0.05$) was significant on lactation yield; while the effect of season of calving, *Hae III* genotype and *Bst YI* genotype was non-significant. For Fat% the effect of parity and season of calving was significant ($P < 0.05$), while the effect of farm and genotype was non-significant. Milk protein % was significantly ($p < 0.05$) influenced only by *Bst YI* genotype. Genotype AB recorded significantly higher protein % as compared to genotype BB. SCC was significantly affected by farm ($p < 0.01$), season of calving, *Hae III* genotype and *Bst YI* genotype ($p < 0.05$). For *Hae III* genotypes AA, AB and EE were the most favoured and for *Bst YI* genotype BB was the most favoured one.

DNA POLYMORPHISM OF MHC B-G GENE AND ITS ASSOCIATION WITH CAECAL COCCIDIOSIS RESISTANCE IN KADAKNATH FOWL

Dr. S.S. Tomar
(Advisor)

Sunil Kumar Nagoriya
(Researcher)

ABSTRACT

The present study was undertaken to explore polymorphism of MHC B-G gene and its association with coccidial resistance in 60 Kadaknath birds procured from Poultry unit of College of Veterinary Science & A.H., Mhow. The 60 chicks at day old were randomly divided into three groups viz., control (C), treatment 1 (T_1) and treatment 2 (T_2), comprising of 20 chicks each. Chicks of Groups T_1 and T_2 were challenged by gavaging 10,000 and 20,000 sporulated oocyst, respectively, to each bird on 21st day of age. The chicks of control group were each given 1 ml of Hanks Balanced Salt Solution. Weekly body weight gain and feed conversion ratio (FCR) up to 12th week of age, OPG from day 5 to day 9 post infection were recorded/ determined. On day 4, 7 and 14 post challenge two birds from each group were sacrificed and caecal lesion score and oocyst index were recorded. The observations on various parameters of coccidial resistance were subjected to least squares analysis of variance.

Genomic DNA isolation, quantification and standardization of PCR protocol was done as per standard methodologies. The restriction digestion of PCR product was performed using enzymes *Msp I*. Gene and genotype frequencies were estimated and the population was tested for genetic equilibrium using chi-square test.

The RFLP pattern for *Msp I* revealed presence of only two genotypic variants viz., AA showing the one fragment of 401 bp and AB showing three fragments of 401,309 and 82 bps, with their respective frequencies of 0.8667 and 0.1333 in Kadaknath birds. The frequencies of A and B alleles were 0.9333 and 0.0667, respectively.

The effect of dose of coccidian infection on weekly body weight gain was significant ($P \leq 0.05$) at 4th week and highly significant ($P \leq 0.01$) from 5th to 12th week of age. The body weight gain was consistently higher for genotype AA than genotype AB from 1st to 12th week; but the difference was significant ($P \leq 0.05$) only for 4th to 6th week of age. The effect of dose of infection was significant ($P \leq 0.01$) on OPG from day 6 to 9 pi and effect of genotype on OPG was significant ($P \leq 0.05$) only at day 7 pi. Mean OPG was lower for Genotype AA than genotype AB. The effect of dose of infection and day pi on caecal lesion score and oocyst index was significant ($P \leq 0.01$) and the effect of genotype was non-significant. Mean lesion score significantly higher at day 7 pi as compared to day 4 and day 14 pi. Significant differences existed between two treatment groups and between treatment and control groups for lesion score and oocyst index .

Significantly higher FCR (3.24±0.06) for T_2 group as compared with T_1 (3.09 ± 0.02) groups and significantly higher FCR for T1 as compared to control group(2.67 ±0.01) was recorded. Mean FCR was significantly lower (2.89±0.02) for genotype AA than genotype AB (3.11 ± 0.06). There was no any mortality.

ANIMAL PRODUCTION MANAGEMENT

EVALUATION OF BREAD WASTE AS A FEEDSTUFF FOR GROWING CROSSBRED PIGS

Dr. Biswajit Roy (Advisor)

Ajay Kumar (Researcher)

ABSTRACT

Present study was designed with the following objectives i) to evaluate the effect of bread waste feeding on growth performance of crossbred pigs, ii) to evaluate the effect of bread waste feeding on carcass traits of crossbred pigs and iii) to evaluate the economics of bread waste feeding for pork yield of crossbred pigs. A total of 36 crossbred pigs (about 3 months of age) were assigned to six different groups (G1, G2, G3, G4, G5 & G6), each group containing six animals. G-1 received concentrate mixture (CM)-1 (standard concentrate mixture) and treated as control group. The diets of the G2, G3 and G4 composed of CM-2 (75%) & bread waste (BW) (25%), CM-3 (50%) & BW (50%), CM-4 (25%) & bread waste (75%), respectively. The diets of the G5 composed of wheat bran (19.5%), bread waste (66%), GNC (10%), fish meal (3%), mineral mixture (1%) and common salt (0.5%). The diets of the G6 composed of rice bran (50%) and bread waste (50%). All the diets were isoproteinous except G-6. The result of the present study indicated that daily feed intake was significantly ($P<0.05$) varied among the groups. Highest daily feed intake (kg/pig/day) was observed in G3 group (1.647) and lowest value observed in G6 group (1.219). Fortnightly average daily dry matter intake (kg/pig/day) significantly ($P<0.01$) varied among the experimental groups. Highest dry matter intake was observed in G3 group (1.562) and lowest value observed in G6 group (1.158). Overall average feed intake in terms of per cent body weight of crossbred growing pigs were 4.11, 4.17, 4.29, 3.92, 3.66 and 3.76, respectively for the G1, G2, G3, G4, G5 and G6 groups and no significant difference were observed among the experimental groups. Highest dry matter intake (% body weight) was observed in G3 group (4.29) and lowest value observed in G5 group (3.66). Fortnightly average daily protein intake (kg/pig/day) of crossbred growing pigs were significantly ($P<0.05$) varied among the experimental groups. The average daily protein intake (kg/pig/day) was 0.258, 0.264, 0.265, 0.223, 0.214, and 0.155, respectively for the G1, G2, G3, G4, G5 and G6 groups. Average daily body weight gain (BWG) (kg/day) was significantly ($P<0.01$) varied among the groups. The lowest BWG (0.171) was observed in G6 group and highest value (0.377) was observed in G2. Feed conversion efficiency (FCR) was significantly ($P<0.01$) varied among the groups. Highest FCR (7.13) observed in G6 and lowest value observed in G2 (4.35). There were no significant differences of blood parameters (PCV, Hb, RBC and WBC) among the groups. Cost (`) per kg diet were 17.75, 15.80, 13.65, 11.56, 12.72 and 10.18, respectively for the G1, G2, G3, G4, G5 and G6 groups. Cost of feed (`)/kg body weight gain were significantly ($P<0.01$) varied among the groups and values were 94.58, 85.76, 75.24, 76.19, 76.64 and 86.42, respectively for the G1, G2, G3, G4, G5 and G6 groups. Feed cost (`) per kg body weight gain was reduced to 9.33, 20.45, 19.44, 18.66 and 8.63 per cent, respectively for the G2, G3, G4, G5 and G6 groups in comparison to control group. It can be concluded that bread waste can be included in the pig ration up to 50 per cent, to reduce the cost of feeding, without affecting growth performance of the growing crossbred pigs.

EFFECT OF NONGENETIC FACTORS ON MILK COMPOSITION AND UDDER HEALTH OF CATTLE AND BUFFALOES.

Dr. Biswajit Roy (Advisor)

Shobhna Madavi (Researcher)

ABSTRACT

The study was designed with the following objectives: i) to study the effect of various nongenetic factors on milk composition of cattle and buffaloes, ii) to study the effect of various nongenetic factors on somatic cell count (SCC) of cattle and buffaloes. The study was conducted at Livestock farm, Adhartal, College of Veterinary Science & Animal Husbandry, N.D.V.S.U., Jabalpur (M.P.) for nine months i.e. from September 2015 to May 2016. The experimental cattle (Crossbred, Sahiwal and Gir) and Murrah buffaloes were classified based on the parity, stages of lactation, seasons, types of green fodder availability and pregnancy status of animals. Following parameters were studied for the experiment, daily milk yield, somatic cell count (SCC) and milk constituents (like fat, protein, solid not fat (SNF), lactose and total solid). The results indicated that parity had no significant effect on daily milk yield, somatic cell count (SCC) and any of the milk constituents in Murrah buffalo, Sahiwal and Gir cattle. However, in Crossbred cattle, parity had significant ($P<0.05$) effect on milk yield (kg/day) and highest value observed in 3rd parity (10.71±0.76). Stage of lactation had no significant effect on somatic cell count (SCC) and any of the milk constituents in Murrah buffalo, Sahiwal and Gir cattle. Stage of lactation had significant ($P<0.05$) effect on milk yield (kg/day) and highest value observed in early lactation in all of the bovine species or animals. Seasons had significant ($P<0.05$) effect on log SCC and SCS in Murrah buffalo, Sahiwal and Gir cattle, and highest value observed in humid season. Milk constituents were numerically varied among the seasons in Crossbred, Sahiwal and Gir cattle. However, in Murrah buffaloes season has significant ($P<0.05$) effect on SNF and total solids. Types of fodder availability and pregnancy status had no significant effect on daily milk yield, somatic cell count (SCC) and milk constituents like fat, protein, solid not fat (SNF), lactose and total solid in Murrah buffalo, Crossbred and Sahiwal cattle. However, in Gir cattle, log SCC and SCS were significantly ($P<0.05$) higher when animals were fed only non-legume fodder. The study concluded that nongenetic parameters like season and stages of lactation has influence on milk yield and SCC, thus nongenetic parameters can play a major roles in relation of animals for increasing milk yield and better udder health for the production of good quality milk.

EFFECT OF DIFFERENT REGIME OF WATERING ON PRODUCTION PERFORMANCE IN LACTATING MURRAH BUFFALO

Dr. Aklank Jain

Akhilesh Kumar Singh

(Advisor) **(Researcher)**

ABSTRACT

Water is second in importance only to oxygen to sustain life and performance of dairy animal. Water requirement of dairy animal are met mainly from that ingested as drinking (free) water, that found in or on feed consumed, and a small amount from metabolic oxidation(metabolic water). Water is closely related to feed intake and thus animal productivity. The present investigation was conducted on lactating Murrah buffalo to see the effect of different watering regime i.e. group-I *.adlib* watering, group-II, watering before 1hrs milking, group-III, watering after 1 hrs milking and group-IV, watering 1hrs before and after milking. The effect of watering was seen on water intake and dry matter intake, milk yield and its composition, milk constituents, Biochemical and Hematological parameters in lactating Murrah buffaloes.

The result indicated that overall dry matter intake significantly (P<0.01). Varied among the groups. The overall feed intake (kg/day/animal) for the experimental group were 12.22± 0.06 12.15±0.06, 11.73±0.06 and 11.30±0.06 in group IV II, III & I. respectively. Overall water intake (lit/day) varied significantly (P<0.01) among the groups. The water intake were 46.0±0.57, 52.0±0.65, 49.7±0.56 and 53.0±0.62 (Liter/day) respectively in the groups I, II, III and IV. Overall milk yield significantly varied among the groups. The daily milk yield (Liter/day) were 7.69±0.08, 8.96±0.09, 7.93±0.07, 7.87±0.07 in the group I, II, III and IV respectively. Fat % significantly, (P<0.01) varied in among the group. Highest fat% was reported in group 3, whereas lowest % was reported in group I (10.40±0.14). SNF significantly (P<0.01) varied among the experimental groups. The mineral % of the milk significantly (P<0.05) varied among the groups whereas protein % did not vary significantly. Hematological parameters like RBC & PCV also not significantly vary among the groups

“STUDIES ON BODY CONDITION SCOREIN RELATION TO MILK PRODUCTION AND BODY MEASUREMENTS IN FRIESWAL COWS”

Dr. Sandeep Nanavati **Kamlesh Kumar**
(Advisor) **(Researcher)**

ABSTRACT

The study was carried out at Military Dairy Farm on Eighty milch Frieswal cows. The cows were divided in five parities and three stages of lactation. The study was done for Body Condition Score and its relation with production parameters and various body measurements along with the effect of parities and stages of lactation on Body Condition Score, production parameters, various body measurements and body weight of animal.

Result of the study showed the significant ($P<0.05$) effect of parity on Body Condition Score and also significant ($P<0.01$) effect on fat percent, Solid Not Fat percent, weekly milk yield, weekly fat corrected milk yield, heart girth, height at wither, height at hook, body length and body weight. The significant ($P<0.05$) effect of stages of lactation was observed on Body Condition Score and also significant ($P<0.01$) effect on fat percent, Solid Not Fat percent, heart girth and body weight. The non significant effect of stages of lactation was observed on weekly milk yield, weekly fat corrected milk yield, height at wither, height at hook and body length.

The correlation of Body Condition Score was found significant ($P<0.01$) with heart girth, body weight and also significant ($P<0.05$) with body length, weekly milk yield. These indicate that body condition of animal has direct impact on milk yield of animal. The correlation of Body condition Score with fat percent in milk was of no significance and it can be said that fat percent in milk is not affected by Body Condition Score. The various body measurements were found in close relationship with each other and it can be concluded that they are bounded with each other strongly. The weekly milk yield and fat percent were found in inverse relationship, while fat percent and Solid Not Fat were in positive correlation. The service period was affected by Body Condition Score.

The positive and significant ($P<0.05$) regression coefficient observed between Body Condition Score and weekly milk yield. So the outcome of regression shows that unit change in Body Condition Score leads to the change in weekly milk yield. And Heart girth and body weight is also showed significant regression coefficient with weekly milk yield.

“BODY CONDITION SCORE AND ITS IMPACT ON PERFFORMANCE OF MURRAH BUFFALOES

Dr. G.P. Lakhani **Mahendra Patel**
(Advisor) **(Researcher)**

ABSTRACT

The study was designed with the following objective: I) To study the change in Body condition (BCS) pattern pre-partum and post-partum in Murrah buffaloes. II) To study the relationship of BCS with milk yield, composition and reproductive performance. The proposed work was conducted at Livestock farm, Adhartal, College of Veterinary Science & A.H., Nanaji Deshmukh Veterinary Science University, Jabalpur (M.P.) for 6 months.18 murrah buffaloes were devided into three groups as (G1, G2 and G3) based on 15 day pre-partum BCS (on 1-5 point scale) as 2.50-3.0, 3.25-3.75, 4 and above, respectively. All animal were maintained under same managemental conditions.

The result of the present study indicated that upto 90 days post-partum, the BCS was decreased to 0.35, 0.92 and 1.25 in G1, G2 and G3 group, respectively. The body weight loss (kg/animal) for calving day to 90 days post-partum was 20.5 and 38.34 in G2 and G3 group, respectively. However, G1 group animal gained the 4.65 kg body weight during the study period.

The total 90 days milk yield (lit./day) were 604.33 ± 16.94, 628.20 ± 40.53, 667.10 ± 48.71 lit./animal in G1, G2 and G3 group, respectively which was found to be non significant. The peak yield and predicted lactation yield 8.5, 9.5, 11 (lit./animal) and 1694.36, 1793.48, 1941.55 lit./lactation in G1, G2 and G3 group, respectively.

The fat, protein and lactose percent of milk affected significantly ($P<0.05$) by BCS and increased as the lactation advanced. The average total solid in milk 17.12 ± 0.08 % in G3 group animals which were highest followed by in G2 and G1 group with 16.03 ± 0.13 % and 15.30 ± 0.11 %, respectively.

BCS had a significant ($P<0.01$) effect on reproductive performance of animals experimental animals. The animals of G2 group had shorter postpartum estrus period, a fewer services per conception, higher first service conception rate and a shorter service period and of 39.46 ± 5.46 days, 1.68, 48.56 % and 69.88 ± 12.46 percent respectively, followed by buffaloes of G3 group with 52.80 ± 4.25 days, 1.90 days 62.65 percent and 82.48 ± 5.83 respectively, then in buffaloes of G1 group with 63.64 ± 5.63 days, 2.80 days, 28.5 % and 113.5 ± 15.42, respectively.

Thus, it can be concluded that BCS positively correlated with reproductive performance and milk composition of the milk but the milk yield traits were not affected by BCS. For optimum productive and reproductive performance in Murrah buffaloes, animals should be maintained at moderate BCS (3.25-3.75) during calving.

STUDIES ON *NIGELLA SATIVA* (KALONJI) SEED SUPPLEMENTATION ON THE PERFORMANCE OF LACTATING CROSSBRED COWS"

Dr. Sudipta Ghosh **Jaya Karosiya**
(Advisor) **(Researcher)**

ABSTRACT

The study was undertaken on lactating crossbred cows with the following objectives: 1. Effect of *Nigella sativa* (Kalonji) seed supplementation on production performance and blood parameters in crossbred cows. 2 Effect of *Nigella sativa* (Kalonji) seed supplementation on economics of milk production in crossbred cows. For the study, eighteen lactating crossbred cows were randomly distributed into 3 groups consisting of six animals in each group i.e. Group-1: without any supplementation (Control), Group-2: supplemented with *Nigella sativa* seed powder @ 50 g per animal per day (T1) and Group-3: supplemented with *Nigella sativa* seed powder @ 50 g per animal per day for first 10 consecutive days of every month (T2). All animals were maintained under same managemental conditions. The observations were recorded 3 months postpartum.

The average total daily milk yield (litres) was 10.30±0.13, 12.06±0.15 and 11.45±0.08 in control, T1 and T2 groups, respectively. There was significant ($p<0.05$) difference in average daily milk yield and 3.25% FCM between the groups. The average total weekly milk yield and three months cumulative milk yield was highest in T1 group compared to T2 and control groups, and significant ($p<0.05$) difference between the control and both the treatment groups. There was no significant difference in peak milk yield between the groups. The persistency of milk production was highest in T2 group animals followed by T1 and control groups of animals, but the difference was not significant between the groups. The average milk fat (%) in T1 group differed significantly ($p<0.05$) with T2 and control groups. There was no significant difference in solid not fat, protein, lactose and total solids (%) in milk between the groups. The average monthly body weight in T1 group differed significantly ($p<0.05$) with T2 and control group.

There was significant ($p<0.05$) difference in serum gloubulin concentration between T1 and T2 groups. There was significant ($p<0.05$) difference in blood glucose concentration between the *Nigella sativa* supplemented (T1 and T2) groups with control group, but there was no significant difference between T1 and T2 groups. There was significant ($p<0.05$) difference in average serum blood urea nitrogen, serum cholesterol, serum creatinine, serum alanine aminotransferase between the T1, T2 and control groups. There was no significant difference in average total leucocyte count, total erythrocyte count, packed cell volume, heamoglobin concentration between the groups. The income from milk based on feed cost per animal per day was highest in T1 followed by T2 and control groups.

EFFECT OF FENUGREEK (METHI) SEED SUPPLEMENTATION ON PERFORMANCE OF LACTATING MURRAH BUFFALOES

Dr. Sudipta Ghosh **Milan Kirar**
(Advisor) **(Researcher)**

ABSTRACT

The study was undertaken on lactating Murrah buffaloes with the following objectives: 1. To study the effect of fenugreek supplementation on production performance in buffaloes. 2. To study the effect of fenugreek supplementation on blood biochemical parameters in buffaloes. For the study, eighteen lactating Murrah buffaloes were randomly distributed into 3 groups consisting of six animals in each group i.e. Group-1: (control) without any fenugreek supplementation (G1), Group-2: supplemented with soaked fenugreek seeds @ 50 g per animal per day (G2) and Group-3: supplemented with soaked fenugreek seeds @ 100 g per animal per day (G3). All animals were maintained under same managemental conditions. The observations were recorded 3 months postpartum.

The average total daily milk yield (litres) was 5.40 ± 0.13, 6.80 ± 0.08 and 7.58 ± 0.11 in G1, G2 and G3 groups, respectively. There was no significant difference in average daily milk yield between the groups. The average total weekly milk yield and three months cumulative milk yield were highest in G3 group compared to G1 and G2 groups, but there was no significant difference between the groups. There was no significant difference in peak milk yield and predicted lactation yield between the groups. The persistency of milk production was highest in G3 group animals followed by G2 and G1 groups of animals, but the difference was not significant between the groups. There was no significant difference in average fat, solid not fat, protein, lactose and total solids (%) in milk between the groups. There was no significant difference in average monthly dry matter intake and body weight change between the groups.

There was no significant difference in average serum calcium, serum cholesterol, serum total protein, serum albumin and serum globulin concentrations between the groups. The overall average blood glucose concentration (mg/dl) was lowest in G3 group with 61.06 ± 1.72 followed by G2 and G1 groups with 63.82 ± 1.25 and 68.72 ± 1.25, respectively. There was significant ($p<0.05$) difference in blood glucose concentration between the fenugreek supplemented (G2 and G3) groups with control (G1) group, but there was no significant difference between G2 and G3 groups.

“PERFORMANCE OF GROWING CROSSBRED PIGS FED AZOLLA (AZOLLA PINNATA) BASED CONCENTRATE MIXTURE”

Dr. Biswajit Roy
(Advisor)

Kiran Pal Singh Saini
(Researcher)

ABSTRACT

The study was designed with the following objective i) to evaluate the azolla production by using manure of cattle, buffalo, goat and pigs and ii) to study the effect of azolla feeding on feed intake, growth performance and carcass traits of crossbred pigs and iii) to study the economics of azolla feeding to crossbred pigs. The study was conducted at Livestock farm, Adhartal, College of Veterinary Science & Animal Husbandry, N.D.V.S.U., Jabalpur (M.P.) for five months. A total of 21 crossbred pigs (about 3 months of age) were selected and randomly distributed in three different groups(G1, G2 and G3) each group containing seven animals. G-1 group considered as control group with no supplementation. Concentrate mixture was replaced by sun dried azolla @ 15% and 30%, respectively for the G-2 and G-3 groups. Body weight, feed intake was measured at fortnightly interval. The results of the present study indicated that daily body weight gain (BWG) (kg/kg) was not significantly varied among the groups. The lowest BWG (359.01) was observed in G1 group and highest value (382.12) was observed in G2 .Feed conversion efficiency (FCR) was significantly varied among the groups. Highest FCR (5.50) observed in G3 and lowest value observed in G2(5.24).Daily dry matter intake (kg/day) was lowest in G1 group(1.76) and highest value observed in G3 group (1.84).Daily protein intake was lowest in G1 group (318.25) and highest value observed in G3 group (342.05). There were no significant differences of blood parameters among the groups. Carcass traits like dressing percentage, carcass length, back fat thickness at first rib, last rib and last lumber were also not significantly varied across the groups. Cost analysis indicated that recurring cost for per kg body weight gain was lower in treatment groups in comparison to the control group. Recurring cost per kg body weight gain was112.90, 108.77, and 110.33, respectively for the G1, G2 and G3 groups. Dried azolla supplementation reduced the recurring cost for per kg body weight gain from 10.50 to 14.78 per cent. From the findings of the present study, it may be concluded that azolla can be added to the diet of crossbred pigs upto 30% to improve economic efficiency of the pig production.

“GROWTH PERFORMANCE AND BEHAVIOUR PATTERN OF SIROHI GOATS UNDER DIFFERENT REARING SYSTEMS”

Dr. Sandeep Nanavati **Vikas Sulya**
(Advisor) **(Researcher)**

ABSTRACT

The present study entitled “Growth performance and behaviour patterns of Sirohi goats under different rearing systems’’ was performed at Goat Unit of Livestock farm complex, College of Veterinary Science and A.H. Mhow. Eighteen male Sirohi goats around 6 to 9 months of age for 90 days (September to November) were randomly distributed in three groups of equal number (6 in each group), namely extensive (T_1), semi-intensive (T_2) and intensive (T_3) group. This study is planned with various objectives like study of the growth performance, feed/water intake, behaviour pattern and cost of production of Sirohi goats under different rearing systems

To study behavioural pattern, recording was done by direct visual observation and with the help of Sony handycam weekly for 12 hours/day for all three groups. The time (min /12hours) spent for various behaviour namely; grazing, browsing, standing, drinking, sleeping/ resting, walking and agonistic behavior was recorded by using stop watch. To determine cost of production, data were collected by direct observations covering all aspects of expenditure on items and returns from animals.

The goat under T_3 (19.24 ± 0.57) group was better than T_2 (17.63 ±0.69) and T_1 (17.05 ± 0.81) group. The daily weight gain under T_3 (87.62 ± 1.26) system showed more gain in body weight than T_2 (75.96 ± 1.20) and T_1 (44.53 ± 1.03) system. The highly significant difference ($P<0.01$) was observed for daily water intake in all groups. The pooled mean of group T_1 (1.94 ± 0.06) showed more water intake as compared to group T_2 (1.61 ± 0.06) and group T_3 (1.22 ± 0.03). The goats which reared under intensive/stall fed group spent more time for standing, sleeping/resting and agonistic behaviour than other. Whereas the goats kept under extensive group spent higher time (min/12hours) for total feeding (grazing and browsing), drinking and walking than other group. Net return per goat was higher in T_3 (Rs. 829.26) than T_2 (Rs. 768.09) and T_1 (Rs. 570.57) due to higher weight gain.

"STUDIES ON THE EFFECT OF DIFFERENT REARING SYSTEM ON PERFORMANCE OF NARMADA NIDHI BREED OF POULTRY

Dr. A. K. Mishra **Pankaj Kumar Bhagat**
(Advisor) **(Researcher)**

ABSTRACT

Narmada Nidhi is an improved dual purpose variety of chicken developed by the AICRP on Poultry Breeding, Nanaji Deshmukh Pashu Chikitsa Vigyan Vishwa Vidyalaya, Jabalpur, Madhya Pradesh. The dual purpose coloured bird is suitable for rural and tribal areas poultry farming in Madhya Pradesh. It has been developed by crossing Kadaknath (Native chicken breed) with Jabalpur colour (Coloured broiler). The breed has been developed in such a way that terminal cross has 25% inheritance of Kadaknath breed and 75% inheritance of Jabalpur colour variety. The present study was planned to investigate the effect of different rearing system on performance of Narmada Nidhi breed of poultry. A total no. of 90 day old male chicks reared under electrical brooding house upto 15 days of age then it randomly distributed into intensive, backyard and scavenging rearing system (30 chicks in each group). The first group was reared under intensive system at instructional poultry unit, College of veterinary science and animal husbandry Rewa on deep litter system. Chicks were fed standard broiler starter feed upto five week of age containing 22% CP and ME 3200 thereafter broiler finisher feed containing CP 20% and ME 3200 Kcal/ Kg feed was fed to the chicks till market weight (Approx 1.5 kg). The second group was reared by poultry farmer under backyard system. According to the backyard system principle the chick were hand fed on standard broiler starter feed upto 50% of their daily requirement. The remaining feed requirement was fulfilled through scavenging feeding upto the market weight. The third group was reared by another poultry farmer under scavenging system. According to scavenging system principle the chick was fed completely on scavenging feeding upto the market weight. The performance of all three system biweekly interval (day old to thirteen week age) were evaluated in terms of body weight, growth rate, feed intake, FCR, haemato-biochemical parameter, carcass traits (at 14 week of age) and economics of different rearing system.

In the present finding body weight recorded significantly ($p<0.05$) higher in intensive system (2093.33 ± 21.85 g) followed by the backyard (1549 ± 19 g) and scavenging (865.66 ± 10.78 g) rearing system at 98 day of age. The growth rate of birds increased with age in all three rearing systems. Maximum growth rate 349 ± 8.96 g was observed in intensive system on day 42. Feed conversion ratio was found significantly ($p<0.05$) increasing with age in three systems highest FCR recorded in 7th interval 6.01 ± 0.10, 7.28 ± 0.25 and 7.53 ± 0.40 in intensive, backyard and scavenging system, respectively. In present finding it is clear that the FCR value was highest during last growing. Most of the heamatological parameters were significantly ($p<0.05$) higher in intensive system whereas WBC (Thousand/µl) and DLC (%) were found higher in scavenging system. The value of MCV (111.52 ±4.44), MCH (42.31 ± 1.87) and MCHC (37.92 ± 0.47) were also higher in scavenging system. Most of the biochemical parameters such as glucose (162.81 ± 0.18 mg/dl), total protein (5.77 ± 0.04 g/dl), albumin (3.99 ± 0.07 g/dl), SGOT (292.18 ± 1.07 IU/L), SGPT (11.89± 0.24 IU/L), cholesterol (103.41 ± 0.29 mg/dl), creatinine (0.68 ± 0.01 mg/dl), bilirubin (25.39± 0.10 mg/dl) and BUN (9.50 ± 0.06 mg/dl) value were significantly ($p<0.05$) higher in intensive system. Whereas, globulin value was higher in scavenging system followed by the backyard and intensive system. There was found 6% mortality in scavenging system during whole experimental period. The body conformation traits such as shank length (9.66 ± 0.16 cm), keel length (12.16 ± 0.30 cm) and head, feet, back, breast, drumstick, thigh, neck, giblet, wing (g), dressing percentage and meat bone ratio was significantly ($p<0.05$) higher were found in intensive system birds. Benefit cost (B:C) ratio of Narmada Nidhi birds was higher in scavenging system followed by backyard and intensive system and there value were 0.21:1, 1.38:1 and 30.33:1.

From present report suggest that the Narmada Nidhi chicken has good potential for meat production in rural area under backyard rearing system with minimum cost. This farming helps to improve the livelihood of rural farmer as additional income source.

EVALUATION OF PERFORMANCE OF KADAKNATH UNDE INTENSIVE, BACKYARD ANDSCAVENGING SYSTEM OF POULTRY REARING.

Dr. K. K. S. Baghel **Saurabh**
(Advisor) **(Researcher)**

ABSTRACT

Poultry development in India has made impressive progress during the last three decades evolving from backyard ventures to a full-fledged commercial agro industrial business. Backyard poultry is a potent tool for upliftment of the poorest of the poor. Native rural breeds are valuable genetic resources for each country due to their adaptability to local conditions and their resistance against common diseases. Kadaknath is an important native chicken breed in India. Kadaknath breed, also known as Kalamashi, is famous for its black-colored meat. The present study was planned to investigate the effect of different rearing system on performance of Kadaknath breed of poultry by evaluation of performance of Kadakanth by compare the growth rate and feed conversion ratio of under intensive, backyard and scavenging system of rearing likewise estimate the hematological and biochemical parameters and calculate the cost economics of rearing of Kadaknath breed under intensive, backyard and scavenging system of rearing. The experiment was conducted in the Department of Livestock Production Management, College of Veterinary Science & Animal Husbandry and Amilki village in Rewa (M.P.). Day old, 90 male chicks reared under electrical brooder upto 15 days of age then it randomly distributed into intensive, backyard and scavenging rearing system (30 chicks in each group). The first group was reared under intensive system at instructional poultry Unit, College of veterinary science and animal husbandry, Rewa on deep litter system. Chicks were fed standard broiler feed till the market weight. The second group was reared by poultry farmer under backyard system and the third group was reared by another poultry farmer under scavenging system.

In the experiment body weight of Kadaknath at 14 week found significantly ($p<0.05$) higher in intensive system followed by backyard and scavenging system were 1499.00 ± 15.22 g, 955.83 ± 41.33 g and 473.83 ± 12.33 g. Likewise the growth rate was also significantly ($p<0.05$) higher in intensive system followed by backyard and scavenging system and the feed intake was higher in intensive system. The total FCR was found lower in intensive followed by backyard and scavenging system were 4.69, 4.9 and 7.0, respectively. While the present finding of hematological studies revealed, the mean value of RBC, Hb, PCV, MCHC was significantly ($p<0.05$) higher in intensive system in, at the age of 84 day were 3.99 ± 0.08 million/µl, 10.53 ± 0.08 g/dl, 27.63 ± 0.07 % and 38.12 ± 0.33 g/dl, respectively while the value of MCV, MCH, WBC, and lymphocyte are significantly ($p<0.05$) higher in scavenging system that were 122.42 ± 5.14 μ^3, 41.57 ± 1.64 pg/cell, 34.73 ± 0.07 thousands/µl and 75.83 ± 0.16 %, respectively may be due to unhygienic condition present in scavenging system. In the present finding of biochemical studies, at 84 days of age the mean value of glucose (mg/dl), total protein (g/dl), albumin (g/dl) and A:G ratio was significantly ($p<0.05$) higher in intensive system that were 156.26 ± 0.42, 4.99 ± 0.10, 2.60 ± 0.02 and 1.09 ± 0.03, respectively and along with the mean value of Serum glutamic oxaloacetic transaminase (IU/L), Serum glutamic pyruvate transaminase (IU/L), cholesterol (mg/dl), creatinine (mg/dl), bilirubin (mg/dl), blood urea nitrogen (mg/dl) were 291 ± 1.31, 11.39 ± 0.03, 108.41 ± 0.11, 0.67 ± 0.01, 27.33 ± 0.02, 10.54 ± 0.11 except globulin value it was higher in scavenging but not significantly. In our investigation the mortality was only recorded in scavenging system (6.7%) at 14 week of age. The body conformation traits of present study was significantly ($p<0.05$) higher in intensive system followed by backyard and scavenging system in which following parameters include live weight (Kg), bleed weight (Kg), carcass weight (Kg), Meat bone ratio were significantly higher in intensive system were, 1.525 ± 0.04, 1.522 ± 0.04, 1.09 ± 0.01 and 2.00 ± 0.01 respectively. The mean value of different cut off parts (g) like head, neck, giblet, wing, breast, drumstick, thigh and feet was found significantly ($p<0.05$) higher in intensive system respectively. In cost economics of Kadaknath for different rearing system, in which net profit is higher in backyard system however benefit cost ratio is higher in scavenging system.

From present result concluded that the Kadaknath chicken has good potential for meat production in rural area under backyard rearing system with minimum cost. This farming helps to improve the livelihood as additional income to the farmer.

STUDIES ON EGG PRODUCTION PERFORMANCE OF NARMADA NIDHI BIRDS

Dr. A.K. Mishra **Anil Kumar Patidar**
(Advisor) **(Researcher)**

ABSTRACT

Narmada Nidhi is an improved dual purpose bird developed by the AICRP on Poultry Breeding, NDVSU, Jabalpur, which is a cross of Kadaknath (25%) with Jabalpur colour bird (75%). The present study was conducted to assess the egg production performance and egg quality traits of Narmada Nidhi birds. The present work was carried out in the Instructional Poultry Unit and Department of Livestock Production Management, College of Veterinary Science & Animal Husbandry, Rewa. Day old, 50 female chicks of Narmada Nidhi birds were obtained from the Hatchery Unit. The study was carried out from day old and was continued up to 40th week of age. The laying period was divided in to three different age groups i.e. 20-26th weeks, 27-33rd weeks, 34-40th weeks of age. The body weight, Growth rate, egg production, egg quality, FCR, Mortality and Cost economics were estimated. The body weight at first egg was 1574.60 gm. However the body weight at 40th weeks of age was only 1960.80 ± 87.11 gm. The growth rate was highest during 8-12th week. During 28-32nd, 32-36th and 36-40th week the growth rate was very less. It is a typical character of a good layer as the weight should not be increased during laying period. The egg production was increasing with age and found highest during 3rd interval i.e. 34-40th week. The egg production till 40th week of age was 48.32% which is good performance by a dual purpose bird. The FCR for production of one dozen eggs was very poor during first interval since the egg production was very low during first interval. However the FCR for total egg production period i.e. 20-40th week of age was 4.83, which is better for a dual purpose bird. The FCR for production of one kg egg mass was 8.32 for total egg production period i.e. 20-40th week of age. The egg weight was increasing with age and reaches up to 50.37 gm during third interval likewise the weight of shell, albumen and yolk was also increasingly with age of bird. However the percentage of shell and albumen was decreasing whereas the percentage of yolk was increasing with age. The yolk index and albumen index was found decreasing with age, which indicate the quality of yolk and albumen was decreasing with age. The mortality occurred during 2nd and 3rd period. The total mortality was 8%, which was well within the limit. The cost of production of one brown egg was Rs.12.63/- as the production cycle would have to continue, may lead to further reduction in cost.

“EFFECT OF PROBIOTIC, PREBIOTIC AND SYNBIOTIC ON PERFORMANCE OF MURRAH BUFFALO CALVES’’

Dr. G.P. Lakhani **Divya Patel**
(Advisor) **(Researcher)**

ABSTRACT

The study was planned on Murrah buffalo calves with the following objectives: (1) Effect of probiotic, prebiotic and synbiotic on performance of Murrah buffalo calves. (2) Effect of probiotic, prebiotic and synbiotic on immune response of Murrah buffalo calves. (3) To calculate the economics of probiotic, prebiotic and synbiotic supplementation of Murrah buffalo calves.

Total 24 Murrah buffalo calves with similar body weight of either sex at the age of 15th day were selected and divided into 4 groups randomly and each group contains 6 animals. Group T1 (Control) was fed basal ration, group T2 was fed basal ration with probiotic (*Saccharomyces cerevisiae*) @4g/animal/day, group T3 was fed basal ration with prebiotic (Mannan oligosaccharide) @4g/animal/day and group T4 was fed basal ration with synbiotic (*Saccharomyces cerevisiae* @2g/animal/day + Mannan oligosaccharide @2g/animal/day). The duration of experiment was 3 months. All the animal were maintained under identical managemental conditions.

Result revealed that at the end of experiment average body weight was 41.39±1.06, 44.84±1.01, 43.04±0.92 and 46.43±1.08 in T1, T2, T3 and T4 groups, respectively. There was significant ($p<0.05$) difference in weekly average daily gain. Average daily DM intake was highest in group T4 followed by T2, T3 and T1 group respectively. There were non- significant differences in Blood parameters between the groups. Faecal score were found higher in control group in compared to treatment groups. Economic analysis indicated that the recurring cost of rearing Murrah buffalo calves was reduced in group T4 followed by T2, T3 group in comparison to the control group. There was reduction in total recurring expenditure for per kg body weight gain were maximum in group T4 (35%) followed by T2 (31%), T3 (26%) in comparison to T1 control) group.

EFFECT OF CONCENTRATE FEEDING AND PROBIOTIC SUPPLEMENTATION ON PERFORMANCE OF GROWING BARBARI AND SIROHI GOATS

Dr. G.P. Lakhani
(Advisor)

Vidya Nidhi Gautam
(Researcher)

ABSTRACT

Kids are the valuable asset for successful goat farming. Proper care of kids from very beginning is directly related to the productive performance of the goat. However, information regarding effect of Sacchromyces *cervisiae* feeding on the goat (Sirohi and Barbari goat) is scanty. Therefore, the present experiment was designed to assess the effect of concentrate feeding and probiotic supplementation (*Saccharomyces cervisiae*) on performance of growing Barbari and Sirohi goat kids. During the study,3 months old Barbari and Sirohi kids of (48 No.'s) with body weights ranging from 8 to 12 kg were selected and randomly divided into four equal (n=6) groups, vizT1 group(Control) Grazing+ concentrate feeding (100 g/day/kid), T2 group T_1 +*S. cerevisiae* ($4X10^9$cfu/g @ 2g/animal /day),T3 group T_1+50g extra concentrate feeding,T4 group T_1+50g extra concentrate feeding +*S. cerevisiae* ($4X10^9$cfu/g @ 2g/animal /day)respectively. All the selected animals were maintained under semi intensive management system.

Experiment was conducted for a period of eight months from mid of June 2018 to mid of February 2019. Observations recorded during the experiment were body weight at fortnight interval, daily feed intake, average daily gain, body measurement (height at wither, body length) and hematological parameters (blood glucose, neutrophil, eosinophil, basophile, lymphocyte, monocyte, MCV, MCH, MCHC, total erythrocyte count, total leucocytes count, total protein, albumin, globulin, albumin globulin ratio) at fortnightly interval.

Results revealed that in probiotic supplemented Barbari group kids body weight body weight gain and Heart girth differed significantly ($P<0.05$) between treatment groups and highest value was observed in T4 and lowest value was observed in T1 group. Height at wither, body length, blood glucose, neutrophil, eosinophil, basophil, lymphocyte, monocyte, MCV, MCH, MCHC, total erythrocyte count, total leucocyte count, total protein, albumin, globulin, albumin globulin ratio, daily feed Intake, were showed non-significant effect between the treatment groups.

Results revealed that in probiotic supplemented Sirohi group kids body weight body weight gain and Heart girth differed significantly ($P<0.05$) between treatment groups and highest value was observed in T4 and lowest value was observed in T1 group. Height at wither, body length, blood glucose, neutrophil, eosinophil, basophil, lymphocyte, monocyte, MCV,MCH, MCHC, total erythrocyte count, total leucocyte count, total protein, albumin, globulin, albumin globulin ratio, daily feed Intake, were showed non-significant effect between the treatment groups.

Additional 50 g. concentrate mixture along with probiotics supplementation @ 2gm per animal per day reduced recurring cost up to 14.72% and 11.72% in compression to control group in Barbari and Sirohi goat simultaneously.

STUDIES ON EGG PRODUCTION AND EGG QUALITY TRAITS OF KADAKNATH BREED

Dr. Girraj Goyal **Rajat Thakur**
(Advisor) **(Researcher)**

ABSTRACT

Kadaknath breed, (Kalamashi) is famous for its black-coloured meat, reared by tribal communities in Jhabua and Dhar (M.P.). Native rural chicken are valuable genetic resources due to their adaptability to local conditions and resistance against common diseases. Egg quality has been defined as the characteristics of an egg that affect its acceptability to the consumers. A large volume of literature is available on egg production performance and egg quality parameters of commercial hybrid variety, but information on egg production performance and egg quality characters is scanty in indigenous breeds. Therefore the present investigation was undertaken with following objectives to assess the egg production performance and various egg quality characteristics of Kadaknath breed of poultry. The present work was carried out in the Instructional Poultry Unit and Department of Livestock Production Management, College of Veterinary Science & Animal Husbandry Rewa. A total of Day old, 50 female chicks of Kadaknath birds were obtained from the Hatchery Unit. The study was carried out from 20th week of age and was continued up to 40th week of age. The experimental period was divided in to three different age groups i.e. 20-26th weeks, 27-33th weeks, 34- 40th weeks of age. The body weight, Growth rate, egg production, egg quality, FCR, Mortality and Cost economics were estimated. The body weight at first egg was 1124 gm at 22 weeks of age. However the body weight at 40 weeks of age was only 1508 gm. The growth rate was highest during 3rd month. During 7th, 8th & 9th month the growth rate was very less, which is a typical character of a good layer as the weight should not be increased during laying period. The egg production was highest during 2nd Interval then it decreases during 3rd Interval. Since Kadaknath is a Indigenous breed, having shorter laying cycle. The total egg production upto 40th week of age was 41.04%, which is very good in Kadaknath. It may increase further with age. The FCR for production of one dozen eggs was very poor during first interval since the egg production was very low during 1st interval. However the FCR for total egg production period i.e. 20-40th weeks of age was 5.90, Which is better for indigenous breeds. The FCR for production of one kg egg mass was 10.73 for total egg production period i.e. 20-40th weeks of age. The egg weight was increasing with age and reached upto 47.07 gm during 3rd interval. Likewise the weight of egg shell, albumin & yolk was also increasing with age of birds. The percentage of dark brown was significantly higher. Off-white/cream eggs were not produced as Kadaknath is a pure indigenous breed. The egg shell percentage was highest during 2nd interval whereas the albumen percentage was slightly decreasing however the yolk percentage was increasing with age. The yolk index and albumen index was found decreasing with age, which indicate the quality of yolk and albumen was decreasing with age. The total mortality was only 2% from 20th to 40th week of age, which was well within the acceptable limit of 5%, showed the higher resistance towards diseases in indigenous breeds. The cost of production for 20-40th week was Rs. 15.38 per egg, which was higher since the egg production was very low during the first period i.e. 20-26 wks. The cost of egg production may decrease further as age advances.

"EFFECT OF MORINGA LEAF MEAL ON PERFORMANCE OF MURRAH BUFFALO HEIFERS"

Dr.Biswajit Roy
(Advisor)

Aprijita Vasuniya
(Researcher)

ABSTRACT

The study was undertaken on Murrah buffalo heifers with the following objectives; 1). Effect of Moringa leaf meal and season on performance of Murrah buffalo heifers and 2) Economics of feeding Moringa leaf meal to Murrah buffalo heifers. For the study, eighteen Murrah buffalo heifers were randomly distributed into 3 groups of six animals in each group i.e., Group1 offered Basal diet (Con), in Group2 7.5% concentrate replaced by Moringa leaf meal (M7.5) and in Group3 15% concentrate replaced by Moringa leaf meal (M15). The duration of experiment was eight months from July, 2018 to February, 2019. Entire experimental period was divided in three seasons namely, hot-humidity (July-September), thermo-neutral (October-November) and cold (December-February). All animals were maintained under same managemental conditions. Feed intake was measured on fortnightly basis. Environmental variables (maximum temperature, minimum temperature and humidity) were recorded on alternate days. Physiological parameters (pulse rate, respiration rate and body temperature) were recorded weekly. Blood parameters (PCV%, Hb g/dl, TLC 10^3/µl, total serum protein g/dl, albumin g/dl, globulin g/dl) were collected in two months interval.

Result revealed that the body weight changes, average daily gain, dry matter intake, average daily dry matter intake (% BW) were non-significant among the groups but average daily gain was 5.66% and 11.32% higher in M7.5 and M15 in comparison to control group. Average body weight (kg) of heifers was 201.26±6.98, 206.49±8.03, 204.99±8.17 in Con, M7.5 and M15 groups respectively. Blood parameters, physiological parameters according to seasons were non-significant among the groups and seasons. Economic analysis indicated that the recurring cost of rearing Murrah buffalo heifers was reduced in M7.5 and M15 groups in comparison to Con group. Recurring expenditure of body weight gain **(**Rs/kg**)** were 217.78, 198.60 and 191.85 in Con, M7.5 and M15, respectively. Reduction of recurring expenditure on the basis of body weight gain (Rs/kg) in comparison to control group was 19.19 and 25.94 for M7.5 and M15, respectively. Per cent decrease of total recurring expenditure in comparison to control group/kg BW gain were 8.81 and 11.91 in group M7.5 and M15, respectively. It can be concluded that concentrate mixture can be replaced by moringa leaves upto 15% to attend better growth rate and improve economic efficiency of Murrah buffalo heifers rearing.

“EFFECT OF CLASSICAL MUSIC ON MILKING BEHAVIOR AND PHYSIOLOGICAL RESPONSES IN CROSSBRED COWS”

Dr. Sandeep Nanavati **Neelesh Singh Yadav**
(Advisor) **(Researcher)**

ABSTRACT

The present study entitled “Effect of classical music on milking behavior and physiological responses in crossbred cows’’ was performed at The Livestock farm complex, College of Veterinary Science and A.H. Mhow. Twelve healthy and same stage of lactating crossbred cows were selected having almost similar body weight, parity and milk yield in current lactation for 90 days (November to January) were randomly distributed in two groups of equal number (6 in each group), namely treatment (with classical music) group and another is control (without classical music) group. This study is planned with various objectives like study of the Milking behavior traits viz: Milk yield, Milk flow rate, Milk let down time and Milking time. The physiological parameters viz: body temperature (°F), pulse rate (beats per minute) and respiration rate (breath per minute). Feed intake of crossbred cows under treatment and control groups.

The milk yield of crossbred cows was significantly ($P<0.05$) higher in animals exposed to music (5.44 ± 0.17 lit.) than the unexposed (4.88 ± 0.11 lit.) group. Which is indicative of the fact that milk production of cows exposed to music was better than control group. The average milk flow rate of crossbred cows are significantly ($P<0.01$) higher in treatment (0.85 ± 0.03 lit/min) group than in control (0.75 ± 0.01 lit/min) group. This indicates that animals under exposure of classical music were more comfortable at the time of milking than other group. Similarly, the cows that are kept in treatment group i.e. exposure of classical music, required less time (132.06 ± 2.50 sec.) for letting down of milk as compared to control (143.63 ± 1.09 sec.) group. The crossbred cows under exposure of classical music did not show any significant effect on feed intake, body temperature and milking time. The overall mean respiration and pulse rate were calculated to be 22.91 ± 0.47 breaths/min. and 69.28 ± 0.66 beats/min. in treatment group. Which were found significantly lower in control group. i.e 19.93 ± 0.23 breaths/min. and 64.94 ± 0.25 beats/min.

LIVESTOCK PRODUCTS TECNOLOGY

DEVELOPMENT AND QUALITY ASSESSMENT OF HIGH FIBRE-LOW FAT NUGGETS OF KADAKNATH CHICKEN

Dr. N.K. Nayak **Shubham Uikey**
(Advisor) **(Researcher)**

ABSTRACT

The study titled, "Development and quality assessment of high fibre-low fat nuggets of kadaknath chicken" was carried out with the prime objective of increasing fibre and reducing fat content by incorporating gram hulls and carrageenan respectively. Efficiency of gram hulls at three different levels (T1-4%, T2-6% & T3-8%) was assessed to increase the fibre content in kadaknath chicken nuggets. The pH value for control was significantly ($P<0.05$) higher as compared to treatment products. Moisture content decreased gradually and showed a significant ($P<0.05$) difference at 6 % and 8 % incorporation of gram hulls. The fibre content in kadaknath chicken nuggets was increased significantly ($P<0.05$) with the increasing level of gram hulls. Moisture retention of gram hulls incorporated kadaknath chicken nuggets also differ significantly ($P<0.05$). Hardness value was increased gradually with the increasing level of gram hulls and become significant ($P<0.05$) at T-3. There was a significant ($P<0.05$) difference between control and T-3 in the adhesive force as well as cohesiveness value of high fibre kadaknath chicken nuggets. There was a non-significant ($P>0.05$) lower gumminess value was recorded for the product prepared with 4 % gram hulls as compared to control. Further, gumminess value in the treatment increased as the level of gram hulls in the product is increased. Nuggets with 8% gram hulls indicated significantly ($P<0.05$) lower flavor and texture scores compared to control. The mean score value for overall acceptability showed that the score for T-3 was significantly ($P<0.05$) lower compared to control. However, score for T-2 was comparable to control. Hence, T-2 (Nuggets with 6% gram hulls) was finally selected for development of high-fibre kadaknath chicken nuggets.

Low fat nuggets from selected variant from previous experiment were prepared by incorporation of three different levels of carrageenan (T1-0.25%, T2-0.5% and T3-0.75%) by replacing added fat. A non-significant increasing trend in the pH as well as in emulsion stability was recorded with increasing levels of carrageenan. There was a significant ($P<0.05$) difference in cooking yield of kadaknath chicken nuggets between control and treatments. There was significant ($P<0.05$) difference in moisture content of kadaknath chicken nuggets between control and treatments. Carrageenan added low fat kadaknath chicken nuggets had significantly ($P<0.05$) lower fat content compared to control. Moisture and fat retention were significantly ($P<0.05$) lower in control as compared to carrageenan incorporated kadaknath chicken nuggets. Hardness, cohesiveness and gumminess values of carrageenan incorporated kadaknath chicken nuggets differed significantly ($P<0.05$). However, no significant difference in adhesive force was noticed. Sensory attributes of carrageenan incorporated kadaknath chicken nuggets indicated comparable scores of flavor and texture scores at T-1 and T-2 compared to control. Overall acceptability revealed that there was significant ($P<0.05$) variations among different carrageenan incorporated kadaknath chicken nuggets and score for T-2 was comparable to control. Hence, nuggets with 6 % gram hulls and 0.5 % carrageenan (T-2) was found superior and most acceptable by the sensory panellists and finally selected as high fibre-low fat kadaknath chicken nuggets and evaluated for storage stability under refrigeration.

The pH, TBA and FFA values of developed high fibre-low fat kadaknath chicken nuggets were lower as compared to control throughout the storage period. A progressive and significant ($P<0.05$) increment in the pH, TBA and FFA values of control as well as developed kadaknath chicken nuggets were observed with the advancement of storage. The total plate count (TPC) followed a significantly ($P<0.05$) increasing pattern from 0 to 12 day in control as well as developed high fibre-low fat kadaknath chicken nuggets. Psychrotropic counts as well as Yeast and Mold count were not detected upto 9 day of storage in control as well as in treatment. However, these were detected on 12 day of storage. Coliforms were not detected during the entire period of storage. Sensory attributes under storage study did not have any significant ($P>0.05$) difference between control and developed high fibre-low fat kadaknath chicken nuggets on all storage days. The mean scores for all the sensory attributes for both control as well as developed high fibre-low fat kadaknath chicken nuggets decreased gradually with increasing storage period. From the study it was concluded that the developed high fibre- low fat kadaknath chicken nuggets may be considered as health full product which was very well accepted up to 12 day under refrigeration.

“DEVELOPMENT AND QUALITY ANALYSIS OF FIBRE ENRICHED LOW FAT KADAKNATH CHICKEN PATTIES”

Dr. N.K. Nayak **Sunil Badole**
(Advisor) **(Researcher)**

ABSTRACT

The study titled, “Development and Quality Analysis of Fibre Enriched Low Fat Kadaknath Chicken Patties” was carried out with the prime objective of increasing fibre and reducing fat content by incorporating black gram hull and guar gum respectively. Efficacy of black gram hull at three different levels (T-1 3%, T-2 6% & T-3 9%) was assessed to increase the fibre content in kadaknath chicken patties. Moisture content decreased gradually and showed a significant ($P<0.05$) difference at 6 % and 9 % incorporation of black gram hull. The fibre content in kadaknath chicken patties was increased significantly ($P<0.05$) with the increasing level of black gram hull. Moisture retention of black gram hull incorporated kadaknath chicken patties also differ significantly ($P<0.05$). Hardness value was increased gradually with the increasing level of gram hull and become significant ($P<0.05$) at T-2. There was a significant ($P<0.05$) difference between control and T-3 in the adhesive force as well as cohesiveness value of fibre enriched kadaknath chicken patties. A non–significant ($P>0.05$) lower gumminess value was recorded for the product prepared with 3% black gram hull as compared to control. Further, gumminess value in the treatment increased as the level of gram hull in the product is increased. Patties with 9% gram hull indicated significantly ($P<0.05$) lower flavor and texture scores compared to control. The mean score value for overall acceptability showed that the score for T-3 was significantly ($P<0.05$) lower compared to control. However, score for T-2 was comparable to control. Hence, T-2 (6% gram hull) was finally selected for development of fibre enriched kadaknath chicken patties.

Low fat patties from selected variant from previous experiment were prepared by incorporation of three different levels of guar gum (T-1 0.5%, T-2 1% and T-3 1.5%) by replacing added fat. The emulsion stability was found to be increased initially from control to T-2 and then decreases with the further increasing level of guar gum. There was a significant ($P<0.05$) difference in the cooking yield of kadaknath chicken patties between control and treatments. There was significant ($P<0.05$) difference in the moisture content of kadaknath chicken patties between control and treatments. Guar gum added low fat kadaknath chicken patties had significantly ($P<0.05$) lower fat content compared to control. Moisture retention was significantly ($P<0.05$) lower in control as compared to guar gum incorporated kadaknath chicken patties. Fat retention was significantly ($P<0.05$) increased with the increasing level of guar gum from control to T-2 and thereafter a non-significant ($P>0.05$) increment was noticed. Hardness, cohesiveness and gumminess values of guar gum incorporated kadaknath chicken patties differed significantly ($P<0.05$). However, no significant difference in the adhesive force was noticed. Sensory attributes of guar gum incorporated fibre enriched low fat kadaknath chicken patties indicated that there were non-significant ($P>0.05$) difference in the mean scores of general appearance, mouth coating, saltiness and juiciness. Flavor and texture scores at T-1 and T-2 were comparable to control although scores were significantly ($P<0.05$) lower for T-3. Sensory panelists rated T-2 similar to control for texture attributes. Overall acceptability revealed that there was significant ($P<0.05$) variations among different guar gum incorporated fibre enriched low fat kadaknath chicken patties. A significant ($P<0.05$) lower score were observed for T-1 and T-3. However, score for T-2 was comparable to control. Hence, patties

with 6% black gram hull and 1% guar gum (T-2) was found superior and most acceptable by the sensory panelists and finally selected as fibre enriched low fat kadaknath chicken patties. The patties were packaged aerobically as well in vacuum condition and evaluated for storage stability under refrigeration.

The pH, TBA and FFA values of fibre enriched low fat kadaknath chicken patties were lower as compared to control throughout the storage. A progressive and significant ($P<0.05$) increment in the pH, TBA and FFA values of control as well as fibre enriched low fat kadaknath chicken patties were observed with the advancement of storage in aerobically as well as in vacuum packaged kadaknath chicken patties . The total plate count (TPC) followed a significantly ($P<0.05$) increasing pattern from 0 to 12 day (in aerobic packaging) and from 0 to 28 day (in vacuum packaging) in control as well as fibre enriched low fat kadaknath chicken patties. Psychrophilic counts as well as Yeast and Mold count under aerobic packaging were not detected upto 9 day of storage either in control or in fibre enriched low fat kadaknath chicken patties and these were detected on 12 day of storage. However, psychrophilic counts under vacuum packaging were detected from 14th day of storage and Yeast and Mold were not detected during the entire period of storage. Coliform were not detected during the entire period of storage in either of packaging. Sensory attributes under storage study did not have any significant ($P>0.05$) difference between control and fibre enriched low fat kadaknath chicken patties on all storage days in either of packaging. The mean scores for all the sensory attributes for both control as well as fibre enriched low fat kadaknath chicken patties decreased gradually with increasing storage period. From the study it was concluded that the fibre enriched low fat kadaknath chicken patties may be considered as health full product which was very well stable and accepted up to 12th day (in aerobic packaging) and for a period of 28th days (in vacuum packaging) under refrigeration.

VETERINARY GYNAECOLOGY

COMPARATIVE EFFICACY OF CHEMOTHERAPEUTIC AND SURGICAL MANAGEMENT OF CANINE TRANSMISSIBLE VENEREAL TUMOUR IN BITCHES"

Dr. S.P. Nema (Advisor)

Madhuri Dhurvey (Researcher)

ABSTRACT

The incidence of reproductive disorders was calculated for past 3 years (2007- 11) and their age wise, season wise and breed wise categorization was done. The incidence of physiological conditions like pregnancy and cyclical animals was lower than the incidence of reproductive disorders. Highest incidence of reproductive disorders was observed from 1 – 3 years of age followed by 3 – 6 years, 6 – 9 years, 9 – 12 years, more than 12 years and upto 1 year of age respectively. Further highest incidence of reproductive disorders was observed during winter season followed by rainy season, summer and spring season respectively. Among various breeds highest incidence of reproductive disorders was observed in Pomeranian followed by GSD, Labrador, Non descriptive, Pug, Great Dane, Cross bred, Rotwiller, Bull Mastiff, Dalmatian and Dachshund respectively.

The experimental work was conducted on 30 female dogs that were presented for complaint of growth in vagina with bleeding calculate the incidence in relation to age, size, parity, history of estrus, mating to male, duration of growth, history of reoccurrence and other clinical signs, before and after the chemotherapy and surgery. Incidence of canine venereal transmissible tumour out of 30 bitches is highest in 4-8 year of age group (4o %), lowest in 12-16 (6.67%). Morphological occurrence canine venereal transmissible tumour more in large size (36.67%) and less in medium size (30%). According to duration of growth occurrence was more in the group of 0-1 month (43.33%), less in 3-6 months (23.34%). According to history of mating occurrence was more in the group had history of mating to male (56.67%). Further, occurrence was more in bitches had history of estrous (63.33%) and more in group of 0 -3 parity (60%). 86.67% cases did not have history of reoccurrence. The female dogs were categorized as: chemotherapy by vincristine sulphate, chemotherapy with cyclophosphamide, surgery followed by vincristine sulphate, surgery followed by cyclophosphamide and surgery alone. To support these findings appropriate haematobiochemical, histopathological parameters were studied.

The research work showed that vincristine sulphate is very successful for treatment of CTVT. There was evidence of stoppage of bleeding and slight reduction in tumour size after first dose of vincristine and complete recovery seen after third dose. However animals treated with cyclophosphamide also revealed stoppage of bleeding but the reduction in tumour size after first dose of cyclophosphamide was comparatively slow and complete recovery needed six to eight doses.

Haemoglobin level (g/dl) in bitches of all five groups reduced under physiological limits which was statistically non significant. The total leukocyte count (10^3/cu.mm) in animals of group ll, lll and lV revealed non-significant decreasing or undulating trend. Significant reduction ($P<0.05$) in the leucocyte count was observed in animals belonging to experimental groups l (vincristine therapy at weekly intervals) and lV which received cyclophosphamide after surgery. In differential leucocytic count, significant reduction ($P<0.05$) of the neutrophil percentage was observed in the bitches of groups l, ll, lV and V and highly significant ($P<0.01$) increase in lymphocyte count in bitches of group l and ll, similar trend was observed in group ll monocytes and

eosinophil percentage. In group I, lV and V it was observed that there was significant ($P<0.05$) increase in monocyte count.

Biochemical estimation in all five groups Serum Creatinine (mg/dl), SGPT (U/L) BUN mg/dl was not differentiated significantly however alkaline phosphatase was significantly reduce ($P<0.05$) in group l and ll.

Histopathological studied vincristine sulphate treated bitches observed highly significant reduction ($P<0.01$) in mast cell number after first week of treatment than cyclophosphamide treated bitches.

Recurrence until 90 days post therapeutic was monitored in all the cases, only one animal belonging to vincristine group was noticed which may be due to irregularity in chemotherapy. Recurrence was also observed in two cases belonging to the surgery alone group.

Toxic effect associated with vincristine sulphate was slight loss of appetite, alopecia and two bitches exhibited vomition after chemotherapy. Toxic effect of cyclophosphamide was slight loss of appetite, alopecia, nausea, vomiting and diarrhea. Only one animal showed high rise of body temperature up 105-106^{0}f next day of chemotherapy with cyclophosphamide.

STUDIES ON SCROTAL BIOMETRICS AND SEMINAL ATTRIBUTES IN RELATION TO CHROMOSOMAL PROFILE IN CATTLE BREEDING BULLS

Dr. Sant Prasad Nema (Advisor)

Narottam Singh (Researcher)

ABSTRACT

The Scrotal biometrics, seminal attributes and karyological study was conducted on Forty cattle breeding bulls of Sahiwal (3), Gir (4), Jersy(19), Holstein Friesian (3) and Jersy X Sahiwal (8) and HFX Sahiwal (3) belonging to Central Semen Station, Bhopal. The Bulls were kept under uniform feeding and managemental conditions and to find out effect of semen quality and fertility.

The semen samples were collected using artificial vagina and were studied for volume, mass motility and sperm concentration, progressive motility, live sperm count, morphological abnormalities in fresh semen and fertility of semen using standard methods of evaluation. The mean volume, mass motility, progressive motility, sperm concentration, live sperm count, total abnormal sperms were 3.929 ± 0.16 ml, 4.09 ± 0.07, 71.39 ± 0.26 %, 915.30 ± 39.93 million/ ml, 90.45 ± 2.30 percent , and 11.84 ± 0.48 percent, respectively in fresh semen samples. Statistically, highly significant (P<0.01) variation was observed between the bulls with regards to volume, sperm concentration and total sperm abnormalities However, non-significant differences were observed for mass motility, progressive motility and Live Sperm count. The variation in mean volume, mass activity, Individual motility, sperm concentration and live sperm percent in bulls did not vary significantly between breeds for these semen characters. The age group wise mean volume in bulls significantly varied (P< 0.01) however there was no age wise statistical variation in the mean mass activity (score), Progressive motile%, sperm concentration, live sperm percent and morphological abnormalities .

The overall mean morphological abnormalities found during study for abnormal head, middle piece defects, tail abnormalities and total abnormalities were 6.5 ± 0.20, 1.12 ± 0.05, 4.57 ± 0.06 and 11.95 ± 0.06 percent, respectively. Statistical analysis for different abnormalities between bulls revealed highly significant difference (P<0.01) in the head and mid peace abnormalities in different bulls while variation in rest of the abnormalities were found to be non significant.

In present study, highly significantly positively correlation between transverse scrotal circumference and sperm concentration were observed. The trend of correlation among semen characters viz: sperm concentration, semen volume, sperm count, abnormal sperm count was positively correlated with SC except with abnormal sperm per cent which was negatively associated and have been presented. It was observed that the scrotal circumference is highly related to many of these satisfactory semen characters. The mean SC value of 40 bulls was 42.450 cms (Range 32 to 48cms) in present study. Thus, higher SC value bulls produced better semen quality with good sperm morphology. Highly significant correlation coefficient was observed for the study between SC and Total sperm concentration 915.30 ± 39.93 (P<0.01) mill. / ml. Thus, SC could be used to know the sperm production potential (SPP) of the bulls because of the highly significant positive relationship with sperm productivity.

All the autosomes were acrocentric in morphology. The X chromosome was largest sub metacentic. The Y Chromosome was smallest and Submetacentric in Bos torus and crossbred bulls where as it was acrocentric In Bos indicus bulls cytogenetic screening did not reveal the

presence of structural abnornormalities except gap and breaks.Exposure time of the slides to the trypsin solution between 15-20 second. Yield as good banding pattern in general the centromeric region where as G-band negative and the characteristic banding pattern among all the breeding bulls.Good quality C-band where optained by applying Barium hydraoxide saline Geimsa technique. Thus, centromeric hetrochromatin of all the achrochromatin of all the acrocentric autosomes stand deeply. The X- Chromosome head is prominent C-banding.

The bull and breed wise variation on mean transverse scrotal circumference in different bulls and breeds was significant ($P<0.05$) however age group wise variation was statistically non- significant.

The variation in mean volume, mass activity, Individual motility, sperm concentration and live sperm percent between bulls did not vary significantly between breeds but for morphological abnormalities the between bull variation was significant ($p<0.01$).

The effect of age on seminal characters was studied in four different groups. There was statistically significant Variation ($P<0.05$) in volume between deferent age groups however, for other seminal characters it was non-significant.

Highly significant positive correlation between transverse scrotal circumference and sperm concentration were observed. The trend of positive correlation among semen characters viz: sperm concentration, semen volume, sperm count, and abnormal sperm count with SC except for abnormal sperm per cent which was negatively associated have been presented.

Screening of bulls belonging to (Sahiwal, Gir, Jersy, Halstein Frisian breeds and Jersy and HF cross bred) breeds, did not reveal any deviation from normal diploid chromosome number of cattle.

STUDIES ON FERTILITY RESPONSE USING INTRAVAGINAL PROGESTOGEN DEVICE WITH INSULIN AND GnRH IN ANOESTRUS BUFFALOES

Dr. S.N. Shukla (Advisor)

Pritam Sing (Researcher)

ABSTRACT

Efficiency of reproduction is the key for a profitable herd. To maximize the productive life of a buffalo, it should be bred within 60 days postpartum to maintain intercalving interval of 13 -14 months. Moreover, long calving interval in buffaloes are mainly due to prolonged anoestrus. Anoestrus is one of the most important production limiting disorders in buffalo cows under field conditions. Various hormonal and non hormonal preparations are being used in different combinations to improve therapeutic response in anoestrus buffaloes. Progesterone devices have been used for the management of anoestrus with limited success. As the insulin also has some beneficial effect on fertility of farm animals, therefore the present investigation was conducted to study the incidence of anoestrus and the therapeutic efficacy of modified protocol using CIDR, insulin and GnRH for the management of anoestrus in buffaloes reared under organized dairy farms of Jabalpur. To study the incidence of anoestrus, a survey was conducted in 2550 buffaloes and was recorded as 37.85% overall anoestrus. A total 542 buffaloes, with a history of non return to oestrus sixty days post partum, were examined and recorded higher incidence of true anoestrus (60.70%), followed by silent/un-observed oestrus (22.51%) and other patho-physiological conditions (16.79%). Anoestrus was observed to be higher during March (26.01%) and October (22.51%) as compared to other months of study *i.e*. November (14.94%), December (12.55%), January (10.89%) and February (13.10%). For the study of therapeutic efficacy, a total of 50 postpartum anoestrus buffaloes were selected and randomly divided into five groups, each comprising ten animals (N=10). The treatments instituted were: CIDR + Insulin (day 8-10) Group-I, CIDR + Insulin (day 0-2) Group-II, CIDR + GnRH (day 9) + Insulin (day 9-11) Group-III, only CIDR (Group-IV) and Untreated Control (Group-V). The animals were monitored for oestrus detection, bred naturally at oestrus and confirmed pregnancy at day 60 post service. The oestrus induction rate of 50, 60, 70 and 40% with the mean time interval after implant removal for oestrus induction 5.20±1.02, 10.00±0.97, 7.71±1.19 and 4.25±0.75 days was recorded in G-I, G-II, G-III and G-IV, respectively. Conception at induced oestrus was 40, 50, 71.42 and 25% in the respective groups. However, none of the animals exhibited oestrus in control (G-V). The serum progesterone concentration was also estimated before and after treatment in anoestrus buffaloes. The serum progesterone concentration (ng/ml) ranged between 2.26±0.53 to 5.02±1.04 at pre treatment (d-0) and 1.06±0.21 to 3.17±0.82 post treatment (d-14). The respective means of serum progesterone in groups I, II, III and IV pre treatment (4.72±0.89, 4.86±0.98, 5.02±1.04 and 4.79±0.89 ng/ml) was significantly higher as compared to post treatment (1.06±0.21, 1.70±0.32, 1.24±0.22 and 1.39±0.33 ng/ml). However, it was significantly lower in group V (2.264±0.527) as compared to other groups. The present study can be concluded as incidence of anoestrus in dairy buffaloes was recorded to be 37.85% under organized dairy sector of Jabalpur. The higher incidence of anoestrus and true anoestrus were also recorded in the month of March and October especially during 90 to 120 days postpartum. All modified controlled internal drug release based protocols exhibited better fertility response than the only controlled internal drug release protocol. Better fertility response was recorded in Insulin plus GnRH as compared to only Insulin administered controlled internal drug release protocols for the therapeutic management of anoestrus in buffaloes under field conditions.

EFFICACY OF MODIFIED OVSYNCH PROTOCOL FOR MANAGEMENT OF POSTPARTUM ANESTRUS IN BUFFALOES

Dr. S.N. Shukla
(Advisor)

Pushpendra Singh
(Researcher)

ABSTRACT

Postpartum anestrus is a functional disorder of ovaries characterized by cessation of sexual cycle and psychic manifestation of estrus. As the GnRH and insulin has been shown to have a synergistic effect on follicular development and maturation to induce estrus and ovulation thus, the modified Ovsynch protocol with insulin was considered to be utilized for a better fertility response in anestrus buffaloes. With the above concept, the present investigation was undertaken with the objectives to study the incidence of postpartum anestrus in dairy buffaloes of Jabalpur and the therapeutic efficacy of modified Ovsynch protocol for the management of postpartum anestrus in buffaloes.

To study the incidence of postpartum anestrus, total 513 postpartum buffaloes with the history of anestrus were examined per-rectally and the overall incidence of postpartum anestrus was recorded to be 35.02 per cent in organized dairy farms of Jabalpur, during the period of six months (October-2012 to March-2013). In the present study, the anestrus was observed to be higher during March (26.51%) and October (22.61%) as compared to other months of study *i.e.* November (14.81%), December (12.48%), January (11.50%) and February (12.09%). On clinical examination, the anestrus buffaloes were diagnosed as true anestrus (60.62%), silent/un-observed estrus (21.05%) and other patho-physiological conditions (18.33%). To study the fertility response, sixty postpartum buffaloes with the history of non-return to estrus for two months or more after calving were selected and randomly divided into 5 groups, each comprising of twelve animals (n=12). Animals of Group-I, received original Ovsynch protocol however, Group-II, Group-III and Group-IV received modified Ovsynch protocols. In Group-II, second dose of GnRH was partially replaced by Insulin while in Group-III, it was completely replaced by Insulin. In Group-IV, Insulin was given with the start of modified Ovsynch protocol without second dose of GnRH. The serum progesterone was also estimated before (day-0) and after (day-14) the treatment for ascertaining the ovarian activities of the animals. The estrus induction rate in anestrus buffaloes was 41.67, 75.00, 66.67 and 50.00% with the mean time taken for onset of estrus as 24.0±1.871, 23.0±2.667, 15.5±2.260 and 15.3±2.499 days along with the conception at induced estrus as 60.00, 88.89, 75.00 and 83.33%, in Groups-I, II, III and IV, respectively. However, none of the animals in control group (Group-V) exhibited estrus. The mean serum progesterone concentrations (ng/ml) ranged from 2.533±0.464 to 5.015±0.762 and 2.135±0.724 to 3.188±1.034, respectively in pre and post-treatment groups. The serum progesterone concentration before treatment was significantly higher as compared to post treatment in Group-II, which was further correlated by higher rate of estrus induction and conception rate.

Present study revealed higher incidence of total anestrus and clinical true anestrus in buffaloes especially during the transition months of the season *i.e.* March and October. The results of fertility response were good and comparable in all the modified protocols however, better results were observed in protocol with partial replacement of GnRH by insulin.

STUDIES ON SCROTAL BIOMETRY, SEXUAL BEHAVIOUR AND EFFECT OF SEMENADDITIVES ON CRYOPRESERVATION OF MURRAH BUFFALO BULL SEMEN

Dr. S.P. Shukla (Advisor)

Ajay Kumar Singh (Researcher)

ABSTRACT

This study was conducted on Murrah buffalo bulls to study the semen characteristics, and to attempt an improvement in the quality of cryopreserved semen of buffalo bulls with incorporation of membrane stabilizer (EDTA) , stimulants (caffeine and prostaglandin) and antioxidants (catalase) in the routinely used egg yolk tris glycerol (EYTG) extender. The scrotal circumference, time between two ejaculates and study of sexual behaviour was conducted on 30 Murrah Buffalo bulls, routinely used for frozen semen production at Central Frozen Semen Station, Bhadbhada Bhopal (M.P). A total of six ejaculates from each bull were taken making a total of 180 ejaculates. The overall average value of the 30 Murrah bulls for scrotal circumference, time between two ejaculates and sexual behaviour score, volume, mass activity, progressive sperm motility and sperm concentration of neat semen was 37.06 ± 0.64 cm, 10.56 ± 0.36 minutes., 3.85 ± 0.09, 2.71 ± 0.22 ml, 3.34 ± 0.14, 67.8 ± 3.32 %, and 992.27 ± 76.65 million ml^{-1}, respectively. There was significant positive correlation of scrotal circumference with age, volume, mass activity, progressive sperm motility and sperm concentration, where as it was significantly negatively correlated with time between two ejaculates. There was significant ($P< 0.05$) positive correlation between sexual behaviour and sperm concentration but significant negative correlation with age was recorded. Also a significant ($P< 0.05$) negative correlation of time between two ejaculates with age, semen volume, mass activity, progressive sperm motility and sperm concentration was recorded. Maximum sexual desire and sexual performance was exhibited in the age group of 5.0 - 6.5 years. However, maximum scrotal circumference and minimum time between two ejaculates was recorded in bulls above 6.5 years of age.

For Studies on effect of additives on cryopreserved semen, 10 bulls were chosen from selected 30 bulls on the basis of freezability of their semen. A total of 6 ejaculates from each bull were taken making a total 60 ejaculates. The average progressive sperm motility of the ten bulls in the neat semen (72.24 ± 1.4%) did not vary significantly with the pre-fill (71.7 ± 1.4%) motility. However, it declined significantly at pre-freeze (63.0 ± 1.2%) and post-thaw (54.9 ± 1.0) stages. The live sperm count and HOS %, was also significantly more in the neat semen as compared to cryopreserved semen suggesting significant decline in viability of semen during cryopreservation. The average total sperm abnormalities in the neat semen of ten bulls also increased significantly after cryopreservation and thawing. In brief, the present study suggests that all the semen evaluation parameters declined significantly after freezing and thawing due to cryoinjury inflicted to the sperm cells during cryopreservation and subsequent thawing.

In the experiment to study the effect of additives, no significant deleterious effect of 1 mM Caffeine on the progressive sperm motility (51. 8 ± 1.0 %), live sperm (58.3±1.16 %) and HOS % (59.7±1.19%) as compared to their respective values of 54.9±1.0 , 61.7±1.23 and 63.7±1.27 % in control at post-thaw was observed. Similarly, significant deleterious effect of 0.1% EDTA on the progressive sperm motility (49.9 ± 0.99 %), live sperm (56.6 ± 1.11 %), total sperm (17.8 ± 0.35 %) abnormalities and HOS % (59.1 ± 1.18 %) as compared to their respective values of 54.9±1.0, 61.7±1.23, 15. 1±0.30 and 63.7±1.27 % in control was recorded at post thaw. No significant beneficial effect of 125 µg prostaglandin on the progressive sperm motility (52. 6 ± 0.10 %), live sperm (61.0 ± 1.22 %) and HOS % (64.2 ± 1.28 %) was recorded as compared to their respective values of 54.9 ± 1.0 , 61.7±1.23 and 63.7±1.27 % in control at post thaw. The total sperm abnormalities (13.3±0.26 %), however, decreased significantly ($P< 0.05$) as compared to control (15.1 ± 0.30). In the present study, significantly ($P<0.05$) beneficial effect of 1000 IU catalase on the progressive sperm motility (58.9±0.11 %), live sperm (66.0±1.32%) and total sperm abnormalities (12.8±0.25%) as compared to their respective values of 54.9 ± 1.0 ,61.7 ± 1.23 and 15.1 ± 0.30 in control was recorded on cryopreservation and thawing of Murrah semen. The frozen semen was thawed by three different thawing methods viz., thawing at 37°C for 30 sec, ice water (3°C) for 90 sec and at 45°C for 10 sec. The present study revealed that individual motility was significantly ($P< 0.05$) better when frozen semen was thawed in water bath at 37°C for 30 Seconds

HARVESTING THE REPRODUCTIVE POTENTIAL OF CULLED COWS BY *IN VIVO* AND *IN VITRO* OVUM PICK UP TECHNIQUE

Dr. S.K. Jain **Ashish Lakhera**
(Advisor) **(Researcher)**

ABSTRACT

Unproductive, infertile or sterile genetically superior cows are regularly culled at farms. These cows do not have any commercial value and are ultimately sent to gaushalas .The genetic potential of such cows can be harvested by recent techniques like ultrasound guided ovum-pickup technique and aspiration of oocytes from slaughter house ovaries and subsequently production of embryo by IVF for transfer. The aim of the present research was to compare the maturation potential of immature oocytes recovered *in vivo* by ultra sound guided ovum pick up (OPU) technique and those recovered *in vitro* from slaughterhouse ovaries (SO).

Oocytes were retrieved by ultrasound guided ovum pick up technique (OPU) from four healthy culled cows, once a week (18 OPU sessions) and twice a week (33 OPU sessions) irrespective of the reproductive status and with a fixed time interval between two successive collections from the same animal. In once a week OPU session, out of 163 observed follicles, 91 (55.82%) were aspirated. Cow wise, follicles per collection ranged from 5.33 to 10.50 of which 4.50 to 5.50 follicles per collection were aspirated. In twice a week OPU session, out of 287 follicles observed, 185 (64.45%) were aspirated. Cow wise, follicles per collection ranged from 7.87 to 9.25 of which 4.62 to 6.50 follicles per collection were aspirated. A total of 7 oocytes were recovered. The recovered oocytes were of grade II (3), III (3) and IV (1). Out of these 7 oocytes, 3 (42.85%) oocytes showed cumulus expansion on *in vitro* maturation.

Cow ovaries were obtained from local slaughter house of Thiruvanantapuram, Kerala. From 170 ovaries, 117 large follicles were aspirated, from which 10 (20.83%) cumulus oocyte complex (COC) were of grade I , 15 (31.25 %) of grade II,14 (29.16%) of grade III, and 9 (18.75%) of grade IV. A total of 48 (41.02%) oocytes were collected out of which 35 oocytes (72.9%) exhibited cumulus expansion and 25 oocytes (52%) exhibited cumulus expansion along with extrusion of polar body. From 1303 medium + small follicles aspirated from which 118 (32.24%) were of grade I, 143 (39.07%)of grade II, 57 (15.57%) of grade III, and 48 (13.11%) of grade IV. A total of 366 (28.08%) oocytes were collected out of which 215 oocytes (58.74%) exhibited cumulus expansion and 134 oocytes (36.61%) exhibited cumulus expansion along with extrusion of polar body.

Alkaline phosphatase, Glutamate dehydrogenase, Total protein, Albumin and Globulin were estimated in follicular fluid from large and medium + small follicles. Alkaline phosphatase in large follicles was 52.97 ±1.81IU/I and in medium + small size follicles, 45.71 ± 1.51 IU/I. The difference between large and medium + small size follicles was non-significant ($P \geq 0.05$). Glutamate dehydrogenase in large follicles was 117 ± 2.3 IU/I and in medium + small size follicles, 143 ± 2.9 IU/I. The difference between large and medium + small size follicles was significant ($P \leq 0.05$). Total Protein in large follicle was 3.18 ± 0.049 gm/dI and in medium + small size follicles, 2.18 ± 0.038 gm/dI. The difference between large and medium + small size follicles was highly significant ($P \geq 0.05$). Albumin in large follicle was 0.97 ± 0.032 gm/dI and in medium + small size follicle, 0.62 ± 0.022 gm/dI. The difference between large and medium + small size follicles was highly significant ($P \leq 0.01$). Globulin in large follicle was 2.2 ± 0.038 gm/dI and in medium + small size follicle, 1.57 ± 0.031 gm/dI. The difference between large and medium + small size follicles was highly significant ($P \leq 0.01$). Albumin Globulin ratio in large follicle was 0.46 ± 0.014 and in medium + small size follicle, 0.42 ±0.019. The difference between large and medium + small size follicles was non-significant ($P \geq 0.05$).

It is concluded that the reproductive potential of culled cows can be salvaged using oocytes obtained by OPU or slaughter house ovaries for conserving the lost genetic potential from such cows. OPU offers a better technique since the cows can be repeatedly used. However, the technique being precise needs high level of expertise and precision before it can be effectively applied.

STUDIES ON SUB-OESTRUS AND FERTILITY RESPONSE USING FIXED TIME INSEMINATION PROTOCOL IN DAIRY BUFFALOES

Dr. S.N. Shukla **Abhishek Bisen**
(Advisor) **(Researcher)**

ABSTRACT

The present study was carried out in three phases- 1) For incidence of sub-oestrus , the study was carried out in 250 postpartum anoestrus buffaloes from August-2015 to April-2016. Based on the history of anoestrus and findings of the gynaeco- clinical examination, the anoestrus animals were further categorized into true anoestrus, sub-oestrus and anoestrus due to other physio-pathological conditions. The results revealed highest incidence of sub-oestrus (56%) followed by true anoestrus (35.20%) and anoestrus due to other physio-pathological conditions (8.80%) in postpartum dairy buffaloes. Incidence of sub-oestrus in dairy buffaloes based on ex-foliative vaginal cytology was also studied in 100 screened sub-oestrus buffaloes based on rectal palpation and results revealed comparatively low sub-oestrus *i.e.* 89% with that of rectal palpation. 2) Fertility response to fixed time artificial insemination protocol in sub-oestrus buffaloes was studied in three groups (n=15) progesterone implant (GI), Ov-synch (GII) and insulin modified ov-synch (GIII). The higher conception rate was recorded in insulin modified ov-synch (73.33%, GIII), followed by progesterone implant (60%, GII) and Ov-synch (46%, GI). Based on the intensity of the oestrus sign observed during fixed time artificial insemination the, oestrus synchronization was graded as excellent, good, fair, poor and nil. The analysis of results revealed that insulin modified ov-synch protocol (GIII) has better grades of synchronization as compared to the original ov-synch and progesterone implant group. 3) In third phase, blood biochemical profile in sub-oestrus and true anoestrus (n=12 each) were compared on day 0, 7, 14, 21 and 28. The mean serum calcium, phosphorus, their ratio and cobalt was recorded non significantly higher in sub-oestrus buffaloes as compared to non cyclic buffaloes. The mean serum manganese and zinc was recorded significantly higher in cyclic as compared to non cyclic buffaloes in different days of cycle however, mean serum copper was higher on 14 and 28 days in cyclic as compared to non cyclic buffaloes.

FERTILITY RESPONSE USING MODIFIED OVSYNCH PROTOCOL IN GOATS

Dr. S.N. Shukla **Pitamber Inwati**
(Advisor) **(Researcher)**

ABSTRACT

Seasonality is one of the major factors affecting reproductive performance of goats in temperate region; however literature is scant in goats of tropical countries. Therefore, present study was conducted to study the effect of season on breeding in goats and to study the efficacy of oestrus synchronization protocols and conception rate using fixed time artificial insemination in Sirohi goats with the objectives: 1) To study the breeding season in female goats in Jabalpur. 2) To study the fertility using Ovsynch based fixed time insemination protocols in goats. 3) To study the serum progesterone profile before, during and after synchronization treatment in goats. To fulfil the above objectives present study was conducted in three phases.

In first phase, the influence of seasonality on breeding performance of goats was studied in 848 breedings under organized and unorganized rearing system. Further under organized rearing system it was studied in total 501 breedings in Sirohi and Barbari goats. A significantly higher percentage of breedings were recorded during rainy (47.70%) followed by winter (28.94%) and summer (23.35%) season. The effect of season on goat breeding under unorganized rearing system in field level was also studied in total 347 breedings and analysis of results revealed significantly higher percentage of breeding during summer (48.99%) followed by winter (31.70%) and rainy (19.30%) season in different breeds of goat. April as lean month in goat breeding was recorded throughout the study period except 2012 in Barbari goats.

In second phase, fertility response following fixed time insemination was studied in 48 Sirohi goats, randomly divided into 4 groups, each comprising 12 animals (n=12). Animals of group l received ovsynch protocol; in group II (IMOvP-1), treatment was similar to group-I plus additional 3-doses of long acting insulin @ 0.14 IU/ kg b. wt. subcutaneously on day 4, 5 and 6. In group-III (IMOvP-2), treatment was similar to group-I plus 3 additional doses of long acting insulin @ 0.14 IU/ kg b. wt. subcutaneous on day 8, 9 and 10. However, animals of group–IV were kept as control. All the animals were inseminated once at fixed time *i.e.* 16 hrs after second GnRH injection using fresh semen and pregnancy was confirmed by ultrasonography at 30 days post insemination.

The results of fertility response using fixed time insemination protocol in goat shows significantly higher synchronization of oestrus in treatment groups (83.33%-GI; 91.66%-GII and 100%-GIII) as compared to control group (8.33%-GIV). The conception rate at fixed time insemination was also recorded higher in treatment groups (58.33%-GI, 83.33%-GII and G-III) as compared to control group (8.33%-GIV).The analysis of results revealed higher conception rate in insulin modified Ovsynch protocols where the intensity of oestrus was better during fixed time insemination.

In third phase, the serum progesterone profile was studied in Sirohi goats on day (-14), (-7), 0, 7, 10 and 14 using Ovsynch based treatment protocols. The higher progesterone concentration was recorded on day 7 in cyclic as compared to acyclic goats but progesterone concentration could not reveal any significant effect of insulin on CL development. Significantly higher progesterone concentration was recorded in insulin treated group (IMOvP-2) on day 14 after start of treatment in acyclic goats.

The study can be concluded that breeding in goats of Jabalpur was recorded sporadically throughout the year however, cluster in breeding occurs in particular months of the year. The breeding pattern was found different for different years and breeds of the study with the existence of lean months. Estrous synchronization and conception were recorded higher in insulin modified protocols and comparable to original Ovsynch protocol in Sirohi goats. However, higher progesterone concentration on day 14 insulin modified Ovsynch protocol-II revealed beneficial effect of insulin on postovulatory CL development. Higher progesterone concentration was recorded in IMOvP-2 on day 14 in acyclic goats however, lower in IMOvP-1 on day 10 in cyclic goats.

AUGMENTATION OF *IN VITRO* EMBRYO PRODUCTION IN BUFFALOES USING ANTIOXIDANT AND ANTIAPOPTOTIC FACTORS

Dr. O. P. Srivastava **Manish Kumar Shukla**
(Advisor) **(Researcher)**

ABSTRACT

The present study was conducted to study the developmental competence of *in vitro* produced (IVP) buffalo embryos obtained from transvaginal ultrasound guided ovum pick-up (OPU) and abattoir derived oocytes; to study the effect of reactive oxygen species (ROS) and apoptosis and to ameliorate the deleterious effect of ROS and apoptosis using antioxidant and antiapoptotic factors. A total of 68 sessions of OPU at different interval/ frequency viz, once weekly (n=34) and twice weekly (n=34) were conducted in 6 genetically superior Murrah buffaloes to study the developmental competence of OPU derived COCs. An average of 1.96±0.10 cumulus oocyte complexes (COCs) with oocyte recovery rate of 50.46±2.75 was retrieved per OPU session. The mean number of surface follicles recorded (5.63±0.18 vs. 5.49±0.19) and oocyte recovery rate (47.90±3.30 vs 52.93±3.20) was not significantly different between once and twice weekly OPU sessions. Significantly ($p<0.05$) higher developmental competence of COCs retrieved in twice weekly OPU session, in terms of maturation (89.28±5.14), cleavage (76.80±7.14), morula (51.79±6.62) and blastocyst (29.72±4.73) was recorded as compared to their respective values of 85.71±5.72, 61.43±7.23, 44.12±5.49 and 24.14±4.81 per cent in once weekly OPU session. A significantly ($p<0.01$) higher morula (48.01±4.89) and blastocyst (28.43±3.80) per cent was recorded in OPU derived *in vitro* produced embryos (IVP) embryos as compared to those derived from abattoir ovaries (36.89±0.67 and 19.04±0.49 per cent, respectively), indicating better developmental competence of OPU derived IVP embryos.

In abattoir derived embryos the developmental competence was significantly influenced by season, follicular size, phase of oestrus cycle, oocyte diameter and grades of COCs. The source of spermatozoa did not significantly affect the developmental competence of abattoir derived IVP embryos which established the potential for use of epididymal spermatozoa for IVF with equally good efficiency as ejaculated spermatozoa.

The glucose-6-phosphate dehydrogenase (G-6-PDH) activity was assessed by brilliant cresyl blue staining (BCB) and expressed as BCB^+ (inactive G-6-PDH) and BCB^- (active G-6-PDH) based on reaction to the dye. The developmental competence (maturation, morula and blastocyst per cent) was significantly ($p<0.01$) higher in BCB^+ COCs from large follicles (85.79±0.98, 46.86±1.40 and 24.87±1.09) as compared to BCB^- (81.30±0.60, 36.27±0.95 and 15.41±1.26%, respectively). Similar trend was also recorded in BCB^+ and BCB^- oocytes derived from small follicles also.

The study of *in vivo* developmental competence of *in vitro* produced embryos resulted in establishment of successful clinical pregnancy in a synchronized recipient buffalo with a conception rate of 12.5. The higher intensity of reactive oxygen species (pixels/ oocyte or embryo) and higher incidence of apoptosis (%) at oocyte and embryonic stage was associated with reduced developmental competence.

The effect of various antioxidant and antiapoptotic factors was studied. A highly significant ($p<0.01$) beneficial effect on cleavage, morula and blastocyst per cent of treatments viz. embryo culture at 5 % oxygen tension (71.17±0.37, 43.31±0.74, 25.23±1.29), supplementation of 1 mM glutathione (73.41±0.37, 44.60±0.71, 28.46±1.37), 10 ng ml^{-1} EGF (76.73±0.74, 48.10±0.54, 33.88±0.63) and 100 ng ml^{-1} IGF-I (77.72±0.61, 50.11±1.00, 34.96±0.92) in embryo culture medium was recorded as compared to control (65.46±0.36, 38.24±0.72 and 20.09±0.60, respectively). The incidence of apoptosis and intensity of reactive oxygen species was also significantly ($p<0.01$) reduced and differential cell count of inner cell mass and total cell number in hatched blastocysts was significantly increased ($p<0.01$) in the mentioned treatment groups as compared to control.

PHYTOTHERAPEUTIC MEASURES FOR ENDOMETRITIS IN CROSSBRED COWS

Dr. Sudarshan Kumar **Sumit Singh**
(Advisor) **(Researcher)**

ABSTRACT

A study was conducted on 24 crossbred cows suffering from endometritis.The overall incidence of endometritic crossbred cows was 32.57%.The cows exhibited clear discharge with ciprofloxacin (93.00%) followed by garlic (88.33%) and neem (86.67%), respectively and in control group 59.17% cows exhibited clear discharge after treatment. The mean pH value of all Groups was 7.97±0.24 before treatment and at subsequent estrus 7.29±0.35 after treatment.Ciprofloxacin was most effective to white side test as compared to neem and garlic.All cows after treatment exhibited typical fern pattern as 100% in Group 2 followed by 83.33% in Group 3, 83.33% in Group 4 and 16.67% in Group 1, respectively.The maximum size of zone of inhibition for neem (15 mm) and garlic (18 mm) was smaller as compared to maximum size of zone of inhibition produced by ciprofloxacin (26 mm). PMNs values indicated highly significant difference in all Groups from before and after treatment but not significantly different in Group 1.

TLC values within the Group were significantly different in Groups 2 and Groups 3. Eosinophil, basophil and PCV values were not significant. Monocyte, lymphocyte, neutrophil and Hb were significantly different between the Group but monocyte in Group 4, lymphocyte in Group 2 and Group 4, neutrophil and Hbin Group 2, Group 3 and Group 4 were significant within the Group. There was no significant difference in mean protein values of all Groups from before and after treatment and among the Groups. Albumin values were significantly ($P<0.05$) different in Group 4 from before and after treatment and but not significantly different among each other. Globulin values were significantly ($P<0.05$) different in Group 2 from before treatment and after treatment and were not significantly differ among each other.

OPTIMISING CONTROLLED BREEDING IN GOATS BY USING PROGESTERONE BASED VAGINAL SPONGE PROTOCOLS.

Dr. O. P. Srivastava (Advisor)

Naveen Kumar Shakya (Researcher)

ABSTRACT

Goats are known to exhibit seasonality in breeding and the onset and length of the breeding season is dependent on several factors. Oestrus synchronization and fixed-time insemination is helpful especially when oestrus detection is not very efficient or due to lack of time to perform it. The reproductive efficiency of goats can be increased with modified oestrus synchronization protocols.The present experiment was conducted 1) To study the reproductive performance of Sirohi goats 2) To study the effect of progesterone based vaginal sponge on reproductive performance of Sirohi goats.

In the first phase, the retrospective study was carried out in 300 goats, it was established that there is distinct seasonality in breeding of Sirohi goats (n=92) with higher number of breeding during November (21.73%) and lowest during September (2.17%) month. A highly significant, difference was recorded between different seasons in breeding with highest, percent breeding recorded during winter season (47.82%) as compared to summer (29.35%) and rainy season (22.83%). The retrospective study of reproductive parameters revealed kidding rate and foetal loss rate of 92.39% and 6.52%, respectively with average kidding interval of 274.50 days in Sirohi goats. Also the average liter size was recorded to be 1.06 with twins and triplet rate of 9.78% and 2.17%, respectively.

Similarly, higher breeding in goats (n=208) in unorganized rearing system during month of November (22.12%) and lowest during September (4.80%). A highly significant, difference was recorded between different seasons in breeding with highest, percent breeding recorded in winter season (46.15%) as compared to summer (28.37%) and rainy season (25.48%). The retrospective study of reproductive parameters revealed kidding rate and foetal loss rate to be 89.42% and 10.57%, respectively with average kidding interval of 320.25 days in field goats. Also the average liter size was recorded to be 1.16 with twins and triplet rate of 14.90% and 5.76%, respectively was also recorded.

In the second phase effect of progesterone based vaginal sponge on reproductive efficiency was studied in 30 Sirohi goats, randomly divided into 5 groups each comprising of 6 animals (n=6). Animals of group-I were implanted progesterone impregnated vaginal sponge (100 mg MAP) for a period of 10 days. Additionally, intramuscular injection of 300I.U. eCG on day 9 and 125 µg of the $PGF_2\alpha$ analogue cloprostenol at the time of implant removal, G-II and G-III were similar to G-I except injection of $PGF_2\alpha$ and eCG, respectively, G-IV received Progesterone impregnated vaginal sponge for 10 days and G-V was kept as control. All the animals were inseminated once at fixed time i.e. 48 hours after sponge removal using fresh liquid semen by vaginal speculum method and pregnancy was confirmed by ultrasonography at 45-60 day post insemination.

The result of fertility response of Sirohi goats following oestrus synchronization using different progesterone based sponge protocols revealed highest oestrus synchronization, induction and conception rate in animals of group-I (100,100 and 83.33%) and group- II (100, 83.33 and

83.33%), respectively with an oestrus interval of 24-36 hours after sponge removal as compared to group-III (83.33, 66.67 and 66.67%), group-IV (50.00,66.67 and 33.33%) and control/group-V (16.67,16.67 and 16.67%), respectively with an oestrus interval of 36-48 hours after sponge removal.

The study of exfoliative vaginal cytology revealed significantly higher ($P< 0.05$) percent of cornified superficial cells on days 2 as compared to day 0 and day 1 of sponge removal in all the treatment groups. However, no significant variation of cornified superficial cells among the days, recorded in goats of control group.

It can be concluded from the present study that (1) Highest percentage of breeding occurs during winter season. (2) In exfoliated vaginal cytology higher cornified superficial cells, revealed the optimum time of breeding in goats. (3)The progesterone based vaginal sponge protocols using eCG and $PGF_2\alpha$ were found better for fertility in sirohi goats.

THERAPEUTIC MANAGEMENT OF LUTEAL CYST IN DAIRY BUFFALOES

Dr. M.S. Thakur **Prerna Thakur**
(Advisor) **(Researcher)**

ABSTRACT

Reduced fertility, observed in high yielding dairy animals, is most likely due to the alterations at several consecutive steps in the reproductive process. One of the known causes of reduced fertility in dairy animals is ovarian dysfunction. Formation of cyst following ovulation failure is the most common ovarian dysfunctions during the postpartum period. Treatments for ovarian cysts are numerous and variable, also they have changed considerably over years. Many endocrine based treatments for cysts have been evaluated including steroids, gonadotrophin and gonadotrophin releasing hormone. With the above concept, the present study was conducted at Livestock Farm (LSF), Adhartal and private (Choubey) dairy farm of Jabalpur to assess the incidence of luteal cyst in dairy buffaloes, effect of different treatment protocols on luteal cyst and comparison of efficacy of various therapeutic regimens. The experiment was performed on 24 Murrah buffaloes suffering from luteal cyst condition. These buffaloes were divided into 04 groups and subjected to different therapeutic regimens *viz*; group 1 (Hydroxyprogesterone), group 2 (Buserelin+$PGF_2\alpha$), group 3 (Melatonin) and group 4 (Control).

The incidence of luteal cyst before the start of experiment (July, 2016) was studies in a total of 583 dairy buffaloes and among these, 68 animals having a history of anestrus (120 days postpartum) were examined per-rectally two times at 10 days interval. The results revealed 10.63 per cent incidence of luteal cyst in dairy buffaloes and its contribution to anestrus was observed to be 91.17 per cent. The study on month wise incidence of luteal cyst in buffaloes at LSF, Adhartal revealed higher incidence during April (19.27%), followed by July (14.45%), March (13.25%) and May (12.19%). The lowest incidence was observed to be 7.22 per cent during December, January and February. The study on season wise incidence of luteal cyst in buffaloes at LSF, Adhartal revealed higher incidence of luteal cyst in buffaloes during summers (13.72%), followed by rainy (10.27%) and winter (7.25%) seasons. The study on age wise and parity wise incidence of luteal cyst in buffaloes at LSF, Adhartal revealed maximum incidence in age group of 11 to 12 years (58.33%) and in fifth parity (34.48%).

The response of the treatment in all the groups was studied in terms of conception rate and it was observed that the conception rate was highest in group 1 (83.33%) followed by group 2 (33.33%). However, none of the animals responded to treatment from group 3 and group 4.

The serum progesterone concentration (ng/ml) was estimated before and after the treatment and the results revealed that the mean serum progesterone concentration at day 0 in both responded and non-responded animals was above 1.0ng/ml. The mean serum progesterone concentration (ng/ml) after treatment (on the day of estrus) in responded animals of group 1 (0.49±0.38) and group 2 (0.44±0.06) remarkably dropped to a level of below 0.50 ng/ml. The mean serum progesterone concentration (ng/ml) after treatment (at day 21) in non- responded animals of all groups was not considerably reduced as compared to the mean serum progesterone concentration at day 0 in these animals and was recorded to be in the range of 0.60-1.20 ng/ml.

Present study revealed higher incidence of luteal cyst in dairy buffaloes during the summer months *i.e.* March, April and May, followed by the transition months *i.e.* June and July. The results of fertility response were good in both the conventional treatment protocols *i.e.* Progesterone and Buserelin+$PGF_2\alpha$ but better results were observed with Progesterone, however, the results with the use of Melatonin were not satisfactory may be due to lower dose rate and frequency of administration.

THERAPEUTIC MANAGEMENT OF REPEAT BREEDING DUE TO SUB-CLINICAL ENDOMETRITIS IN CATTLE USING HERBAL PLANTS

Dr. O.P. Shrivastava **Brahmanand**
(Advisor) **(Researcher)**

ABSTRACT

The present study was conducted to study the incidence of repeat breeding and sub-clinical endometritis among repeat breeder cattle from livestock farm, Adhartal and farmer's door in and around Jabalpur, to know the diagnostic efficacy of whiteside test and endometrial cytology and to evaluate the therapeutic efficacy of herbal extract for management of sub-clinical endometritis in terms of conception rate.

A total of 100 repeat breeder cattle were screened for diagnosis of sub-clinical endometritis. On the basis of characteristic of cervico-vaginal mucus, whiteside test, pH, fern pattern and endometrial cytology, 30 animals were selected for the study. Thirty sub-clinical endometritic repeat breeder cattle were divided into five groups (n= 06 per group). The group wise treatment allotted were group I (25 ml normal saline at 24 hrs. interval for 3 days intrauterine), group II (25 ml methanol fraction of neem oil at 24 hrs. interval for 2 days intrauterine), group III (25 ml methanol fraction of neem oil at 48 hrs. interval for 2 days intrauterine), group IV (25 ml extract of neem bark at 24 hrs. interval for 3 days intrauterine) and group V (25 ml extract of neem bark at 48 hrs. interval for 3 days intrauterine). All the animals were tracked for successive oestrus and were subjected to whiteside test, pH, fern pattern and endometrial cytology. The overall incidence of repeat breeding was recorded as 30.47 per cent, with highest in village Hinotia (35.08%) and lowest in village Jamtara (26.65%). The incidence of sub-clinical endometritis among repeat breeder cattle was recorded as 33 per cent, being highest in village Jamtara (38.46%) and lowest in Yadav dairy farm, Bilpura (28.57%).

The PMN percentage in endometrial samples from different treatment groups after treatment varied from 2.61±0.34 to 6.00±0.44. The PMN percentage after treatment varied significantly ($p<0.05$) between different groups. The difference was found non-significant ($p>0.05$) between treatment groups II and III, II and V, IV and V, III and IV, whereas, it was significant ($p<0.05$) between groups I and II, I and III, I and IV, I and V. Significant decline ($p<0.05$) in the PMN percentage after treatment was observed in all the groups. After treatment the cows exhibited typical fern pattern as 33.33, 83.33, 66.67, 66.67 and 50.00 per cent Maximum typical fern pattern (83.33%) was observed in group II animals, which were treated with neem oil (25 ml at 24 hrs. interval for 2 days). The pH value of CVM after treatment from different groups varied from 7.00±0.05 to 7.50±0.04. The difference was found non-significant ($p>0.05$) between treatment groups II and III, II and IV, III and IV, whereas, it was significant ($p<0.05$) between groups I and II, I and III, I and IV, I and V. Significant decline ($p<0.05$) was observed in the pH value of CVM after treatment in all the groups. There was no positive sample of whiteside test (0.00%) observed in group II after treatment. The overall conception rate was observed as 83.33 per cent. However, the first service conception rates were higher in group II (66.67%) followed by group III (33.33%), group IV (16.67%) and group V (16.67%), respectively.

Therefore, it is concluded that endometrial cytology by cytobrush technique is reliable and effective diagnostic technique for diagnosis of sub-clinical endometritis and proved to be better than whiteside test. The therapeutic efficacy of methanol fractionated neem oil administered at 24 hrs. interval for two days intrauterine appeared superior over the other treatment groups in sub-clinical endometritic cattle.

AUGMENTATION OF REPRODUCTIVE PERFORMANCE OF CROSSBRED COW USING MONENSIN, NIACIN AND GNRH

Dr. V. K. Bhatt **Pradeep Singh**
(Advisor) **(Researcher)**

ABSTRACT

The present experiment was carried out to study the effect of negative energy balance and supplementation of monensin, niacin and administration of GnRH on postpartum reproductive performance of crossbred cows. A total of 60 advance pregnant crossbred cows were screened for energy status. Out of the 60 animals, 30 were selected for the study. In the experimental animals 24 animals were in negative energy balance and 6 were in positive energy balance on the basis of blood glucose, body condition score and body weight.

The selected animals were divided in to 5 groups, viz. group-I (control-I, negative energy balance), group-II (niacin+GnRH), group-III (monensin+GnRH), group- IV (GnRH) and group V (control-II, positive energy balance). Monensin and niacin supplementation was started on day 21 prepartum and continued till 21 days postpartum in the respective groups. GnRH was administered on day 14th postpartum.

The loss in body weight was numerically higher in group I (21.72±2.94 kg) as compared to group II (14.82±2.58 kg), group III (15.64±2.07 kg), group IV (19.13±0.92) and group V (16.76±2.93 kg), however the difference was statistically non-significant. The loss in mean body condition score occurred more in group I and group IV (0.33±0.05 each) followed by group V and group III (0.29±0.04 each) while minimum loss occurred in group II (0.25±0.00), however the difference was statistically non significant.

Blood glucose concentration in the treatment groups viz. Group II (64.42±1.17), Group III (63.79±1.34) and Group V (63.70±0.75) was significantly ($P<0.05$) higher than Group I (50.97±2.92) and Group IV (50.23±1.55) on day 21 postpartum. Plasma non-esterified fatty acid level in the treatment groups viz. Group II (283.03±0.03) and Group III (285.67±4.10) were significantly lower ($P<0.05$) than group I (300.65±2.79), group IV (298.82±3.07) and group V (296.35±3.24) on day 21 postpartum. The mean blood urea nitrogen level decreased significantly ($P<0.05$) on day 21 postpartum as compared to day 0 (calving day) in all the groups.

The plasma progesterone concentration in the treatment groups viz. group-II (2.48±0.05), group III (2.37±0.05) and group IV (2.25±0.55) was significantly ($P<0.05$) higher as compared to group V (0.59±0.05) and group I (0.44±0.08) on day 28 postpartum. Higher conception rate was recorded in group II (83.33%) followed by group III and V (66% each) and group I and IV (50% each).

The reproductive performance of negative energy balance cows can be enhanced by supplementation of niacin @ 6-12 g/head/day starting from 21 day pre partum to 21 day post partum and administration of GnRH @ 20 μg I/M on 14th day post partum.

STUDY ON ANOESTRUS AND FERTILITY RESPONSE BY USING MELATONIN HORMONE IN DAIRY BUFFALOES

Dr. M.S. Thakur **Ambrish Singh**
(Advisor) **(Researcher)**

ABSTRACT

The present study was designed to study incidence of anoestrus, blood biochemical and hormonal profile of anoestrous buffaloes at Livestock farm, Adhartal Jabalpur. The effect of melatonin on fertility response in anoestrus buffaloes was also studied. A total of 18 Murrah buffaloes were selected for the study and were randomly divided in three groups, viz. G I (subcutaneous injection of melatonin @ 18 mg/ 50 kg body weight in sterile olive oil), G II (two subcutaneous injections of melatonin @ 18 mg/ 50 kg body weight in sterile olive oil at 10 days interval) and G III/control (subcutaneous injection of sterile olive oil @ 1 ml/50 kg body weight).

To study the incidence of anoestrus during study period, 83 dairy buffaloes were screened at LSF, Adhartal Jabalpur before the start of treatment *i.e.* in July, 2016. A total of 18 animals were found anoestrus (120 days postpartum) during the particular period. Anoestrus was diagnosed on the basis of lack of overt signs of oestrus 3 months postpartum along with concurrent transrectal examination and serum P4 estimation using RIA at 10 days apart. Oestrus detection was carried out twice daily using teaser bull parading along with observation of behavioural oestrus signs till 21days post treatment.

The analysis of results on month wise incidence of anoestrus revealed highest incidence of anoestrus in April (25.30%), followed by May (21.95%), July (21.68%) and June (21.25%). The lowest incidence (10.84%) was observed in January and February.

The blood gonadal steroid concentration is considered as an indicator of ovarian activity and as a marker to predict response to hormonal treatment. The serum progesterone concentration was estimated by ELISA kit.

The serum progesterone concentration in animals of group 1 on day 0 and day of oestrum was recorded to be 1.31±0.13 and 0.33±0.07ng/dl respectively The respective value for group 2 were 1.29±0.16 and 0.33±0.06ng/dl. In non responding animals the concentration of serum progesterone remained constant on day 0 and 21.

The concentration of blood glucose (63.40±1.32 mg/ml), serum calcium (8.37±0.47mg/dl) and albumin (3.62±0.17mg/ml) were higher on day of oestrus compared to their respective value of (62.56±0.68mg/ml) and (7.53±0.34mg/ml) and (3.36±0.17mg/ml) on the day 0 in group 1. The concentration of serum phosphorus on the day of oestrus was (8.37±0.47mg/ml) higher as compared to day 0 (7.47±0.30mg/ml) in animal of group 1. Higher conception rate was observed in group 2 (66.66%) as compared to group 1 (50%) in the present study.

In conclusion, subcutaneous melatonin injection was an effective approach for true anoestrus and initiating ovarian cyclicity of anoestrus buffaloes.

INVESTIGATION ON DIAGNOSTICS AND HERBALTHERAPEUTICS OF POST-PARTUM SUBCLINICAL ENDOMETRITIS IN BUFFALOES

Dr. V.K. Bhatt **Vandana Porte**
(Advisor) **(Researcher)**

ABSTRACT

The present study was conducted to study the prevalence of sub-clinical endometritis; to investigate the relationship of non esterified fatty acids (NEFA) and urea during peri-parturient period with subclinical endometritis and to study the therapeutic efficacy of intrauterine administration of ashwagandha extract and garlic extract for treatment of buffaloes suffering from sub-clinical endometritis. In the prevalence study carried out in 83 buffaloes, the overall prevalence of subclinical endometritis was recorded to be 40.90 per cent in three villages and one private dairy farm, Jamtara included in the study and Livestock farm (LSF), Adhartal. Highest percentage of sub-clinical endometritis was recorded in Deepak dairy farm, Jamtara (47.00%); followed by Gaur and Jamtara village (40%), LSF, Adhartal (38.46%) and Shalivada (35%). The study of correlation of plasma NEFA with incidence of subclinical endometritis revealed that the concentrations of NEFA tended to increase significantly ($p<0.05$) with the advancement of time from one week pre-partum to calving and one week post-partum in both healthy as well as diseased buffaloes. Also a significantly ($p<0.05$) higher mean urea (mmol/L) was recorded in healthy animals at one week post-partum (4.979±0.178) as compared to that recorded at one week pre-partum (4.200±0.190). No significant difference was, however, recorded in total plasma NEFA and urea concentration between healthy and diseased animals irrespective of the time interval.

A total of 18 animals with subclinical endometritis were selected and divided randomly into three group viz. group I (control), group II (ashwagandha extract) and group III (garlic extract), for the study of therapeutic response. A significant ($p<0.05$) decline in mean number of polymorpho nuclear cells was recorded in control and treatment groups II and III post treatment. A significantly ($p<0.05$) lower mean percent of polymorpho nuclear cells was recorded in animals treated with ashwagandha extract/ group II (7.98±0.13) as compared to control/ group I (9.25±0.12). The conception rate in the present study was observed to be highest in group II (83.33 %) as compared to group III (66.66%) and group I (50.00%) which indicates that intra uterine administration of ashwagandha extract proved effective for treatment of sub-clinical endometritis in buffaloes.

THERAPEUTIC MANAGEMENT OF SUB-CLINICAL ENDOMETRITIS IN POSTPARTUM BUFFALOES

Dr. V.K. Bhatt (Advisor)

Pankaj Pusham (Researcher)

ABSTRACT

The present experiment was conducted to study the prevalence of sub-clinical endometritis in postpartum buffaloes from livestock farm, Adhartal and farmers door in and around Jabalpur, to study the correlation of energy status of buffaloes during periparturient period with incidence of sub-clinical endometritis and to evaluate the therapeutic efficacy of ceftiofur sodium and $PGF_{2\alpha}$ for management of sub-clinical endometritis.

The prevalence study conducted on 80 buffaloes revealed an overall prevalence of sub-clinical endometritis of 30.12 per cent. The prevalence was recorded to be highest in village Jamtara (38.46%) and lowest in LSF, Adhartal (20.00%). The incidence of sub-clinical endometritis was found 27.27% from duration between August to October. There was no significance difference in glucose, cholesterol, triglycerides and calcium between buffaloes suffering from subclinical endometritis (SCE) and healthy (NOENDM) buffaloes at different weeks of periparturient period. At the time of parturition, a significantly ($p<0.01$) higher mean body condition score was recorded in NOENDM group (3.54±0.04) as compared to buffaloes of SCE group (2.50±0.07). The study of various metabolites during peri-parturient period (1 week pre-partum, on the day of parturition and one week post partum), however, suggested no significant difference between buffaloes suffering from endometritis and healthy buffaloes at different time intervals.

On the basis of white side test and endometrial cytology, 24 animals positive for sub-clinical endometritis, divided into four groups (n=06) were used for the study of therapeutic response. Analysis of data revealed significantly ($p<0.01$) higher percent positive animals in control /group I as compared to the treatment groups II (Inj. ceftiofur sodium @ 1mg/kg body weight at 24 hrs. interval for 3 days intramuscular), III (Inj. ceftiofur sodium @ 1mg/kg body weight and Inj. Calcium borogluconate @ 300 ml intravenous at 24 hrs. interval for 3 days) and IV (Inj. cloprostenol 500 µg total dose intramuscular) post treatment. The animals of group III showed significantly ($p<0.01$) better therapeutic response in terms of white side test as compared to other treatment groups. The endometrial cytology revealed a significantly ($p<0.05$) higher number of mean endometrial cells and lower number and per cent of polymorpho nuclear cell was observed in all the treatment groups (II, III and IV) as compared to the control (group I) at post treatment stage. A significant ($p<0.05$) beneficial effect of treatments in group II, III and IV was also recorded in terms of increase of mean endometrial cell number and decrease in mean number and proportion of polymorpho nuclear cells at post treatment stage as compared to pre treatment suggesting recovery of the animals. The difference was, however non significant in control. The results also depicted similar trend in conception rate to first insemination post treatment where a significantly ($p<0.05$) higher conception rate was recorded in animals of group II (66.67%), group III (83.33%) and group IV (50.00%) as compared to control/ group I (33.33%), the conception rate in group III being significantly ($p<0.05$) higher than other treatment groups also. The results suggest injection of ceftiofur sodium @ 1mg/kg body weight and calcium borogluconate @ 300 ml intravenous at 24 hrs. interval for 3 days to be best therapeutic regime for management of sub-clinical endometritis in buffaloes.

STUDIES ON INDUCTION OF OVARIAN CYCLICITY AND EFFICACY OF DIFFERENT HOMONAL PROTOCOLS IN POSTPARTUM ANOESTRUS BUFFALOES"

Dr. S.P. Shukla (Advisor)

Pratipal Singh Kaurav (Researcher)

ABSTRACT

The present investigation was aimed to evaluate the incidence of anoestrus in postpartum buffaloes, compare the intensity oestrus and conception rate using different hormonal protocols and compare the level of serum trace minerals and plasma progesterone concentration in anoestrus and oestrus induced buffaloes.

In the present study a total of 500 postpartum buffaloes were selected from different villages situated around Rewa (M.P.). Calving and breeding history of animals was recorded and Gynaeco-clinical examination was carried out twice 10 day apart. The incidence of anoestrus in postpartum buffaloes was recorded as 33.40 (167/500) per cent. Out of 167 postpartum buffaloes found to be positive for anoestrus, 24 buffaloes were again randomly divided into treatment (n=18) and control group (n=06). These treatment group animals were again divided into 03 treatment groups on the basis of hormonal treatment protocols. Treatment group A (Ovsynch protocol), treatment group B (Heatsynch protocol), treatment group C (CIDR plus Heatsynch) while control group animals were left untreated.

Therapeutic efficacy of different hormonal protocols in terms of oestrus induction efficiency was found to be 66.66, 83.33 and 100 per cent with a mean post treatment oestrus induction intervals of 19.50 ± 0.53, 15.20 ± 0.61 and 17.20 ± 0.91 hrs., while conception rate was recorded as 75.00, 60.00 and 83.33 per cent, respectively in Ovsynch, Heat synch and CIDR plus Heatsynch groups.

The overall and treatment groupwise oestrus intensity mean weighted score for different characters of genital tract (Reproductive organ status) and behavioural expression ranged from 46-90 with a mean of 76.13±3.43.

Oestrus intensity score of buffaloes ranged from 80-90, 68-72 and 46-52 in intense, moderate and weak oestrus intensities at induced oestrus respectively, with a mean weighed score of 84.88±1.30, 70.00±0.81 and 49.00±3.00, respectively. Significant ($p<0.05$) variation between oestrus intensity score at induced oestrus was observed between different treatment groups. Out of total 15 buffaloes, 60.00, 26.66 and 13.33 per cent buffaloes were categorized in intense, moderate and weak oestrus intensity groups, respectively.

The mean plasma progesterone concentration (ng/ml) in group A, B and C on day 0 was increased significantly ($p<0.01$) to day 7 where as the value was decreased on day 9 and day 10, however no significant ($p>0.05$) difference was recorded in control group. The highest value was found in group C on day 7 (4.48 ±0.05) and lowest value was recorded on day 10 (0.53±0.01).

The mean serum copper level (µg/ml) increased significantly ($p<0.01$) from day 0 to day 7, 9 and 10 in group A, B and C. The mean serum cobalt level (µg/ml) increased significantly ($p<0.05$) from day 0 to day 7, 9 and 10 in group A, B and C except serum cobalt in group B on day 7. Serum iron concentration increased significantly ($p<0.05$) from day 0 to day 9 and 10 except on day 7 in group A, B and C and on day 9 in group A. The mean zinc level (µg/ml) increased significantly ($p<0.05$) in group B and C on day 9 and 10 except day 7. The serum manganese concentration on day 0 increased significantly ($p<0.01$) to day 9 and 10, the value on day 0 was also found significantly from day 7 in group C. The mean serum selenium, the value on day 0 was increased significantly ($p<0.01$) to day 7, 9 and 10 in group A, B and C except the value on day 7 in group B.

Thus, it was concluded that the incidence of anoestrus recorded to be 33.40 per cent. Oestrus intensity score card pattern is a good tool to designate intensity of oestrus which has positive relationship with fertility. CIDR plus Heatsynch protocol prove to be excellent in oestrus induction (100%) with conception rate 83.33 per cent. Deficiency of Cu, Fe, Zn and Se either singly or in combination, could be responsible for anoestrus condition thus, by improving the nutritional status, fertility can be improved in buffaloes.

“COMPARATIVE EFFICACY OF CONVENTIONAL AND PHYTOTHERAPEUTIC MEASURES IN SUBCLINICAL ENDOMETRITIC CROSSBRED COWS”

Dr. S.P. Nema
(Advisor)

Shailendra Singh
(Researcher)

ABSTRACT

The present study was conducted on 36 crossbred cows with the history of repeated inseminations, having no apparent genital anomaly and positive to white side test indicating subclinical endometritis were selected to be included in six therapeutic groups randomly. Six animals in each corresponding therapeutic group were treated with intrauterine infusion of Lugol’s Iodine, Ceftiofur sodium, Ashwagandha extract, Ashwagandha + Garlic extract, Ashwagandha + Neem extract and Normal Saline respectively, at 24 hrs interval for 3 days.

Animals of all the therapeutic groups except group VI showed clear color of CVM; having thin consistency; a non-significant decline in pH and significant increase ($p<0.01$) in spinnbarkiet value of CVM at subsequent estrus after treatment.

After treatment at subsequent estrus mean glutathione peroxidase activity and mean inorganic phosphorus in serum found to differ non-significantly and in uterine flushing mean total protein values of group III, IV and V increased significantly ($p<0.05$); mean alkaline phosphatase values of group IV and V decreased significantly ($p<0.01$); whereas mean total immunoglobulin values of group I and II decreased while group III, IV and V increased significantly ($p<0.01$).

At subsequent estrus after treatment none of the animal in ceftiofur sodium group remained positive to white side test and had maximum conception rate (50.00%) followed by Lugol’s iodine and phytotherapy. It was concluded that therapeutic efficacy of ceftiofur sodium was better followed by Lugol’s iodine and phytotherapy.

THERAPEUTIC AND NUTRITIONAL MANAGEMENT OF POSTPARTUM ANOESTRUS IN CROSSBRED COWS

Dr. Sudarshan Kumar
(Advisor)

Vinita Mangrole
(Researcher)

ABSTRACT

The present study was conducted on 24 crossbred cows with history of postpartum anoestrus randomly divided into four treatment groups to evaluate the efficacy of Clomiphene citrate (Gp I), GnRH analogue (Gp II), GnRH analogue + mineral mixture (Gp III) and Clomiphene citrate + mineral mixture (Gp IV).

The mean Hb value (g/dl) was found significantly ($p<0.05$) higher during post-treatment period in Group II, III and IV. The mean value of neutrophil was significantly ($p<0.05$) higher during pre-treatment period. The mean value of lymphocyte (%), PCV (%) and serum calcium (mg/dl) was significantly ($p<0.05$) higher during post-treatment period in all treatment groups as compared to pre-treatment values.

The mean value of total protein (g/dl) was found significantly ($p<0.05$) higher during post-treatment period in Group I and III. The results revealed that Clomiphene citrate with mineral mixture supplementation has good oestrus induction efficacy with higher conception rate in postpartum anoestrus crossbred cows.

"COMPARATIVE EFFICACY OF DIFFERENT SYNCHRONIZATION PROTOCOLS FOR OESTRUS INDUCTION IN POSTPARTUM ANOESTRUS COWS"

Dr. N. K. Bajaj
(Advisor)

Ravi Kumar Thakur
(Researcher)

ABSTRACT

The present research work was carried out at dairy farm of college and different village in an around Rewa to study the incidence of anoestrus in postpartum cows, compare the efficacy of various synchronization protocols for therapeutic management of anoestrus and fertility in postpartum cows under field conditions.

In present study a total of 500 postpartum cows were selected from different villages situated in and around Rewa (M.P.). Calving and breeding history of animals was recorded and gynaeco-clinical examination was carried out twice 10 day apart. The incidence of anoestrus in postpartum cows was recorded 34.40 per cent (172/500) out of 172 anoestrus cows, 24 cows were randomly divided in three treatment groups (n=18) (Ovsynch, Double Ovsynch and CIDR plus Ovsynch) and control group (n=06) (no treatment) each containing six animals.

Therapeutic efficacy of Ovsynch (group A), Double Ovsynch (group B), CIDR plus Ovsynch (group C) hormone protocols and control group in terms of oestrus induction efficiency, oestrus induction interval and conception rate were monitored in 24 postpartum anoestrus cows. Oestrus induction efficiency was found to be 83.33, 66.66 and 66.66 per cent with a mean post treatment oestrus induction intervals of 15.4±0.92, 14.75±0.85 and 13.00±0.25 hrs. in Ovsynch, Double Ovsynch and CIDR plus Ovsynch protocols, respectively. While conception rate was recorded as 80.00, 75.00 and 100.00 per cent, respectively in Ovsynch, Double Ovsynch and CIDR plus ovsynch groups.

The overall and treatment groupwise oestrus intensity mean weighted score for different characters of genital tract (Reproductive organ status) and behavioural expression ranged from 44-92 with a mean of 71.38±5.90.

Oestrus intensity score of cows ranged from 76-92, 66-72 and 44-48 in intense, moderate and weak oestrus intensities at induced oestrus respectively, with a mean weighed score of 81.33±2.29, 69.60±1.16 and 46.00±1.26, respectively. Significant ($p<0.05$) variation between oestrus intensity score at induced oestrus was observed between different treatment groups. Out of total 13 cows, 100.00, 100.00 and 0.00 per cent cows were categorized in intense, moderate and weak oestrus intensity groups, respectively.

The mean plasma progesterone concentration (ng/ml) on day 0 increased significantly to day 7 where as the value was decreased on day 9 and day 10 in group A, B and C, however no significant difference was recorded in control group.

The mean serum copper level (µg/ml) increased significantly ($p<0.01$) from day 0 to day 9 except on day 10 in group A, B and C. Serum cobalt concentration increased non-significantly ($p>0.05$) from day 0 to 9 except on day 10 in group A, B and C. Serum iron concentration increased non-significantly ($p>0.05$) from day 0 to 7 except on day 9 and 10 in group A, B and C. The mean zinc level (µg/ml) increased significantly ($p<0.05$) and ($p<0.01$) from day 0 to 9 except in group A and B on day 10. The mean manganese level (µg/ml) increased significantly ($p<0.05$) from day 0 to 9 except in group A and B on day 10. Serum selenium concentration increased non-significantly ($p>0.05$) from day 0 to 10 except on day 9 in group A and B and on day 10 in group C.

Thus it was concluded that the incidence of anoestrus in postpartum cows was recorded as 34.40 per cent. Oestrus intensity score card pattern is a good tool to designate intensity of oestrus has relationship with fertility. Ovsynch proves to be excellent in oestrus induction (83.33%) while CIDR provides excellent fertility with conception rate of 100.00 per cent. Deficiencies of zinc, manganese and selenium either singly or in combination could be responsible for anoestrus condition in anoestrus cows and by improving the nutritional status the fertility can be improved.

"OPTIMIZING VITRIFICATION OF *IN VITRO* PRODUCED GOAT EMBRYOS WITH FORSKOLIN SUPPLEMENTED CULTURE MEDIA"

Dr. Manish Kumar Shukla
(Advisor)

Neeraj Verma
(Researcher)

ABSTRACT

The present study was conducted to study the developmental competence of *in vitro* produced (IVP) goat embryos obtained from abattoir ovaries; to study the effect of forskolin on vitrification of *in vitro* produced goat embryos and to comparatively analyze the reactive oxygen species (ROS) and apoptosis in fresh and forskolin treated vitrified goat embryos. A total of 874 ovaries were used in 25 experimental trials and 3.72±0.12 follicles were aspirated per ovary resulting in retrieval of 2361 cumulus oocyte complexes (COCs). The average COCs retrieved per ovary was 2.70±0.12. The mean recovery rate was recorded to be 74.69±2.73%. The cumulus expansion (%) recorded in the present study was significantly ($p<0.01$) higher for grade A (47.45±0.38) as compared to B (35.33±0.39) and C (17.23±0.56) grade cumulus expansion. In various grades of oocytes significantly ($p<0.05$) higher developmental competence in grade I oocytes was recorded in terms of maturation (89.65±0.62), cleavage (72.21±0.76) and blastocyst (32.85±0.32) percentage as compared to COCs of grade II (83.61±1.01, 64.75±0.21 and 26.84±0.16) and grade III/IV (40.17±0.27, 34.34±0.34 and 5.60±0.33).

The effect of supplementation of 2.5µM forskolin (group I) and 3.5µM (group II) forskolin at day 4 for 24 hours was compared with vitrified (group III) and non vitrified (group IV) control. The post vitrification blastocyst rate in 2.5µM forskolin/group I (21.41±0.91) and 3.5µM forskolin/group II (23.27±0.96) was significantly ($p<0.01$) higher as compared to vitrified control/group III (16.20±1.59). The blastocyst rate in non vitrified control/group IV (29.42±1.27) was, however significantly ($p<0.01$) higher as compared to all the treatment groups. The concentration of reactive oxygen species (pixels/embryo) and embryonic apoptosis (%) recorded in the embryos of forskolin supplemented (group I and II), vitrified (group III) and non vitrified (group IV) control groups at pre-vitrification (day 5) was not significantly different between the groups. A significantly ($p<0.05$) higher concentration of reactive oxygen species was, however, recorded in post vitrified embryos as compared to pre vitrified embryos in all the groups except group IV where embryos were not vitrified. Forskolin, significantly ($p<0.01$) reduced the intensity of reactive oxygen species in group I and II (forskolin supplemented groups) as compared to vitrified control (group III). There was, however, a significantly ($p<0.01$) lower level of reactive oxygen species in group IV (non vitrified control) as compared to other treatment group (I and II) and vitrified control (group III) on day 7. No significant difference of embryonic apoptosis (%) was recorded in embryos of different treatment and control group on day 5 (pre vitrification stage). On day 7 (post vitrified embryos) a significantly ($p<0.05$) higher incidence of embryonic apoptosis was recorded in group III (vitrified control) as compared to forskolin supplemented groups (I and II). The incidence was, however, significantly lower ($p<0.01$) in non-vitrified control (group IV) as compared to the other treatment groups and vitrified control (group III). The embryonic apoptosis percent in post-vitrified embryos (on day 7) was significantly ($p<0.05$) higher as compared to pre-vitrified embryos in control as well as treatment groups except group IV where embryos were not vitrified.

"AUGMENTATION OF *IN VITRO* EMBRYO PRODUCTION USING SIMULATED PHYSLOGICAL OOCYTE MATURATION IN GOATS"

Dr. O. P. Shrivastava **Ashitha Suresh**
(Advisor) **(Researcher)**

ABSTRACT

The present study was conducted to study the effect of simulated physiological oocyte maturation on the developmental competence of *in vitro* produced goat embryos. A total of 1422 follicles were aspirated from 348 ovaries resulting in aspiration of 1035 cumulus oocyte complexes (COCs). The average number of follicles per ovary and COCs retrieved per ovary was 4.35±0.43 and 3.20±0.32, respectively with a mean recovery rate of 73.93±1.49%. The oocytes retrieved were graded and mean per cent of I, II and III+IV grade oocytes was 19.01±2.24, 42.58±4.75 and 38.41±4.6, respectively. The *in vitro* maturation, cleavage and blastocyst rate was recorded to be 89.78±0.50%, 63.88±2.33% and 25.38±2.08%, respectively. The highest developmental competence was recorded in grade I oocytes with maturation, cleavage and blastocyst rates of 91.26±0.97, 63.70±1.23 and 26.01±1.24% respectively, while grade III+IV oocytes had the lowest developmental competence (39.94±0.85 maturation rate, 35.39±1.71 cleavage and 7.41±0.57% blastocyst rate).

The mean intensity of reactive oxygen species (pixels/ embryo) and apoptosis (%) was recorded to be 15.37±0.98 and 9.63±0.74, respectively. A significant negative ($p<0.01$) correlation of reactive oxygen species with maturation (-0.68), cleavage (-0.71) and blastocyst rate (-0.72) was also recorded in the present study. Similarly, a significantly ($p<0.05$) negative correlation of embryonic apoptosis with maturation (-0.47), cleavage (-0.53) and blastocyst rate (-0.50) was recorded.

A significantly ($p<0.05$) higher grade A (49.25±1.11% vs 43.69±0.35%) and B (42.01±0.52% vs 37.95±0.4%) grade cumulus expansion was observed in oocytes subjected to SPOM as compared to control. The cumulus expansion of grade C was, however, significantly ($p<0.05$) higher in oocytes in the control group (18.36±0.71%) as compared to those subjected to SPOM (9.32±1.39%). The SPOM group showed a significantly ($p<0.05$) higher maturation and blastocyst rates (90.60±0.46% and 29.09±2.59%, respectively) as compared to the control group (85.29±0.98% and 24.09±1.08%). No significant difference between the cleavage rate of SPOM (62.89±1.60%) and control (60.98±1.39%) was, however, recorded in the present study. The intensity of reactive oxygen species of the embryos in the control group (14.98±0.83 pixels/embryo) was significantly ($p<0.05$) higher than the SPOM group (9.60±0.76 pixels/embryo). The apoptosis rate was also significantly ($p<0.05$) higher in the embryos of the control group (9.18±1.07%) as compared to the SPOM group (5.71±0.90%) suggesting the efficacy of the protocol in improving the developmental competence and reducing the reactive oxygen species and apoptosis in *in vitro* produced goat embryos.

PREVALENCE OF REPEAT BREEDING DUE TO SUBCLINICAL ENDOMETRITIS IN COWS AND ITS THRERAPRUTIC MANAGEMENT.

Dr. N.K. Bajaj **Vinay Kumar Manjhi**
(Advisor) **(Researcher)**

ABSTRACT

The present study was conducted to investigate the prevalence of repeat breeding due to subclinical endometritis in cows, efficacy of cytobrush technique in diagnosing subclinical endometritis and comparative efficacy of certain immunomodulators and proteolytic enzymes in enhancing uterine immunity and pregnancy rate in repeat breeder cows suffering from subclinical endometritis. A total of 500 cows included in the study were randomly selected from college livestock farm, Kuthuliya and different villages in and around Rewa (M.P.). On the basis of characteristics of cervico-vaginal mucus (CVM), per-rectal examination, Whiteside test and endometrial cytology by cytobrush technique, the prevalence of clinical and subclinical endometritis in these repeat breeder cows was recorded as 16.00 (80/500) and 28.00 (140/500) per cent, respectively. Endometrial cytology revealed polymorphonuclear cell (PMN) per cent normal, clinical and subclinical endometritis groups to be 4.00±0.03, 34.80±0.25 and 14.02±0.14, respectively and difference between them was significant ($p<0.05$). Bacterial isolates were obtained from 38.40 per cent (192/500), out of these 95.31 (183/192) and 4.69 (9/192) per cent single type and mixed bacterial isolates, respectively. Among the bacterial isolateds *Staphylococcus* species (36.31%) was highly prevalent. The antibiotic sensitivity of isolates was found to be maximum for ceftriaxone and sulbactum combination 176 (91.67%) followed by levofloxacin 171 (89.07%), ciprofloxacin 153 (79.69%), ceftriaxone 141 (73.43%), enrofloxacin 118 (61.45%) and gentamicin 109 (56.78%), respectively. The efficacy of endometrial cytology by cytobrush technique to diagnose the subclinical endometritis increased when microbial assay was performed in addition to endometrial cytology by cytobrush technique. Out of 140 repeat breeder cows, 112 (80.00%) were found to be positive. Out of 140 subclinical endometritis, 30 subclinical endometritic repeat breeder cows were again randomly divided into 5 groups (n=06 per group). The groupwise treatment allotted were Group I (levamisole, 2.5 mg/kg body weight, once at weekly interval for three weeks, SC), Group II (100 µgm *E. coli* LPS in 30 ml PBS, single I/U infusion), Group III (500 mg Benzathine cephapirin, single I/U infusion), Group IV (proteolytic enzymes in 10 ml distilled water, single I/U infusion) and Group V (no treatment). All the 30 animals were subjected to endometrial cytology at 12 hrs., 24 hrs. and 48 hrs. post-treatment. The animals were bred on next successive estrus and pregnancy was confirmed 60 days post insemination by per-rectal examination. Endometrial cytology in treatment group I revealed that the PMN per cent was significant ($p<0.05$) from 0 hrs. to 24 hrs. while the variation between 0 hrs. to 48 hrs. was non-significant ($p>0.05$). In groups II, III and IV, the increase in PMN per cent was significant ($p<0.05$). This PMN per cent decreased significantly ($p<0.05$) from 12 to 48 hrs. While PMN per cent variations in control group (Group V) was non-significant ($p>0.05$). The overall pregnancy rate was higher (83.33%) in treatment groups II and IV as compared to treatment group III (50.00%), group I (33.33%) and group V (0.00%), respectively.

Therefore, it is concluded that endometrial cytology by cytobrush technique and microbial assay can be combined for more accurate assessment of subclinical endometritis. Immunomodulators like *E. coli* lipopolysaccharide and proteolytic enzymes proved to be better for enhancing uterine immunity and first service pregnancy rates in subclinical endometritic repeat breeder cows.

COMPARATIVE EFFICACY OF INTRAUTERINE TURMERIC EXTRACTAND CEFTIOFUR SODIUM ALONE AND IN COMBINATION WITH MICRO-NUTRIENTS SUPPLEMENTATION ON FERTILITY AUGMENTATION IN POSTPARTUM METRITIC CROSSBRED COWS

Dr. S. P. Nema (Advisor)

Rajender Kumar (Researcher)

ABSTRACT

The present study "Comparative efficacy of intrauterine turmeric extract and ceftiofur sodium alone and in combination with micronutrients supplementation on fertility augmentation in postpartum metritic crossbred cows" was conducted on 24 crossbred cows at TVCC, College of Veterinary Science and A.H., Mhow and in nearby villages of Mhow.

The animals were selected on the basis of clinical symptoms and gynaeco-clinical examinations. They were randomly allocated equally into four treatment groups. Body condition score, therapeutic efficacy was judged on the basis of time interval between last drug administration with cessation of uterine discharge, resumption of cyclicity, conception rate and haemato-biochemical changes in postpartum metritic crossbred cows.

The difference observed in body condition score and serum glucose level in all the treatment groups was not significant before and after treatment. Further, the mean time required for cessation of the uterine discharge was minimum in ceftiofur sodium + micronutrients supplementation group (gp IV), followed by turmeric extract + micronutrients supplementation group (gp III), ceftiofur sodium alone (gp II) or turmeric extract groups (gp I).

The mean time interval required for resumption of cyclicity was highest in gp II (98.66±4.12) followed by gp I (87.50±1.47), gp III (73.50±2.04) and gp IV (66.16±1.66). The group turmeric extract + micronutrients supplementation and ceftiofur sodium + micronutrients supplementation group registered a considerable higher conception rate (66.66) followed by (50%) in turmeric extract and ceftiofur sodium group.

The mean TLC values, neutrophil count, total protein (g/dl) were significantly higher ($p<0.05$) before treatment as compared to after treatment in all the groups. The mean lymphocyte count, A: G ratio were significantly higher ($p<0.05$) after treatment as compared to before treatment

The results depicted that turmeric extract and ceftiofur sodium with micronutrient supplement has good efficacy for treatment of postpartum metritis.

EFFICACY OF DIFFERENT SYNCHRONIZATION PROTOCOLS FOR AUGMENTING REPRODUCTIVE EFFICIENCY IN NON-DESCRIPT GOATS

Dr. N.K. Bajaj **Birendra Pratap Singh**
(Advisor) **(Researcher)**

ABSTRACT

The present investigation was aimed to study the reproductive performance of non-descript goat in organized and unorganized goat farm in and around Rewa to study progesterone profile during and after oestrus synchronization and the fertility response using different oestrus synchronization protocols.

The present study was carried out in non-descript goats in and around Rewa. In phase I, the retrospective study was carried out on 300 non-descript goats maintained in organized and unorganized farms (2-4 year age. The data of reproductive performance was collected in prescribed format and analyzed for month and season. The parameters studied were foetal loss, kidding rate, kidding interval, breeding pattern, multiple kidding and litter size. The highest breeding was recorded as 18.65% (25/134) and 27.10 % (45/166) in organized and unorganized goat farms in November. The highest breeding was recorded as 49.25% (66/134) and 52.40 % (87/166) in organized and unorganized goat farms in winter season. The retrospective study of reproductive parameters in organized farms revealed foetal loss, kidding rate, twins and triplets as 8.06, 91.85, 7.22 and 1.80 per cent, respectively. While, reproductive parameters in unorganized farms revealed foetal loss, kidding rate, twins and triplets as 12.16, 89.15, 12.08 and 6.02 per cent, respectively.

In second phase effect of different oestrus synchronization protocols on reproductive efficiency was studied in 30 adult does, randomly divided into 5 groups each comprising of 6 animals (n=6). Animals of group-I were injected 0.004mg GnRH (Receptal) on first day. Additionally, intramuscular injection of 12.5 mg $PGF_{2\alpha}$ (cloplostenol) on day 7 day and GnRH (day 9) then mating between day 10-14. In Group–II, $PGF_{2\alpha}$ (day 0) and $PGF_{2\alpha}$ (day 7) and GnRH on day 9 and mating between 10 to 14 day. In Group–III, Vaginal sponge (10 days) and eCG (10 day) and vaginal sponge removal (10 day) and mating (10 to 14 day). In group –IV, Vaginal sponge (10 days) and GnRH (day 0) and $PGF_{2\alpha}$ (day 10) and vaginal sponge removal (10 day) and mating (10 to 14 day). Group –V animals were kept as control group and were not treated with any preparation. The exfoliative vaginal cytology revealed higher ($P<0.05$) per cent of cornified superficial cells on day 3 of PGF2$\boldsymbol{\alpha}$ injection/ sponge removal in group I, II III and IV. However, no significant variation was seen in cornified cells among the days in control group goats.

The mean plasma progesterone concentration (ng/ml) was increased significantly from day 0 to day 7 in group I, II, III and IV whereas the value was decreased on day 10 in group I and II, and on day 14 in group III and IV, however no significant difference was recorded in control group.

The result of fertility response in non-descript goats following oestrus synchronization using different synchronization protocol revealed highest estrus synchronization in group I and II (100.00 %), oestrus induction in group I, II and III (100%) and conception rate in group III (83.33 %), respectively.

Among the different synchronization protocols fertility response in terms of oestrus synchronization, oestrus induction rate and conception rate was higher in progesterone impregated intravaginal sponge along with eCG injection (group III) as compared to other groups.

EFFECT OF LINSEED SUPPLEMENTATION ON REPRODUCTIVE PERFORMANCE OF GOATS

Dr. J. S. Rajoriya **Satish Yadav**
(Advisor) **(Researcher)**

ABSTRACT

The present work were carried out in the Department of Veterinary Gynaecology and Obstetrics, Goat Farm, College of Veterinary Science & Animal Husbandry, Rewa (M.P.) and different villages in and around Rewa. Duration of experimental period was six months. Twenty four normal cycling and clinically healthy goats of Rewa, aged between 2-2.5 years with 1-2 parity, was used to study the effect of dietary linseed supplementation on reproductive performance. The experimental goats were maintained under intensive housing management system. Before the commencement of study, proper health care including vaccination & deworming was taken into consideration. At least one estrous cycle was also be monitored closely. Group A The animals (n=06) was fed ration containing 10% linseed. Group B: The animals (n=06) was fed ration containing 15% linseed. Group C: The animals (n=06) was fed ration containing 20% linseed. Group D: The animals (n=06) was fed ration containing 0% linseed. The mean concentration of serum P_4 from day -7 to day 60 feeding and post-breeding in Control group(D) and treatment group (A,B,C) have been presented. The mean serum progesterone (ng/ml) concentration in group-A were recorded as 0.765 ± 0.04, 0.851 ± 0.04, 2.17 ± 0.25, 3.10 ± 0.93 in different days. These value is higher significantly ($P<0.05$) on day 30 when compared to days -7, 0 and 15, however similar trends were observed in group-B, group-C and the mean serum progesterone (ng/ml) concentration in control group-D were recorded as 0.788 ± 0.04, 0.725 ± 0.04, 2.10 ± 0.27, 2.93 ± 0.97 in different days such as -7, 0, 15 30. These value is higher significantly ($P<0.05$) on day 30 when compared to days -7 and 0 at the time of linseed feeding supplementation. In post breeding period the mean serum progesterone concentration in group-A were recorded as 1.52 ± 0.17, 1.98 ± 0.19, 2.56 ± 0.75, 4.53 ± 1.60 in different days. These values are higher significantly ($P<0.05$) on day 60 as compared to days 7, 14 and 21, however similar trends were observed in group-B, group-C and group-D.

After linseed feeding supplementations maximum conception rate/kidding percentage was observed in group B i.e. 83.33% (5 animal) followed by group C (66.66%, 4 animal) and least conception rate/kidding percentage was observed in control group D i.e. 33.33% (2 animal).

INCIDENCE OF REPRODUCTIVE DISORDERS AND EFFICACY OF CERTAIN CHEMOTHERAPEUTIC DRUGS IN CANINE TRANSMISSIBLE VENEREAL TUMOUR

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Chanchal Thakur
(Researcher)

ABSTRACT

Present study was conducted on "Incidence of reproductive disorders and efficacy of certain chemotherapeutic drugs in Canine transmissible venereal tumour" in 18 dogs at TVCC, Mhow. The study included retrospective analysis of the Incidence of reproductive disorders which were 2.39% (628 cases) as calculated from records of TVCC, Mhow, out of 26,173 total registered cases (2012-2017) of dogs.

The incidence of CTVT 34.71% (218 cases) was made from total reproductive disorders (628) recorded of past five years. Among various reproductive disorders, the incidence of CTVT was highest (34.71%) and of cystic endometrial hyperplasia (0.47%) lowest.It was highest at 1-3 years of age (33.48%) and in females (77.64%). Further, its highest incidence was observed during winter season (35.32%). Breed wise the highest incidence of CTVT was observed in GSD (27.06%).

To compare therapeutic efficacy, 18 cases of CTVT were allocated in three chemotherapeutic drug groups viz inj. Vincristine sulphate @ 0.025 mg/kg B.wt, inj. Doxorubicin @ 1 mg/kg B.wt. and inj. Methotrexate @ 0.3 mg/kg B.wt. I/V administered with normal saline minimum three times at weekly interval respectively. The response to vincristine, doxorubicin and methotrexate in terms of regression of tumor mass observed was 99.23%, 65.92% and 42.26% respectively. Adverse effects of cytotoxic drugs were recorded inappentence, vomition, fatigue, alopecia and pruritis problems.

Cytological examination was carried out using papaincolaou stain for diagnostic purpose which revealed numerous neutrophils and round neoplastic cells with vacuolated cytoplasm. The neoplastic cell count gradually reduced significantly and neutrophil cell count also reduced statistically significant irrespective of treatment groups.

Haemato-biochemical alterations revealed leucopenia, neutoropenia, lymphocytosis, monocytosis and myelo-suppression, eythropoiesis and non significant decrease in PCV values. Significant increase in AST values, and decreased serum creatinine was observed in all the therapeutic groups.

All the therapeutic indices indicated Vincristine sulphate to be superior drug.

"EFFECT OF CURRY LEAF, BAEL LEAF AND MINERALS SUPPLEMENTATION ON FERTILITY RESPONSE IN DELAYED PUBERTAL CATTLE

Dr.S. N. Shukla
(Advisor)

Pradeep Kumar Patel
(Researcher)

ABSTRACT

The present study was designed to study the incidence of delayed puberty in cattle and to evaluate the fertility response in delayed pubertal cattle by feeding curry leaf, bael leaf and minerals. **Proposed work was conducted in delayed pubertal cattle at LSF, Adhartal and farmer's door step especially in villages adopted by university as well as other area in and around Jabalpur.**

The incidence of delayed puberty was studied in 500 cattle heifers. The overall incidence of delayed puberty was found 44.44%. The analysis of result on breed wise incidence revealed 52.92%, 29.21%, 57.89% and 41.67% in Non descript, Crossbred, Gir and Sahiwal, respectively.

To study the fertility response by feeding curry leaf, bael leaf and minerals a total of 50 delayed pubertal cattles of above 18 months of age (range 18 – 35 months) with body condition score between 2-4 in 5 point scale were selected and randomly divided into 5 groups, viz. T_1 (supplemented with curry leaf), T_2 (supplemented with curry leaf and miniral mixture), T_3 (supplemented with curry and bael leaf), T_4 (supplemented with curry, bael leaf and miniral mixture) and T_5 (supplemented with miniral mixture). Supplementation was done for 7 days in all the groups and blood collection was done on day 0, day 7 and day 15.

The highest fertility response in terms of oestrus induction rate was observed in T_4 (70%), followed by T_2 (60%), T_3 (50%), T_1 (30%) and T_5 (20%). The mean days for oestrus induction was lowest for T_4 (9.86±0.34) and highest for T_5 (14.50±0.50). The conception rate (%) were 66.66, 50.00, 60.00, 71.42 and 50.00 for T_1, T_2, T_3, T_4 and T_5, respectively.

The mean serum oestradiol concentration was found to be significantly higher on day 7 and day 15 as compared to day 0 in all the groups. In T_2, T_3 and T_4 mean serum oestradiol on day 15 was also significantly higher as compared to day 7.The mean serum oestradiol concentration (pg/ml) on day 15 were found to be significantly higher in treatment group T_2 (97.21±3.24), T_3 (102.26±3.88) and T_4 (105.78±4.13) as compared to T_1 (88.39±3.87) and T_5 (85.58±2.10).

The mean serum calcium concentration was found to be significantly higher on day 7 and day 15 as compared to day 0 values in all the groups. The mean serum calcium concentration (mg/dl) in treatment group T_2 (7.79±0.082), T_4 (7.98±0.098) and T_5 (7.84±0.065) were significantly higher as compared to T_1 (7.43±0.065) and T_3 (7.5±0.139) on day 7. The mean serum phosphorus concentration was significantly higher on day 7 and 15 as compared to day 0 values in T_2, T_4 and T_5.In conclusion, delayed puberty is one of the major reproductive disorder seen under field condition in indigenous animals especially in poor body condition score animals. Curry leaves, bael leaves, and mineras supplementation was an effective approach for initiating ovarian cyclicity in delayed pubertal cattle heifers.

VETERINARY SURGERY

"EVALUATION OF ROPIVACAINE AS AN EPIDURAL ANALGESIA IN COW CALVES"

Dr. B.P. Shukla
(Advisor)

Sachin Chaudhary
(Researcher)

ABSTRACT

The present study was aimed to elucidate with the objective to evaluate the effects of drug as an epidural analgesia, to study clinico-physiological effects and haemato-biochemical alteration of drug during and after epidural analgesia and to evaluate a better dose rate of epidural analgesic drug for routine surgery.

Six cow calves of similar age and managemental conditions were selected for study and divided into groups 1 and 2 and ropivacaine was used @0.11 mg/kg body weight and 0.22mg/kg body weight in group 1 and 2 respectively.

Results of the clinical studies revealed that onset of analgesia was quick in group-II as compared to group-I. The duration of analgesia also lasted more in group-II than group-I. There was non-significant change observed in all the physiological parameters such as rectal temperature, pulse rate, and respiration rate. There was non-significant decrease in haematological parameters such as Hb, TEC, PCV, except TLC where non significant increase in both the groups was observed.

In biochemical parameters only blood glucose showed a significant increase in both the treatment groups. All other parameters such as Total protein, ALP, AST, ALT, BUN and Creatinine revealed non significant increase in both the treatment groups. The increase of glucose concentration might be due to the effects of stress induced secretion of cortical hormones from adrenal gland under adreno corticotropic hormone.

Therefore ropivacaine @ 0.22mg/kg body weight as epidural analgesia was able to give better induction time and longer duration of analgesia as compared to 0.11 mg/kg body weight. Ropivacaine exhibited no adverse effects on respiratory, cardiovascular renal and hepatic parameters hence it can be used safely in patients with impaired renal, hepatic functions and cardiopulmonary function.

A COMPARISON OF THE EFFECTS OF BUTORPHANOL NASAL SPRAY AND TRAMADOL RECTAL SUPPOSITORIES FOR MANAGEMENT OF THE POSTOPERATIVE PAIN IN DOGS"

Dr. S.S. Pandey
(Advisor)

Shivendra Singh
(Researcher)

ABSTRACT

The present study was aimed to elucidate the following objectives:

1. To evaluate the efficacy of Tramadol rectal suppositories and Butorphanol nasal spray in the management of postoperative pain in dogs.
2. To study the bio-chemical and physiological changes.
3. To establish the behavioral and physiological scoring system for pain assessment.
4. To provide a general background of analgesia that is sufficient to permit normal activities for prompt surgical recovery.

In the present study, the efficacy and supremacy of Butorphanol nasal spray (2mg total dose repeated in 24hrs) and Tramadol rectal suppositories (2mg/kg b.wt. repeated in 8hrs) was observed.

There was significant changes observed in physiological parameter, at the time of recovery but then after value become towards normal within 24hr.

The biochemical changes was significantly affected at the time of recovery then after value become normal within 24hr. The cortisol level was affected significantly, at after recovery and changes was significant up to 4hrs in group G2 (Tramadol rectal suppositories). Where as in group G1 (Butorphanol nasal spray), there was significant change at after recovery was observed then after the value became towards normal in 24hrs. The pain score exhibites, higher significant changes in group G2 at after recovery and mild pain was observed up to 4hrs. Whereas, in group G1 there was no pain. Therefore it can be suggested that both the drugs can be used for the postoperative pain management in dogs but Butorphanol nasal spray can be prefer because repetition time 24hrs without any side effects.

"CLINICAL EVALUATION OF CISSUS QUADRANULARIS IN LONG BONE FRACTURE HEALING IN DOGS"

Dr. B.P. Shukla
(Advisor)

Sanjay Kumar Verma
(Researcher)

ABSTRACT

The present study was aimed to elucidate with the objective to study the efficacy of *Cissus quadrangularis* as a stimulating agent in the bone healing on the basis of clinical and haemato- biochemical observations and to evaluate bone healing by radiographic examination.

The 12 dogs under study were divided into two groups of 6 dogs each, group I and II. In group I, Immobilization of fractured bone by intra-medullary pinning (Control). In group II, Immobilization of fractured bone by intra-medullary pinning + Inj. extracts of *Cissu quadrangularis* @ 50 mg/kg body weight S/C on alternate days for 20 days postoperatively.

The respiration (per minute), pulse rate (per minute) and rectal temperature (ºF) was recorded at day 0, 7th, 14th and 28th. There were non-significant changes in respiration rate, pulse rate and rectal temperature.

On the basis of radiological evaluation, fracture healing was fast and better in group II as compared to group I animals. In early stage, pain, exudations of wound, weight bearing and fracture healing was also better in group II as compared to group I. This is because of use of *Cissus quadranularis* in group II animals, which has been claimed to be analgesic, anti-inflammatory and bone healing inducing property.

There were non-significant changes in haematological (total erythrocyte count, total leucocytes count, haemoglobin, lymphocyte, neutrophil, monocyte, eosinophil, basophil) and biochemical (Serum alkaline phosphatase, creatinine kinase, serum calcium, serum phosphorus).

In the present study, no major complications were recorded except one animal(C1) in group I, where cranial bending of distal fracture fragment was noticed and signs of mal-union with complete fracture healing, angular deformity was there, however, animal was able to walk with slightly limping gait.

"EFFICACY OF ULTRASOUND GUIDED TISSUE CORE BIOPSY AND FINE NEEDLE ASPIRATION CYTOLOGY IN DOGS"

Dr. Apra Shahi (Advisor)

Pankaj Jain (Researcher)

ABSTRACT

Ultrasound is sensitive but often nonspecific for the diagnosis of soft tissue abnormalities. Some diseases generate no sonographic changes; while some diseases cause a variety of sonographic changes. Tissue core biopsy (TCB) and fine needle aspiration cytology (FNAC) are often employed in conjunction with ultrasonography to obtain confirm diagnosis in patients with focal or diffuse lesions.

The present study was conducted for a period of six months from October, 2013 to March, 2014. Total 24 samples were collected, out of which 18 samples were collected by TCB using 16G automatic spring loaded tissue core biopsy gun using free hand technique and 6 were collected for FNAC by using 22G needle under ultrasound guidance. Before taking biopsy samples, all the animals underwent a thorough physical, clinical, haemato-biochemical and ultrasonographic examination. Clotting time was also determined in case of TCB to assess the clotting ability of blood.

All the cases were divided into five groups depending upon the underlying disease condition. Group 1 comprised of four animals suffering from liver affections. Hepatic cyst, hepatocellularcarcinoma and hepatitis were diagnosed in three animals based on histopathological findings of biopsy samples. In one case only liver capsule was approached. The mean depth of needle penetration was calculated as 39.32 ± 5.49 mm.

In group 2 five animals which were suspected to have renal disorders based on ultrasonographic findings, were included. Biopsy samples were collected from caudal pole of kidney in all cases. In all animals urine analysis showed presence of protein, epithelial cells and cast. Histopathologically two animals revealed tubulo-interstitial nephritis and glomerulonephritis. Rest of the three cases showed normal kidney tissue on histopathology. Mean depth of penetration was 26.84 ± 1.49 mm in his group. Group 3 comprised of five animals suspected to have splenic affections based on clinical and ultrasonographic findings. Splenic texture was found altered in all cases. Biopsy samples were collected at a mean depth of 17.26 ± 1.26 mm from left paracostal area. In two cases splenitis was detected on histopathology while aspiration of fluid from one case revealed degenerated macrophages and bacteria. Two samples were found unfit for histopathology due to crush artifacts.

In group 4 six animals suffering from fluid accumulations in peritoneal cavity were included which underwent ultrasound guided FNAC to collect the fluid sample for physical, cytological and biochemical analysis. Physical examination revealed clear to red fluid and turbidity. Erythrocytes and epithelial cells were detected cytologically but no tumorous cells were found. Total protein content of fluid fluctuated from 1.8 to 5.5g/dl based on which exudative nature of fluid was detected in two cases. Group 5 comprised of four animals which had swelling or growth at various body parts, increasing in size continuously. Based on histopathological findings of ultrasound guided TCB of inguinal and popliteal lymph node, the lymph node enlargement was detected as lymphoma, growth on right fore limb was diagnosed as fibroma, growth related to sternum was confirmed as myositis with muscle degeneration and FNAC confirmed the swelling in the region adjacent to inguinal mammary gland as haematoma.

In all the cases, animals were treated symptomatically using fluid therapy, antibiotics, non steroidal anti inflammatory drugs, corticosteroids, hepatoprotectives, immunosuppressive drugs and surgically as per underlying disease condition. Ultrasound examination 5th and 10th day post treatment showed improvement in all the cases.

No complications were detected after TCB and FNAC except one case of haematuria. All samples, except two splenic samples, were fit for histopathological diagnosis. Three kidney samples and one sample of spleen were found normal on histopathological examination. Thus, the efficacy and diagnostic value of the technique were calculated as 91.66 and 79.16%, respectively. TEC and Hb counts, immediately and 24 hours after biopsy showed no marked variation. Ultrasound examination repeated at 30, 60, 90 and 120 minutes after biopsy did not revealed any sign of haemorrhage, however biopsy tract can be visualized.

Based on the findings of present study it can be concluded that ultrasound guided tissue core biopsy and fine needle aspiration cytology is a safe procedure and has minimal complications and thin tape of tissue obtained by TCB gun was found sufficient for histopathology.

COMPARATIVE STUDY ON PLASTER OF PARIS AND HYBRID CAST FOR LONG BONE FRACTURE IN GOATS

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(Advisor)

Sumit Kumar Patel
(Researcher)

ABSTRACT

Fracture is a highly complex injury, resulting in discontinuity in the bony framework. Goats because of their habitat are more prone for fracture. Hybrid cast is a combination of Plaster of Paris cast bandage followed by fiber glass cast. Looking to the frequent occurrence of long bone fractures in goats and paucity of literature regarding their economic management, the present study was planned to evaluate and compare the fracture healing by clinical and radiographic findings of plaster of Paris and hybrid cast.

The incidence of caprine cases at TVCC accounted 27.95% out of which 30.92 per cent i.e. 2451 were referred to OPD surgery. Out of which fracture of goats accounted to 69 cases (2.81%). The involvement of long bone fracture was recorded in 29 cases (42.05%) Animals were presented to TVCC for the treatment with a lapse of 2 hours to 5 days following fracture. In 8 animals the fracture occurred due to automobile accident while fall down from height was recorded 4 cases.

The fracture were simple oblique in four, simple transverse type in three, while three had simple comminuted multiple types, one simple linear and one dislocating growth plate fracture in the present study. Abnormal mobility and the crepitation at the fracture site were observed on palpation in all the cases. The clinical parameter recorded in both the group showed non- significant changes among of the group.

The radiograph were taken before the casting and subsequently on 0, 7th, 21st and 45th day post casting intervals for the fracture healing specially for evidence of fracture gap, extent and type of callus and position of fracture fragments. The radiological union was mild in hybrid cast group II at 21st day intervals while in POP group I, it was marked later on and complete on 45th days interval of the present study.

The internal cast temperature recorded in both the groups showed non- significant difference between in the groups. Weight bearing was recorded as per the score card on day 0 and 7th, 14th, 28th and 45th day post-operatively. In POP group animal started full weight bearing between 39-45 days. However, in hybrid cast group it took 30-40 days.

The immobilization with POP group I found more economic in comparison to the hybrid cast group II. However in POP group, three cases revealed softening of the cast due to poor management, which resulted in failure of cast and ultimately recasting, hiked up the expenditure. The time taken for application of plaster of Paris cast was less as compared to the hybrid cast. On the other hand, the setting time of the plaster of Paris cast was recorded higher, 20-25 minutes then hybrid cast which sets well within 8-10 minutes. More complications were noticed with plaster of Paris cast as compared to hybrid cast and the most common was softening of the cast due to contact with humidity which was not observed in hybrid cast.

STUDIES ON ADVANCED DRESSING MATERIALS FOR CUTANEOUS WOUND HEALING IN GOATS

Dr. V.P. Chandrapuria (Advisor)

Aakanksha Upadhyay (Researcher)

ABSTRACT

Dressings are a part of a holistic wound management plan with individualized patient goal and aimed to provide the optimal environment for healing processes. Different dressings have been shown to promote healing during different phases of the wound healing.

The present study was undertaken on 18 adult goats of the Amanala goat farm, Teaching Veterinary Clinical Service Complex of the College Of Veterinary Science and A.H and Government Veterinary hospital, omti, Jabalpur, for the treatment of the open wounds, selected irrespectively of their breed, body weight and sex. The healing of the cutaneous wound was evaluated and compared with conventional and advanced dressings.

The goats were randomly divided into 2 groups. The wounds of group I were acted as control and treated with hydrogen per oxide, povidone iodine followed by parental administration of antibiotic (Inj. Procain Penicillin + Benzylpenicillin + Streptomycin Sulphate) @10 mg/kg b.wt o.d for five days and analgesic (Inj. Flunixin Meglumine) @ 2.2 mg/kg b.wt bid for first 3 days, while in groups II wounds were dressed with advanced dressing materials serially in three phases. The chlorhexidine dressing was applied for first three days followed by calcium alginate for at least two days and collagen sponge applied till the complete healing. Parenteral antibiotic and analgesic administration was same as group I.

The clinical parameters like appearance of the wound, degree of inflammation (Visual score) , degree of exudation(Visual score) and size of the wound (cm^2) were recorded before treatment on day 0 and subsequently following treatment on day 3rd,7th, 10th and 14th in both the groups while percentage healing was measured on 3rd , 7th , 10th and 14th post treatment. The inflammation and exudation was found to be subsided earlier in group II.

The size of the wound reduced more significantly from 3rd to 14th day interval in group II than that of group I. On day 14th the mean value of size of the wound in group I and II was 2.52±0.04 and 0.77±0.12 cm^2 respectively . The per cent healing was observed higher in group II in comparison to group I.

The haematobiochemical parameters were recorded on day 0 (before treatment) following 7th and 14th day (after treatment).The haematological changes were found non significant except the Neutrophil Per Cent which decreased significantly on day 14th in group II and Lymphocyte Per cent was significantly higher in group II on day 14th than that of group I.

The biochemical parameters like Total Serum Protein decreased significantly on day 14th to 7.12±0.14 g/dl in group I than that of 7.24±0.02 g/dl in group II. The Creatinine Kinase showed non significant decrease in both the groups from day 0 to 14th.The highly significant decrease was found in plasma fibrinogen from day 0 to 14th in group II than that of group I.

The impression smear of the wound revealed significant decrease in the leukocytes on 14th day in group II compared to group I and the bacterial population showed earlier reduction in group II.

On the basis of results obtained in the present study, it may be concluded that in group II inflammation and exudation subsided earlier, marked granulation tissue with scar less healing was observed, it fulfills the requirement of the wound without any adverse effect , easy to apply and cost effective. The changes in clinical, haematological and biochemical parameters were transient in nature and within the normal physiological range.

TWO-DIMENSIONAL AND M-MODE ECHOCARDIOGRAPHY IN DOGS

Dr. Apra Shahi
(Advisor)

Prachi Seth
(Researcher)

ABSTRACT

In recent years, the development of echocardiography permits detailed imaging of internal cardiac anatomy, which has markedly reduced the necessity for invasive cardiac catheterization and angiography to establish a definitive diagnosis of congenital and acquired heart diseases. Ultrasound examination of the heart and large vessels allows an evaluation of the space relationship between structures, cardiac movement and the blood flow features for precise diagnosis.

The present study was conducted for a period of six months from December 2013 to May 2014 on 24 clinical cases of dogs which included 12 clinically healthy and 12 unhealthy dogs divided on basis of body weight. The dogs underwent a thorough physical and clinical examination. The dogs were broadly divided into two groups of 12 animals each, which were further divided into groups I A, I B and II A, II B to know the effect of body weight on different echocardiographic parameters. Groups I A and II A acted as healthy control whereas; groups I B and II B included unhealthy animals. Then dogs were examined by two-dimensional and M-mode echocardiography.

In two-dimensional mode, structural alterations were noticed in cases of pericardial effusion, left ventricular collapse and dilated cardiomyopathy in group I B and dilated cardiomyopathy and pericardial effusion in group II B. In M-mode, the parameters which significantly alter with body weight included systolic and diastolic left ventricular internal dimension, left atria and aortic dimension. Also, there was a positive correlation between body weight and systolic and diastolic left ventricular internal dimension (LVIDs) (LVIDd), fractional shortening (FS), systolic and diastolic interventricular septum thickness (IVSs) (IVSd), interventricular septum systolic thickening (IVS%Δ), left atria (LA) and aortic dimension (Ao).

It can be concluded that baseline data for two-dimensional and M-mode was generated as per body weight. Also, positive correlation with body weight was observed in left ventricular internal dimension at systole and diastole, interventricular septum at systole and diastole, left atria and aortic dimension. Lastly, two-dimensional mode in conjunction with M-mode was found to be useful in diagnosis of cardiac diseases.

SCALPEL VERSUS ELECTROSURGICAL CELIOTOMY IN DOG

Dr. V.P. Chandrapuria (Advisor)

Surendra Singh (Researcher)

ABSTRACT

Electrosurgery has been described as high frequency alternating current passes through tissue and heats up to create desired surgical effects. This affords minimal neuromuscular stimulation without risk of electrocution. Electrosurgery is considered to be an efficient mode of rapid haemostasis, faster dissection and reduced post operative pain.

The present work was conducted on twelve adult dogs brought to Teaching Veterinary Clinical Complex for different indications for celiotomy. These adult dogs were divided into two equal groups. Group I included scalpel celiotomy while group II electrosurgical celiotomy. Both the groups were analyzed for comparative evaluation and assessment of healing pattern by using a healing score system.

In scalpel celiotomy, a sharp incision has been made over the skin of ventral midline with scalpel and deepened further through muscle up to the peritoneum to complete the celiotomy, while in electrosurgical celiotomy, electrosurge 250 B solid state electrosurgical unit set on required intensity and pencil knob used with cut mode to incise the skin up to level of peritoneal cavity. For coagulation purpose during the incision and dissection, bland mode with ball knob was used. Following completion of specific surgery in the abdomen, the celiotomy incision was closed in the routine manner.

Complete history of the cases including age, sex, breed and indication for celiotomy were recorded and observed that out of twelve clinical cases seven were between 2-5 years, four were between 6-10 years and remaining was above 10 years and all were female animals. Nine cases in Mongrel and remains were in Pomerinarian. 10 cases were presented for elective ovariohysterectomy while rest of the two animals for pyometra.

Sharp and bold incision without charring effect was observed in group I while, unsharp and bold incision with mild charring effect was noticed in group II. The blood loss was recorded 0.49 to 0.56 ml and 0.47 to 0.55 ml in the animals of group I and group II, respectively which showed a significant difference between both the groups. The duration of Celiotomy incision was recorded 5.5 to 6.0 and 5.8 to 6.1 in the animals of group I and group II, respectively and showed a non significant difference between both the groups.

The degree of post-operative pain observed by visual analogue scale for characteristics of response for food and touch, routine activity, attention to surgical site and vocalization. The Skin apposition in group I was perfect on average day 7 to 10 while, in group II 3rd to 7th day. Visual assessment of healing on incisional site showed no marked difference between both the groups on 3rd, 7th and 14th postoperative day, respectively.

The recorded biochemical parameters such as total serum protein (g/dl), alkaline phosphatase (U/L), creatine kinase (U/L), glucose (mg/dl) showed a non significant decreasing trends from day 0 (postsurgical intervantion), 3rd and 7th day post-operatively in both the groups.

Blood loss was significantly less in group II, while, no marked difference was noticed in respect of incisional quality, celiotomy duration, postoperative pain and other complications in both the groups. Therefore, it may be concluded that electrosurgery is a safe, haemostatic and quicker technique for celiotomy in dogs.

COMPOSITE MESH GUIDED TISSUE REGENERATION FOR FRACTURE REPAIR IN DOGS

Dr. V.P. Chandrapuria (Advisor)

Randhir Singh (Researcher)

ABSTRACT

This study was conducted on 19 dogs of either sex and age of 1 to 6 years having long bone fractures with variable amount of bone loss. Radiographic and haemato-biochemical examinations were conducted at 0, 30th, 60th and 90th day to evaluate the animal before internal fixation and to monitor fracture healing. The animals were randomly divided into three groups for internal fixation of fracture using a Reconstruction plate or Locking compression plate (LCP). In group T1, only the Composite mesh was placed in a cylindrical manner around fracture site, whereas in group T2 and T3, β-tricalcium phosphate (β-TCP) and β-TCP with Platelet-rich plasma (PRP) having platelet concentration of 568×10^3/µl was installed at fracture site, respectively.

The incidence of fracture in dogs at TVCC was found to be 0.76%. The mean age of the animals was 26.32 months and 78.95% of the animals having fracture were in age group of 12-36 months. Fracture was noticed more common in male animals (73.68%) than females. The most of the animals under the study were non-descript (42.10%). An automobile accident was most common (42.10%) cause of trauma. The mean inflammation score decreased significantly ($p<0.05$) at 7th day in groups T2 and T3 and at 30th day in all the three groups and then gradually declined till 90th day. The mean haemoglobin concentration was recorded significantly lower ($p<0.05$) at 60th and 90th day in group T1 than group T2 and T3. Neutrophil count markedly reduced on 30th day and then gradually till 90th day. The mean lymphocyte count was higher in group T1 at all the intervals than in group T2 and T3. The plasma albumin was recorded significantly higher in group T3 than remaining two groups at 0 and 30th day. The mean radiographic score increased significantly at 30th day in all the three groups. There was significant ($p<0.05$) improvement in the score at 60th day than at 30th day in group T3. The mean radiographic score was observed markedly higher in groups T2 and T3 than group T1 at 60th and 90th day. The increase in mean radiographic score was recorded significant ($p<0.05$) in group T3 between 30th and 60th day. In animals of group T3, it increased significantly ($p<0.05$) at 30th day and full weight bearing (while standing) was recorded on 60th day onwards. The mean weight bearing score (while walking) improved significantly ($p<0.05$) in group T3 from 30th day onwards, however, in group T1 and T2 slow progress was noticed. The mean weight bearing score (while running) improved at 30th day in all the groups, however it was slightly higher in group T3. Based upon the present findings, it can be concluded that β-TCP and PRP have a promising role in repair of fractures with bone loss in clinical cases of dogs.

EFFECT OF ROPIVACAINE ALONE AND IN COMBINATION WITH DEXMEDETOMIDINE AS AN EPIDURAL ANALGESIA IN BUFFALO CALVES

Dr. S. S. Pandey **Shweta Kamble**
(Advisor) **(Researcher)**

ABSTRACT

The present study was contemplated to evaluate the efficacy of ropivacaine as an epidural analgesia, with and without dexmedetomidine and to study the clinico-haemato-biochemical changes following the epidural administration of ropivacaine alone and in combination with dexmedetomidine.

Twelve healthy buffalo calves of 6-12 months of age were selected for study and divided into two groups I and II comprising of 6 animals each. Ropivacaine was used @ 0.25 mg/Kg. body weight in group I and animals of group II received Ropivacaine @ 0.25 mg/Kg. body weight along with dexmedetomidine @ 5 µg/kg. body weight in sacrococcygeal space.

Results of clinical studies revealed that onset of analgesia was quick in group II as compared to group I. Group II animals also displayed prolonged duration of analgesia than Group I. Physiological parameters like rectal temperature, respiration rate and heart rate showed non significant changes in both groups except in Group II, where significant ($P<0.05$) change in heart rate was observed. Haematological parameters like haemoglobin and packed cell volume were found to have non significant change in both the groups. Among biochemical parameters, only Blood glucose, Creatinine and Blood urea nitrogen levels showed significant increase in both the treatment groups. The increase in glucose concentration might be due to effect of stress induced secretion of cortical hormone from adrenal gland under adreno corticotropic hormone. The elevated creatinine and blood urea nitrogen might be due to reduced glomerular filtration rate due to reduction in renal blood flow and disturbance in urinary function.Ropivacaine does not exhibit adverse effect on respiratory, cardiovascular, renal and hepatic parameters hence it can be safely used in patients with impaired renal, hepatic and cardiopulmonary function. It can also be used efficiently in minor standing surgeries. Ropivacaine and dexmedetomidine analgesic provides early onset and prolonged duration of analgesia and hence can be used for major surgeries of perineum, inguinal and flank regions.

DEXMEDETOMIDINE WITH AND WITHOUT BUPIVACAINE AS EPIDURAL ANALGESIA IN BUFFALO CALVES

Dr. S. S. Pandey
(Advisor)

Aditya Jaiswal
(Researcher)

ABSTRACT

One of the most commonly used regional anaesthetic technique in ruminants is epidural anaesthesia. Dexmedetomidine is a potent as well as highly selective alpha-2-adrenergic receptor against. Dexmedetomidine provides a patient reduced need of analgesic and anaesthetic drugs in the preoperative and intra-operative period and also increase duration of action of local anaesthetics. Looking towards the use of alpha-2-adrenergic receptor agoinst and local anaesthetics the study was designed with following objectives

1. To evaluate the efficacy of dexmedetomidine with and without bupivacaine as an epidural analgesia.
2. To evaluate the clinico-haemato-biochemical changes following the epidural administration of dexmedetomidine alone and in combination with bupivacaine.

The study was conducted on 12 healthy male buffalo calves, weighing between 50 to 70 kg. The animals were divided into two groups of six animals each. The animals of group 1 received dexmedetomidine (@ 5µg/kg body wt.) in sacrococcygeal space, while animals of group 2 received bupivacaine (@ 0.15mg/kg. body wt.) and dexmedetomidine (@ 5 µg/kg body wt.) simultaneously in the sacrococcygeal space. The clinico-physiological and haemato-biochemical changes were recorded at different time intervals in both treatments. The animals of treatment 2 showed quick onset and longer duration and good depth as compared to animals of treatment 1. The recovery was smooth in both groups. Rectal temperature showed significant decrease, heart rate showed nonsignificant decrease while respiration rate showed nonsignificant changes in treatment 1 and significant decrease in treatment 2. Haematological examination showed nonsignificant changes. Biochemical examination showed significant increase in blood glucose, alanine aminotraminase, aspartate amino transaminase, blood urea nitrogen and serum creatinine while nonsignificant changes in total protein and alkaline phosphatase. All haemato-biochemical changes were transient and compensatory. On the basis of above study, it was concluded that for restraining and short surgical procedures dexmedetomidine alone can be used whereas, dexmedetomidine in combination with bupivacaine can be used for major surgical procedures.

STUDIES ON ADVANCED DIAGNOSTIC MODALITIES FOR HEPATOBILIARY SYSTEM IN CAPTIVE FELIDS

Dr. V.P. Chandrapuria (Advisor)

Somil Rai (Researcher)

ABSTRACT

The study was conducted to standardize and compare the Doppler ultrasonography especially the biometric features of hepato biliary system in captive/ free ranging felids: tigers (*Panthera tigris*), leopard (*Panthera pardus*) and lion (*Panthera leo persica*). Secondly, to correlate haematobichemical findings with Doppler ultrasonographic features. The work has been performed in eighteen wild felids comprising six in each group of tiger, leopards and lion at National Parks of Madhya Pradesh. All the animals of present study were subjected to clinical investigation including anamnesis, haemato-biochemical and Doppler ultrasonography of hepato biliary system and were performed either in squeeze cage or general aneasthesia.

Sixteen felids were captive (aged 5 to 27.6 years) and two free ranging (adult and sub adult). There were 12 males and 6 females with body weight ranged from 42 to 162 kg. The mean values of the rectal temperature, pulse rate and respiratory rate recorded were within the normal range and no variation were observed between the groups.

In haematological estimation the mean values of total erythrocyte count, total leucocyte count, differential leucocyte count and haemoglobin were found non significant in between the groups. However, mean values of reticulocyte count (%) were 16.33±1.45, 22.33±1.09 and 21.50±1.89 and packed cell volume (%) 33.20±0.40, 38.80±1.27 and 34.92±0.86 were recorded in tiger, leopard and lion respectively with significant variation in ($p<0.05$) between the groups. The changes recorded in the values of biochemical parameters, alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, total protein and serum albumin were transient and non significant in all the three species of the present study.

The mean values of liver size (cm) in Doppler ultrasonographic biometry were 12.97±0.25 in tigers, 10.54±0.24 leopard and 12.00±0.44 lions. While the length and widths (cm) of gall bladder were 3.64±0.23, 2.38±0.32 and 3.49±0.15 and 4.42±0.26, 3.16±0.42 and 5.04±0.19 respectively in tiger, leopard and lion. A significant variation ($p<0.05$) was recorded in liver size and gall bladder in between the groups. The wall of the gall bladder was seen as a fine clear echogenic line and recorded to be 0.42±0.05, 0.56±0.04 and 0.60±0.03 (cm) in tigers, leopard and lion respectively. The mean values of Portal vein diameter were measured as 1.13±0.03, 0.79±0.02 and 0.96±0.05 (cm) in tigers, leopard and lion respectively. The values showed a significant variation in between the groups for gall bladder wall thickness as well as in portal vein diameter.

The hepatobiliary biometric features were found significantly higher in tigers in comparison to leopard and lions. The procedure can be better performed under general anaesthesia and images were found better in lions followed by tiger and leopards. The study revealed Color Doppler imaging to be a valuable technique for measuring hepatobiliary biometric features and for advanced diagnosis of pathological lesions in felids.

EFFICACY OF BONE SUBSTITUTES FOR FRACTURE HEALING IN GOATS

Dr. M.K. Bhargava **Dharmendra Kumar**
(Advisor) **(Researcher)**

ABSTRACT

During the study period total of 23997 cases were registered. Among this, 198 cases were of fracture in different species of animals, which accounts an incidence of 0.82 percent. Highest incidence of fracture was recorded in caprine (45.45), followed by canine (34.84). Higher incidence was observed in male goats (68.89%) between 6 months to 1 year (40%) of age. Involvement of different bone was studied and it was found that highest incidence of fracture was observed in metacarpal 31(34.44%), followed by metatarsal (23.33).

Twenty four goats having fracture were divided into four groups, each group consisting of 6 animals. The fracture of group I were immobilized by internal fixation alone, group II: Internal fixation + Bone marrow mesenchymal stem cells (BMMSCs), group III: Internal fixation + β-tricalcium phosphate (β-TCP) scaffold and group IV: Internal fixation + BMMSCs in β-TCP scaffold. Temperature, pulse and respiration were recorded pre-operatively and at 30 minutes, 24 and 48 hour after surgery and they fluctuated within normal range.

Exudation and pain decreased gradually in all groups with no pain and exudation on 7thpost-operative day in all groups except in control group, where it was found till 15th post-operative day. Complete weight bearing was observed on 30th day in all three groups except group I.

Radiographic evaluation revealed no callus in any of the group till 7th post- operative day, while slight periosteal reaction was observed in group II, III and IV on 15th post- operative day. On 30th post-operative day maximum callus was observed in group IV, followed by group III and II. Extensive callus was observed on 45th day in group IV, followed by group II and III, while least callus was seen in group I.

A non-significant decrease in total erythrocyte count, PCV, haemoglobin and lymphocyte was observed on 7th post-operative day, in all groups and values fluctuated within normal range.

Alkaline phosphatase level showed an increasing trend till 15th post-operative day in all groups, followed by gradual decrease till 45th post-operative day, in groups II, III and IV. Creatinine kinase showed a significant decrease on 7th day in all groups. Level of serum calcium decreased till 45th day in all groups, followed by increase till the end of observation period. Serum phosphorous revealed a decreasing trend in all groups till 90th post operative day. Slight decrease in total protein was observed on 7th post-operative day and then it increased gradually in all groups. Decrease in blood glucose was also observed on 7th post-operative day and thereafter, it fluctuated within normal range.

Thus on the basis of above findings it was concluded that, combination of bone marrow mesenchymal stem cells and β-tricalcium phosphate is good bone substitute, to accelerate fracture healing, followed by bone marrow mesenchymal stem cells and β-tricalcium phosphate alone respectively, which were equally good as bone substitutes for fracture healing.

ADVANCED DIAGNOSTIC MODALITIES AND SURGICAL MANAGEMENT OF UPPER GASTRO INTESTINAL TRACT DISORDERS IN DOGS

Dr. V.P. Chandrapuria (Advisor)

Sharath Chandra .D (Researcher)

ABSTRACT

The present study was conducted on 12 adult dogs, irrespective of sex and breed having clinical symptoms of gastro intestinal disturbances. In all the dogs clinical, hematological, gastric lavage and fecal examination were carried out. Each animal was subjected to plain radiography, ultrasonography and gastroscopy under general anesthesia. Among the 12 dogs, 9 were male and 3 females. The age of animal ranged from 1-8 years and body weight between 11-48.5 kg. In all the dogs anorexia, vomition, diarrhea, dehydration and weight loss were the common clinical findings. In the present study, the value of rectal temperature (^{0}F), pulse rate (/min) and respiration rate (/min) ranged from 100.6-102.1, 82-88, 22-26 respectively. The total erythrocyte count ranged from 2.73 – 7.11 (10^6/µl), total leukocyte count 9.72–53 (10^3/µl), differential leukocyte count (neutrophils 64-90 %, lymphocytes 01-29 %, eosinophills 0-1 % and monocytes 02-9 %), hemoglobin 6.5-14.9 (g/dl), packed cell volume (PCV) 19-41 (%) and blood pH between 5.09-6.7. The pH of gastric lavage ranged from 1.3-7.3. The pH of blood and gastric lavage were acidic in all the dogs, expect in one case where gastric lavage was found to be alkaline. In the gastric lavage cytological examination revealed 6 cases of degenerative cells, 4 cases of inflammatory cells and 2 cases of cytoplasmic vacuoles and mucosal epithelial cells with bacteria. Fecal examinations of all the dogs were found to be negative for benzidine test. Radio-imaging studies, revealed gastric erosion and ulceration with or without petechial hemorrhages in 11 cases. The gastric inflammation that is esophagitis and gastritis were noticed in 2 cases each. Polyp was noticed on the mucosal wall of thoracic part of the esophagus in 1 case, whereas in another case an unidentified growth was noticed on the mucosal layer of the stomach. Gastric foreign body (bandage roll) was a feature noticed in a case which was causing physical obstruction, and it was gastroscopically retrieved without any surgical intervention. None of the animal showed any complication in radio diagnostic imaging or therapeutic procedure. In the present study it was found that the gastroscopic evaluation was the ideal diagnostic non-invasive modality for diagnosis of the pathological lesions of the upper gastro intestinal tract disorders in dogs followed by ultrasonography and radiography. The accurate diagnosis was possible by co-relating clinical observation, hematological estimation with radiography, ultrasonography and gastroscopic.

BURDIZZO VERSUS PINHOLE CASTRATION IN BUCKS AND CATTLE CALVES

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(Advisor) **(Researcher)**

ABSTRACT

Castration is the most common surgical procedure in animals. Various non-invasive, minimally invasive and invasive methods have been evaluated to castrate the ruminants. Each techniques has its own merits and demerits. Recently, many developments have taken place to simplify the technique and to perform ethical and comparatively less painful procedure. Presently, Burdizzo's method is widely accepted to castrate the ruminants, which require skill, equipments and considered as painful and inhumane procedure. Therefore, the study was designed to evaluate the minimally invasive Pinhole technique and to compare it with the conventional Burdizzo's method in bucks and cattle calves. The study included, 12 apparently healthy bucks aged 3-6 months and 12 cattle calves aged 6 months to 1 year divided equally in two groups, subjected to Burdizzo's (group IA and IIA) and Pinhole castration (group IB and IIB).

Clinical observation, evaluation and haematological examination were conducted at precastration period and found clinically normal. Mean rectal temperature, heart rate and respiration rate showed transient changes and remained within normal range after 30 minutes of castration in both the species. Mean haemoglobin, TLC and DLC were also within the normal range at different time intervals. Significant increase ($p<0.05$) in TLC at 7th post castration day was observed in both the species, while significant increase ($p<0.05$) in monocytes was depicted in calves on 30th day. There was significant decrease ($p<0.05$) in scrotal circumference on 30th day after castration. The mean testicular volume reduced to 37.04% and 39.01% in bucks and 44.56% and 42.18% in calves castrated by Burdizzo and Pinhole methods respectively.

Ultrasonographically, precastration echotexture of testicle was homogenous, granular, with a thin hyperechoic capsule and linear hyperechoic mediastinum testis. On 30th day after castration, testicular atrophy, less echogenic parenchyma with microliths were depicted in both the species, but pronounced in Pinhole castrated animals.

On 30th day, histological study revealed atrophy of seminiferous tubules with desquamation and obliteration of the lumen by cell debris. There was no evidence of any viable cell. However, in Pinhole castrated testicle, vacuolations at the basal part of the seminiferous tubules with more intertubular collagen bundles were observed in both the species.

Complications recorded were unilateral failure of castration in one buck castrated by Burdizzo's method, while in other buck castrated by Pinhole technique, the ultrasonogram showed unilateral hydrocele with degenerative changes in testicular parenchyma.

On the basis of physical measurements, ultrasonographic and histological findings, it can be concluded that the Pinhole technique was more satisfactory and superior in both the species.

SURGICAL MANAGEMENT OF URINARY RETENTION IN BUCKS

Dr. Apra Shahi **Sandeep Shukla**
(Advisor) **(Researcher)**

ABSTRACT

Urine retention and obstruction is the second major cause of death in castrated and intact rams and bucks after respiratory diseases. In this context present study are undertaken to determine the incidence of urinary retention in bucks and to compare efficacy of different urinary catheters to relieve urinary retention. From August 2015 to April 2016 total 7,483 cases of goats were registered at TVCC and District Veterinary hospital Omti. Out of these 62 cases were showing sign of dribbling of urine and urinary retention based on history and clinical signs, in which, most of the goats responded to medicinal treatment. In 17 bucks complete anuria was diagnosed out of which 5 animals having cystorrhaxis and was excluded from the study on the basis of ultrasonographic examination. Rest of 12 animals were randomly divided into three equal groups each group consisting of four animals. The urinary retention in all three groups was surgically treated with tube cystostomy, by using different type of catheters. Foley's catheter was used in group I while ultrasound guided Supracath and pigtail catheter was used in group II and III respectively.

The common clinical signs recorded in bucks were dribbling of urine or anuria, dullness, depression, inappetance to anorexia, reluctant both hind leg starched backward and lateral, getting up and lying down and frequently attempt to urination etc. Maximum numbers of cases were recorded in the age group of 0-6 months (58.06 per cent) and higher incidence (66.13 %) was recorded in winter season. Most of the cases had complete urinary obstruction with majority of cases (91.93%) having intact urinary bladder and in 8.07 per cent cases. However breed wise incidence was observed in maximum Totapari (42.02%) followed by non-descript (32.25%). Overall incidence of urinary retention was found to be 0.83 per cent.

Haemoglobin, total leukocyte count, differential leukocyte count, blood urea nitrogen and creatinine values fluctuated within normal range on day 0 and 10th post-operatively. Macroscopic urine examination showed significantly variation in pH and on microscopic examination, different types of cast and crystals were found in urine, at day 0 pre-operatively.

The complication encountered in the present study includes blockage of the catheters, rupture of balloon of Foley's catheter inflammation due to stagnant contrast at site of obstruction, rupture of urethra followed by seepage of contrast agent into subcutaneous area, causing cellulitis, abscessation and urine accumulation into the scrotal sac. It was concluded that urinary retention was more in those animals which were habituated on concentrate ration. In group II and III Supracath and pigtail catheter were passed under ultrasound guidance. This took less time and reduced the risk of anaesthesia and surgery. Therefore, Ultrasound guided Supracath and Pigtail catheter was found superior than Foley's catheter. However Pigtail is better than Supracath. The only limitation was cost of catheters.

SURGICAL AND THERAPEUTIC MANAGEMENT OF HOOF LESIONS IN GOATS

Dr. Apra Shahi (Advisor)

Chakresh Thakur (Researcher)

ABSTRACT

Hoof diseases are major cause of lameness in goats. Sheep and goat are predisposed to lameness by a number of factors. Most lameness arises from disease and lesions of hooves viz. punctured sole, cracked hoof, sole wear, sole ulcer, white line abscess, solar hemorrhages, fissured hoof and foot rot. In India a lot of work has been done on hoof disorders in cattle however, due importance has not been given to goats. Keeping these facts in mind present study was planned to study the incidence of various hoof affections in goats and to evaluate the response of neem (*Azadirachta indica*) and custard apple *(Annona squamosa)* leaves on healing of hoof lesions.

Screening of 714 animals was done for identification and characterization of the various lesions of hoof. Out of 714 goats, total 112 animals showed various kind of hoof affection which accounted for 15.68%. Out of 112 cases 24 goats suffering from traumatic wound were selected for present study, which were randomly divided into three equal groups of 8 animals each. Each group was subdivided into sub group A and B consists of 4 goats each. In group IA and IB, antiseptic dressing of hoof lesions was done by zinc sulphate ointment without and with antibiotic (streptopenicilline), respectively. In group IIA and IIB fine paste of fresh Neem leaves (*Azadirachta indica*) was applied without and with antibiotic, respectively. In group IIIA and IIIB fine paste of fresh Custard apple leaves (*Annona squamosa*) was applied without and with antibiotic, respectively. Wound area (mm^2), per cent wound healing was estimated and wound scoring was done on day 0 and subsequently on 5th, 10th, 15th and 20th day post treatment.

Out of 714 animals, 112 (15,68%) were found to have various hoof affections. Maximum incidence was recorded for hoof overgrowth i.e. 06.44%. Age group of 4-6 years was fond maximally (58.04%) affected. 59.82% hoof affections were recorded in fore limbs followed by hind limbs (30.35%) and both the limbs (9.82%). Male animals were more prone to hoof affections (19.26 %) than to female animals (37 %). Maximum incidence was in Jamnapari breed (43.75%) followed by Non-descript (31.25%) Barbari (13.39%) and Siroshi (11.60%).It was maximum in those animals which were kept in intensive housing system (46.43%),open (28.57%)and semi-intensive housing system(25.00%).In pakka floor (62.50%) and kachha floor (37.50%).It was maximum in high concentrate diet (43.75%) schedule followed by green leaves (33.92%) and concentrate along with green leaves(22.33%). Mild lameness was (46.43) followed by moderate (30.36%) and severe lameness (23.21%).

In group IIB maximum healing per cent and minimum wound area and wound score were observed at 20th post treatment day followed by group IB and IIIB. However, complete healing was not observed in any treatment group at day 20th which was observed on 45th to 58th post treatment day in different groups.

It was concluded that Neem leaves (*Azadirachta indica*) with antibiotic was better than zinc ointment with antibiotic. However, wound healing properties of Custard apple leaves (*Annona squamosa*) were not as good as Neem or zinc ointment treated animals.

SURGICAL MANAGEMENT OF CORNEAL ULCER IN DOGS

Dr. Apra Shahi
(Advisor)

Priyanka Pandey
(Researcher)

ABSTRACT

Corneal ulceration or ulcerative keratitis, is one of the most common extra ocular diseases identified in dogs. A lot of work has been done on cataract in dogs with and without intra ocular lens (IOL) implantation in India as well as in M.P. However, there is lack of detailed study on corneal ulcer.

Therefore, looking to the high incidence of corneal ulcer in dogs, the present study was designed to determine the incidence of various eye affections in dogs and to evaluate the response of therapeutic procedures on corneal ulcer.

Overall incidence of eye affections was recorded as 1.39% out of which 0.18 % cases were of corneal ulcer. Highest incidence (38.62%) of various eye affections was recorded in non descript dogs. Age group 6-10 years was found maximally (47.54%) affected with various eye affections. Male animals were found to have highest incidence (70.49%) of various eye affections.

Schirmer tear test, ophthalmoscopic examination, fluorescein dye test, ultrasonographic examination and microbiological examination were performed before starting the treatment. Total 12 dogs suffering with moderate and severe corneal ulcer were selected for the present study. These 12 dogs were randomly divided in to two groups each consisting of six animals. Non-descript (58.33%) male (66.66%) animals of age group of 6-10 year (66.67%) were found maximally affected with corneal ulcer. Group I and II were treated surgically by temporary tarsorrhaphy technique and third eyelid flap surgery respectively along with pre and post treatment medication.

Haemoglobin, total leukocyte count, differential leukocyte count and blood glucose level were within normal range in all the dogs. In both the groups sutures were removed on 15th post operative day.

In both the groups size of corneal ulcer is markedly reduced in 83.33% dogs and in 16.67% dog corneal ulcer is completely healed on 15th post-operative day. However in group I (66.66%) and in group II (50%) dogs recovered without scar formation on 60th post-operative day. In group I lesser complications were observed as compared to group II. Instillation of eye drop was easier in group I as compare to group II. Based on the findings of present study, it was concluded that self trauma is the major cause of corneal ulcer mostly in non-descript breed of dogs. Temporary tarsorrhaphy technique was superior then the third eyelid flap technique. Combination of moxifloxacine and flurbiprofen was found better for the healing of corneal ulcer.

EVALUATION OF LASER THERAPY ON HEALING OF LACERATED WOUNDS OF TEAT IN GOATS

Dr. M.K. Bhargava **Mrignayni Rajput**
(Advisor) **(Researcher)**

ABSTRACT

The present study was done on 18 healthy adult goats, brought to the teaching veterinary clinical complex, Nanaji Deshmukh Veterinary Science University, Jabalpur, suffering from deep teat lacerations. These goats were randomly divided in to 3 groups, each group consisting of 6 goats. In goats of group I, daily dressing of wound + administration of antibiotics for 7 days and analgesic for 3 days was done along with intramammary infusion for 5 days. In group II goats, in addition to treatment as in group I, laser therapy was done for continuously six days, while in group III, same treatment as done for group II was used, except administration of analgesic on first day only. Complete history of the each case was recorded including age, sex, breed, involvement of area of laceration of teat, duration of laceration and production of the milk from the affected teat. Complete physical examination and haematological examination of all the animals was carried out prior to the surgery (day 0) and subsequently on 7th day post-operative day to ensure their physical status. These goats were subjected for various clinical examinations which were recorded on 1st, 3rd, 5th and 7th day post-operatively, all the three groups.

Milk production showed non significant increase in all the three groups, however comparison between groups showed significantly more milk in group II, as compared to group I and III. Laser treated wounds showed less inflammation, exudation and embedding of sutures with clinically no scar at wound site, after healing as compared to control group of goats.

Non significant increase was observed in total erythrocyte count, total leukocyte count and hemoglobin in all 3 groups ,however total leukocyte count showed non significant increase in group I, while in group II and group III significant increase was observed. Lymphocyte, monocyte, easinophil and basophil count showed non significant decrease in control group and non significant increase in laser treated groups, whereas, neutrophil count showed non significant increase in control group and non significant decrease in LLLT treated groups of goats. Estimation of biochemical parameters showed non-significant increase in total protein and significant increase in albumin, significant decrease in globulin and non significant decrease in plasma fibrinogen in laser treated groups.

On the basis of results obtained in the present study, it is concluded that, laser therapy along with local dressing of the wounds and parenteral administration of antibiotic and analgesic, is an effective modality for treatment of teat lacerations in goats.

EFFICACY OF LEVOBUPIVACAINE WITH AND WITHOUT FENTANYL CITRATE AS CAUDAL EPIDURAL ANALGESIA IN COW CALVES.

Dr. B.P. Shukla **Garvita Roonwal**
(Advisor) **(Researcher)**

ABSTRACT

One of the most commonly used regional anaesthetic technique in ruminants is epidural anaesthesia. Levobupivacaine is the pure S enantiomer of bupivacaine. Levobupivacaine has been found to be equally efficacious as bupivacaine, but with a superior pharmacokinetic profile with less cardio toxic and neuro toxic potential. So it was thought worthwhile to use levobupivacaine and fentanyl as epidural analgesia in cow calves with following objectives

1. To evaluate the efficacy of Levobupivacaine as an epidural analgesia, with and without Fentanyl Citrate.
2. To evaluate the clinico-haemato-biochemical changes.

The study was conducted on 12 healthy cow calves, weighing between 50 to 70 kg. The animals were divided into two groups of six animals each. The animals of group 1 received Levobupivacaine (@ 0.8mg/kg body wt.) in sacrococcygeal space, while animals of group 2 received Levobupivacaine (@ 0.8mg/kg. body wt.) and Fentanyl Citrate (@ 2 µg/kg body wt.) simultaneously in the sacrococcygeal space. The clinico-physiological and haemato-biochemical changes were recorded at different time intervals in both treatments. The animals of treatment 2 showed and longer duration and good depth as compared to animals of treatment 1. The recovery was smooth in both groups. Rectal temperature, respiration rate and heart rate showed non significant decrease in their values in both the groups. Haematological examination showed non significant changes in levels of Hb and PCV. Biochemical examination showed non significant increase in alanine amino traminase, aspartate amino transaminase, blood urea nitrogen and serum creatinine. All haemato-biochemical changes were transient and compensatory. On the basis of above study, it was concluded that for restraining and short surgical procedures Levobupivacaine alone can be used whereas, Levobupivacaine in combination with Fentanyl citrate can be used for major surgical procedures.

“COMPARATIVE EVALUATION OFSILVER NANOPARTICLE GEL WITH POVIDONE IODINEON INFECTED WOUND HEALING IN COW CALVES”

Dr. B.P. Shukla
(Advisor)

Yogendra Singh
(Researcher)

ABSTRACT

Silver nano particles have a potent anti-inflammatory, antimicrobial effect and can accelerate wound healing. Looking towards beneficial effect of this drug, the study was designed with following objectives

1. To compare the efficacy of Silver nano particle gel with Povidone-Iodine on infected wounds.
2. To observe the haemato-biochemical and histopathological changes during study.

The study was conducted on 12 cow calves with infected wounds, irrespective of sex and breed, divided into two groups having 6 cow calves each. The animals of group 1 were treated with silver nano particle gel and the animals of group 2 were treated with povidone iodine dressing for 7 consecutive days. Gross observation of wound, haemato-biochemical, histopathological changes, percentage of wound healing and re-epithelialization were recorded at different time interval in both the groups. As wound healing progressed the colour of wound was pink due to formation of granulation tissue and minute capillaries. Exudation, oedema and pus were not observed at wound site as healing completed. The non significant changes were observed in haemato biochemical parameters in both the groups. Histopathological studies revealed that there was marked re-epitheliazation and hyperplasia with considerable thickening of epidermis and large amount of collagen deposition in granulation tissue in group 1 as compared to group 2. The percentage of wound healing and re-epithelialization was significantly higher at different time interval in group 1 as compared to group 2. The study of gross observation, percentage of wound healing and re-epithelialization along with histopatathological findings clearly suggest that the group treated with silver nano particle gel showed better, faster healing of wound as compared to povidone iodine treated group. Therefore clinical use of silver nano particle gel can be advocated for wound dressing in cow calves.

STUDY ON XENOGENIC BIOLOGICAL SCAFFOLD FOR REPAIR OF INDUCED MUSCULAR DEFECT IN RABBITS

Dr.Apra Shahi **Pankaj Jain**
(Advisor) **(Researcher)**

ABSTRACT

Clinical need for strong and biocompatible biomaterials is always apparent. Currently available synthetic biomaterials are not free from complications. On the other hand biological materials may result in significant tissue reactions and graft rejection. Decellularization is the process by which these biomaterials can be made acellular and utilized without immunological reactions or graft rejection.

With these facts present study was planned to prepare and evaluate the decellularize buffalo diaphragm and to observe its efficacy for repair of induced muscular defects in rabbit after comparison with conventional polygalactin-910 and polypropylene composite mesh. In Phase I acellular buffalo diaphragm was prepared using 1 % sodium dodecylsulfate (SDS) as a detergent and stored at -20º C till use. Evaluation of buffalo diaphragm showed that 1% SDS was highly efficient in removal of cellularity without much alteration in architecture. Nuclei were found absent in H & E staining, Massons's Trichome and DAPI staining. DNA content was significantly ($P<0.01$) reduced from 952.20±25.41ng/µg to 51.11±1.72 ng/µg. Agarose gel electrophoresis showed no bands indicating absence of DNA in acellular scaffold.

In phase II 2 X 2 cm. full thickness muscular defect was created in all rabbits over left flank region after aseptic preparation of site and under general anaesthesia. For this animals were divided in two groups (n=12 each). In group I, defect was repaired by composite mesh by using 2/0 polygalactin -910 sutures. In group II defect was reconstructed with acellular buffalo diaphragm in the same pattern as in group I. Clinical evaluation revealed that rectal temperature increased significantly ($p<0.05$) up to two days post operatively in both the groups followed by significant decreases up to day 4. Mild to moderate swelling was recorded in both the groups up to 4th day post operatively. Later on significant decrease ($p<0.05$) was observed in of both the groups. Degree of exudation revealed significant decrease in exudation from day 1 (moderate) to day 4 (no exudation) in both the groups. Moderate warmth was recorded on day 1 in all animals of both the groups followed by significant decrease ($p<0.05$) up to day 4. In group I, moderate pain was recorded up to day 3, which reduced significantly up to day 6. Later on mild pain with non significant variation was observed up to day 14. Some animals showed mild pain up to day 90. However, in group II moderate pain was recorded up to day 2 followed by mild pain up to day 5. Later on pain was not recorded. Samples were collected surgically on day 15, 30, 60 and 90 post operatively from three animals of both the groups at each time interval.

Grossly in group I, maximum vascularity was seen up to day 15. There was marked contraction of granulation tissue covering the mesh. Mild to severe shrinkage in mesh was observed from day 30 to day 90. Peritonization, herniation and muscle layer development were not observed. Cosmetic appearance of skin was poor on day 90 in all the animals.In group II, increased vascularity was seen up to day 60. Scaffold was found completely covered with fibrous tissue on day 60 without any visible granulation. Moderate peritonization and muscle layer development was observed on day

90. Better cosmetic appearance on day 90 was observed. However, shrinkage and herniation were not observed up to day 90.

Significant ($p<0.05$) increase in quantitative score of intra-abdominal adhesions was recorded from day 15 to day 90 in group I. Qualitative scoring revealed filmy soft (day 15) to dense adhesion (day 90) in group I. Adhesions were not observed in group II at any time interval.

Microscopically acute inflammatory reaction, neovascularization and collagen infiltration followed the same pattern in both the groups with minor variations. Higher degree of mononuclear cell infiltration was observed in group II animals on day 15 which reduced up to day 30 along with mild degree of vascularization in both the groups. Myofibroblasts were seen in group II at this time period. Mature collagen fibers were predominantly present on day 60 in tissue samples from both the groups. On day 90, the tissue section contained masses of acellular mature collagen fibers.

The protocol for decellularization of buffalo diaphragm was standardized in present study with 1 per cent SDS after continuous agitation for 72 hours. The acellular diaphragmatic scaffold was well accepted without visible adverse reactions and rejection. Macroscopically group II was found better as complications like adhesion formation, suture dehiscence and shrinkage were not observed throughout the study period. Microscopically uniform granulation tissue observed in both the groups. Based on these findings, it can be concluded that xenogenic decellularized diaphragmatic scaffold has several advantages over composite mesh and can be used *in vivo*. HOD

MULTIMODAL ANALGESIA FOR VISCERAL PAIN MANAGEMENT IN CANINE

Dr. Shobha Jawre **Rahul Jamra**
(Advisor) **(Researcher)**

ABSTRACT

In recent years pain management in pets has been widely recognized as an important component in veterinary practice. Abdominal surgical procedures produces moderate to severe post-operative pain which last for 2-3 days. Multimodal analgesia should be applied for the management of such type of pain. Thus the present study was carried out on the 16 dogs of either sex which were referred for the major abdominal surgery. The comparative evaluation of analgesic drugs was conducted by using various clinical, haemato-biochemical and behavioural pain assessment.

These dogs were randomly divided into two groups, with 8 animals in each groups, further subdivided into two sub-groups having 4 animals in each .The group I was considered as tramadol group, divided in IA and IB on the basis of bupivacaine as incisional block and epidural administration along with I/M tramadol at different time interval .Whereas, in group II buprenorphine was replacing the tramadol.

Rectal temperature was decreased 30 minutes after complete recovery in the animals of both the groups. The heart rate, respiration rate and capillary refill time reduced from 30 minutes postoperatively. The Haemoglobin, PCV and Total erythrocyte count showed non-significant variation at different time intervals among the animals of both the groups. Non-significant decrease were noticed in total leucocyte count, neutrophil count, eosinophil count, basophil and monocyte count. Whereas lymphocyte count showed significant decrease ($p<0.05$) at 30 minute after complete recovery.

Plasma glucose value has shown significant increase ($p<0.05$) at 30 minute interval in the animals of both the groups. Non-significant changes were observed in the plasma protein level at different time intervals among the animals of same group however significant decrease ($p<0.05$) were noticed between the groups. Plasma creatinine was higher in subgroup-IB (buprenorphine) at 30 minute postoperatively. Plasma cortisol levels in subgroup-IA, IB and IIA were non-significantly increased then returns to the normal range but in subgroups-IIB (buprenorphine with epidural bupivacaine) there was significant decrease ($p<0.05$) at all the intervals between the groups.

The mean total pain score of postural parameters were significantly decreases ($p<0.05$) from 24 to 72 hour postoperatively in the animals of group I A (tramadol with incisional bupivacaine).

The mean score values for the vocalization , appetite, thirst and facial expressiondepicted significant increase($p<0.05$) at 30 minute after complete recovery from anaesthesia and up to 24 hour postoperatively in the animals of group IA and II A respectively

Mean score values of personality/ attitude and response against palpation showed non-significant variations at different intervals in the animals of both the groups.

Therefore on the basis of above findings it can be concluded that intramuscular administration of buprenorphine along with epidural administration of bupivacaine was found to be best analgesic for the control of visceral pain due to major abdominal surgeries in dogs.

EVALUATION OF INTRAMEDULLARY INTERLOCKING NAILING FOR LONG BONE FRACTURE IN GOATS

Dr. Randhir Singh **Deepak Singh**

(Advisor) **(Researcher)**

ABSTRACT

A total number of 12004 cases of different species were registered in Teaching Veterinary Clinical Complex, Jabalpur, during study period. Out of these 12004 cases, 153 animals were presented with the fracture in any of the limb. The incidence of fracture was found to be 1.27%. Canine was the most common (58.82%) species to have a fracture. The incidence of fracture was highest (60.00%) in animals of age below 9 months. Further, the male animals (53.34%) outnumbered female (46.66%) for fracture cases.

The tibia-fibula (36.66%) was the most common bone affected with fracture followed by metatarsal (23.33%) and radius–ulna (16.66%). Most of the fractures were oblique and transverse types and were located in midshaft of a bone. Hind limb was found more vulnerable for a fracture than fore limb. Fractures were more commonly recorded in left limbs (66.66%) of animal than the right limbs (33.34%). Automobile accident (50.00%) was found to be most common cause of a fracture.

Eight clinical cases of long bone fractures were included in the study, irrespective of age, sex and breed. Open reduction and internal fixation (ORIF) was performed in group I using dynamic intramedullary interlocking nailing and in group II using static intramedullary interlocking nailing (SIILN).

The mean value of temperature, respiration rate and heart rate decreased significantly at 24 hours post-operatively. Pain and exudation were observed to decrease significantly from 2nd day onwards to 15th day in both the groups. Total erythrocyte count, packed cell volume and haemoglobin were found to be slightly decreased at 2nd and 5th days post-operatively, but were within the physiological range. The mean total erythrocyte count was found to be slightly increased at 2nd post operative day and resumed to normal at 15th day. However, it was significantly higher than group I from 5th to 10th day post-operatively. The total leucocyte count was significantly higher at 2nd and 5th day post-operatively in both the groups. In both the groups, there was a gradual increase in alkaline phosphatase level and reached to maximum level on 30th day and then after a decrease was observed till 60th day. The level of creatinine kinase decreased significantly from day 0th today 60th in both the groups.

The mean radiographic score for fracture healing was significantly higher in group I than group II at 45th and 60th day. The mean radiographic score was observed significantly increased on 21st day onwards in both groups. The mean weight bearing score (while standing) was significantly higher in group II till 10th post -operative day. The mean weight bearing (while standing and walking) was observed significantly increased on 5th day onwards in group II and 15th day onwards in group I. The mean weight bearing (while running) was observed significantly higher on 2nd day onwards in group II and 30th day onwards in group I. On the basis of clinical, haemato-biochemical, radiographic examination and evaluation of weight bearing, it can be concluded that less callus formation and early weight bearing was observed in group II using SIILN.

EFFICACY OF LOW LEVEL LASERTHERAPY IN FRACTURE HEALING OFLONG BONES IN DOGS

Dr. Shobha Jawre **Dilip Singh**
(Advisor) **(Researcher)**

ABSTRACT

Fracture of long bones is most commonly observed in dogs and even after doing internal immobilization; it has lots of post operative complications. Looking to the importance of laser therapy in the treatment of fracture in laboratory animals the present study was undertaken with the following objective; to study the efficacy of low level laser therapy on fracture healing of long bones in dogs and comparative evaluation of laser therapy on the basis of clinical, radiographic and haemato-biochemical attributes.

The study was conducted on 18 dogs, aged between 1 to 8 years, brought to T.V.C.C, Jabalpur for the treatment of long bones fracture. These dogs were divided randomly into 3 groups, each consisting of 6 animals. The dogs were selected irrespective of their sex, breed and body weight. In group I all the fractures were immobilized by intra- medullary pinning. Whereas in group II along with intramedullary pinning, low level laser therapy (LLLT) was applied for 6 minutes, up to 7th post-operative days on one side of the fractured bone and in group III for 3 minutes each on both the side of the fractured bone up to 7th day post operatively. Post operative treatment was same in all the groups.

Rectal temperature, respiration rate and pulse rate decreases for short period in all the groups. In laser treated groups postoperative inflammation was less as compare to control group. The weight bearing score during standing, walking and running was significantly more in laser treated groups as compare to control group.

Radiographic score of laser treated group III and II dogs showed earlier fracture healing than without laser treated, group I dogs. In all the three groups, the total erythrocyte count showed non-significantdecrease .However, this count increased significantly in group III and non-significantly in group I and II. Whereas, hemoglobin concentration showed non-significant fluctuations in all the three groups. The packed cell volume decreased non-significantly in group II and III and significantly in group I .Total leucocyte count and neutrophil count showed non-significant increase followed by a significant decrease in all the three groups. Lymphocyte count showed non-significant decrease in all the groups of dogs. The eosinophil, basophil and monocyte count showed non-significant differences between the groups.

The mean values of enzyme serum alkaline phosphatase showed significant increase followed by significant decreasing trend in all the three groups of dogs. Total protein showed non-significant changes in dogs of group I whereas, significant increase was observed in group II and III. Serum calcium showed non-significant decrease at 48th day in group I whereas, 24th day in group II and III dogs .Non-significant decreasing trend in serum phosphorous was observed in all the three groups and comparison between all the three groups revealed non-significant difference between them.

Therefore on the basis of above findings it can be concluded that fracture healing was more in laser treated groups II and III as compared to group I which was subjected to Intramedullary pin alone without laser therapy.

NONINVASIVE THERAPEUTIC ULTRASOUND STERILIZATION IN MALE DOGS

Dr. V.P. Chandrapuria **Brijesh Kumar Singh**
(Advisor) **(Researcher)**

ABSTRACT

The present study was undertaken with the objectives to establish a noninvasive therapeutic ultrasound procedure for sterilization in male dogs and evaluation of its clinical efficacy for sterilization by clinical, hematological, hormonal Assay-Testosterone and histological examination.

The study was conducted on 18 apparently healthy male dogs, divided into three equal groups. Animals of group I (n=6) subjected to castration by conventional surgical procedure, whereas animals of group II and III (n=6 each) were subjected to therapeutic ultrasound treatment over testicles with 1 and 3 MHz transducer respectively for 5 minutes and five applications on zero ,2nd ,4th ,6th and 8th days intervals.

All the animals were adult and presented for elective sterilization for various reasons. In all the animals, clinical observation, rectal temperature, pulse rate, respiration rate were evaluated and morphology of testes were measured at 0, 10 and 20th day post-treatment. Hormonal assay (testosterone ng/dl) was estimated on day 0, 20, 40th and histological examination was carried out on day 0, 10, 20 and 40th post-treatment was also performed.

Rectal temperature, pulse rate and respiration rate showed transient and non significant changes in all the groups at different intervals.

Slight homogenous tenderness was observed on day 20 in group III only. The mean values of testicular measurements (scrotal circumference cm²) in group II differed significantly from group I at day 0. However, no changes were observed in between intervals.

With respect to hematological estimation the mean value of total leucocytes and nutriophils were within the normal range in all the group at different intervals. Transient changes were observed in hemoglobin, eosinophils lymphocyte and monocytes count within the groups.

The values of testosterone showed highly significant difference in between mean values of day 0, when compared with values at day 20 and 40 in group I ($p>0.05$). The testosterone value differed significantly in animals of group I when compared to animals of group II and III at day 20 and 40.

The values of testosterone (ng/dl) showed declining trends in all the three groups at intervals of day 20 and 40. However, this decrease was significantly lower in group I as compare to group II and III. However, no significant difference among hormonal level in groups II and III was observed. On day 20 and 40 the hormonal level in Group I was significantly lower as compared to those in Groups II and III. However, the hormonal levels in Groups II and III were at par and do not differ from each other on day 40.

Histological examination revealed depletion of testicular elements and spermatogonial cells with presence of dead spermatozoa in the center portion of the seminiferous tubuls. However, abundant increased connective tissue was more seen in group III when compared to group II.

EVALUATION OF DIFFERENT THERAPEUTIC REGIMENS FOR TREATMENT OF GINGIVAL RECESSION AND FURCATION DEFECTS IN DOGS

Dr. Apra Shahi
(Advisor)

Kalpana Jaiswal
(Researcher)

ABSTRACT

Periodontitis is a severe disease of dogs and looking to the severity of the disease the present study was designed with the following objectives; to determine the incidence of periodontal diseases in dogs and to evaluate the efficacy of bone substitute (β tricalcium phosphate and hydroxyapatite) and osteoinductive platelet rich plasma (PRP) alone and in combination for gingival recession and furcation defect.

During the period of study oral cavity examination of 67 dogs, irrespective of sex and breed brought to the TVCC was done to record the incidence of periodontal disease in dogs which was 0.47%. Incidence of periodontal disease was highest in Pomeranian/Spitz/Samoyed breeds 35.82%. Age group 4-7 years was found maximally affected (38.80%) by periodontal disease. Periodontal disease was found more in male dogs (65.67%) than female dogs (34.33%). Periodontal disease was found more among dogs fed on home made food alone (77.61%). Gingivitis and dental tartar was found in all the 67 dogs, while 25.37% dogs were affected by gingival recession, 14.92% by gingival hyperplasia, 11.94% by furcation defect, 7.46% by chronic mouth ulcers with drooling of saliva, 10.45% by gingival tumor and 1.49% by Wound on lip.

Rectal temperature (°F), heart rate(beat/min), and respiration rate (breath/min) fluctuated within the normal physiological limit in all the groups at different time intervals. Haematological parameters were fluctuated within normal physiological limit in all the groups. Probe depth was observed (6.00±0.41), (6.75±0.25), (6.50±0.29) and (6.75±0.48) mm in group I, II, III and IV respectively at 0 day, which reduced significantly on day 5 in all the groups and recorded (2.50±0.50), (1.50±0.29), (2.25±0.48) and (1.00±0.00) mm in group I, II, III and IV respectively at day 60. Although healing in gingival recession was not complete but group IV showed slight improvement, followed by group II and Group I and III showed similar results.

Significant reduction in furcation area was found at day 20 in group I and II, at day 30 in group III and at day 10 in group IV. Furcation was absent on day 60 in group II and on day 30 in group IV. At day 60 marked improvements in periodontal disease were found in group IV and II, followed by III and I. Marked healing was found on dental x- ray of animals in group IV on day 15, followed by group II (on day 20), group 3 (on day 30). In group 1 healing was less than remaining groups even after day 30 postoperative.

On the basis of periodontal probing depth, gingival recession, furcation defect score and dental x ray, early healing was observed in group IV followed by group II and in group I and III healing was observed after 30 days.

DECELLULAR BUBALINE DIAPHRAGMATIC SCAFFOLD FOR REPAIR OF ORAL DEFECTS IN DOG

Dr. Apra Shahi **Jyoti Navade**
(Advisor) **(Researcher)**

ABSTRACT

In dogs oral defects are very common. In dog mostly oronasal fistula develops secondary to extraction of maxillary canine teeth and upper 4th premolar teeth. Closure of these defects is very difficult because of limited mucoperiostium availability in the oral cavity, continuous irritation due to saliva and mobility. Looking to this the present study was designed with the following objectives; to standardize the procedure for placement of xenogenic decellular bubaline diaphragmatic scaffold for oral defects in dogs and to compare xenogenic decellular bubaline diaphragmatic scaffold with gingival flap for repair of oral defects in dogs.

During the study period oral cavity of 62 dogs brought to the T.V.C.C. Jabalpur were examined irrespective of age, sex and breed. In T.V.C.C. Jabalpur the incidence of periodontal diseases was recorded as 1.09%. Gingivitis and dental tartar were found in all dogs except with traumatic injury. Gingival hyperplasia 12.95%, gingival recession 19.35%, furcation 9.67%, tumorous growth 9.67%, oronasal fistula 4.83%, dental fistula 1.61%, chronic mouth ulcer 6.45%, epulis 1.61% and accidental injury 6.45% were recorded.

Study was conducted in two phases in phase I decellular bubaline diaphragmatic scaffold was prepared using 1% sodium dodecyl sulphate (SDS) as a detergent and stored at -20^0 C till use. In phase II out of these 62 cases 12 dogs suffering with oral defect were randomly divided into two equal groups comprising of 6 animals each. In group I repair of oral defect by autologus gingival advancement flap was done and in group II repair of oral defect by xenogenic decellular bubaline diaphragmatic scaffold was done.

The symptoms like foul smelling mucopurulent discharges, pyrexia, ulcerated gum, pus along the gum line, severe tartar deposit and mobile teeth or defect due to loss of teeth etc. were examined. Among these 12 cases maximum incidence of oral fistulous defect was observed in young animals of dog in 4-7 years age (41.66%). In study male dogs (66.66%) were found more prone for oral fistulous defect in comparison to female dogs (33.33%). the dogs maintained on pure vegetarian showed oral defects earlier than combined diet and non vegetarian dogs'

The periodontal probing depth was recorded from 3 mm to 9 mm the average size of oral defect was 5.0±0.73 mm - 5.5±0.88mm that was medium. The premolar oral defect was observed more followed by canine defect and ventral defect. In dogs different types of oral defect were observed most of the cases were of dentoalveolar pockets followed by oronasal fistula and ventral fistula**.**

Heart rate, respiration rate and capillary refill time was within normal physiological limit in both the groups. Haematological parameters were also fluctuated within normal physiological limit in both the groups.

For placement of scaffold three different procedures were performed among which placement of double scaffold with mucoperiosteal covering was found to be more successful. In value of degree of inflammation significant reduction was seen in group I and group II from day 0 to day 14 and on visual healing assessment from day 14 to day 90 normal pinkish mucous membrane at site of oral defect was observed which was suggestive of complete healing. Complication in group I was recurrence that was in 33.33% cases and in group II the complication was suture dehiscence in 16.66% casess. Success rate in group I was 66.66% and in group II was 83.33%.

On the basis of present study it was concluded that double scaffold placement with mucoperiosteal covering showed less recurrence rate as comparision to advancement flap technique. Decellular bubaline diaphragmatic scaffold can be used successfully in clinical cases of oral defect.

ACRYLIC VERSUS EPOXY CONNECTING BAR IN EXTERNAL FIXATOR FOR APPENDICULAR FRACTURE OF GOATS

Dr. Randhir Singh
(Advisor)

Sandeep Nagar
(Researcher)

ABSTRACT

This study was conducted on 10 goats, aged between 10 months to 5 years, brought to T.V.C.C, Jabalpur for the treatment of fracture in metacarpal, tibia and metatarsal. These goats were randomly divided into 2 groups, consisting of 5 animals each. The animals were selected irrespective of their age, sex, breed and body weight. In group I, external skeletal fixation using Acrylic as the connecting bar, where as in group II Epoxy was used as connecting bar. Fracture was more common in male animals (60.00%). Automobile accident was most common (90.00%) cause of fracture.

Rectal temperature decreased significantly in both groups postoperatively. Wound area at fracture site decreased significantly at 30th day in both the groups as compared to 0 day. Exudation was present significantly at 5th day in both the groups.

The mean haemoglobin concentration significantly increased at 15th day in both the groups as compared to 0 day. Total erythrocyte count markedly increased at 30th day in both the groups as compared to 0 day. In both groups, Neutrophil increased significantly at 7th day in comparison to 0 day and decreased at 30th day where as Lymphocyte decreased significantly at 7th day and increased at 30th day.

Alkaline phosphatase increased significantly in both groups at 30th day and decreased at 60th day, although serum calcium level significantly decreased at 30th day in both the groups. The level of serum phosphorus increased significantly at 15th day.

The mean radiographic score increased significantly at 30th day in both the groups and was highest at 60th day in both the groups.

In group I, weight bearing score (while standing) improved on 15th day as compared to group II. The mean weight bearing score (while walking) improved significantly on 15th day as compared to group II. The mean weight bearing score (while running) improved significantly on 15th day as compared to group II.

Therefore, on the basis of above findings, it was concluded that Acrylic and Epoxy has no impact on haemato-biochemical parameters during fracture repair, although weight bearing was good with Acrylic connecting bar as compared to Epoxy connecting bar. The Acrylic connecting bar was lighter in weight and having less hardening time.

EVALUATION OF HERBAL MEDICAMENTS FOR WOUND HEALING IN DOGS

Dr. Randhir Singh **Neha Sharma**
(Advisor) **(Researcher)**

ABSTRACT

A wound is defined as the disruption of the cellular and anatomic continuity of a tissue and may occur due to physical, chemical, thermal, microbial, or immunological tissue trauma. The study was conducted on 24 dogs, irrespective of sex, breed and aged between 1 to 8 years. The animals were randomly divided in to four groups. In group I, animals were treated with standard dressing material Povidone iodine (5.0%). In animals of group II, III, IV herbal ointments of Marigold leaves extract, Guava leaves extract and mixture of both Marigold and Guava leaves extracts respectively were used for dressings of wounds for 7 consecutive days.

Degree of exudation and degree of inflammation were recorded on day 0, 7, 14, 21 and 28. Haemato-biochemical, histological and wound healing parameters were recorded on day 0, 3, 7 and 14.

Phytochemical tests were performed and ointments were prepared at Department of Veterinary Pharmacology & Toxicology, Jabalpur. Phytochemical tests were found positive for phenol, sterol, tannins, glycosides, alkaloids and flavanoids in Marigold leaves hydroalcoholic extract. The hydroalcoholic extract of Guava leaves was positive for phenol, sterol, tannins, glycosides and flavanoids in phytochemical tests.

The incidence of wounds in animals at TVCC was found to be 2.42% in all animals. Among these 24 dogs, wounds were recorded higher in 3 to 5 years of age group. The wounds were found to be more common in male animals (66.66%) than female (33.33%) animals**.** The wounds were found to be more common in non-descript dogs (62.5%) followed by Spitz (25.0%), German shepherd (8.33%) and St. Bernard (4.16%).

The mean values of degree of inflammation and degree of exudation were significantly decreased up to day 14 in group IV. In groups II, III and IV mean values of neutrophils per cent significantly decreased on day 7 onwards. In group IV, marked re-epithelialization and moderate inflammatory cells, neovascularization and thicker but scattered collagen fibrils were seen on day 7 and mature collagen fibers were observed with least number of inflammatory cells on day 14 as compared to other three groups. Percentage of wound healing and wound re-epithelialization were significantly higher in group IV at 14th day as compared to other three groups.

Therefore, it can be concluded that group IV (mixture of Marigold and Guava leaves hydroalcoholic extract) revealed better wound healing properties as compared to group I (Povidone iodine 5.0%), group II (Marigold leaves hydroalcoholic extract) and group III (Guava leaves hydroalcoholic extract).

ENDOSCOPIC EVALUATION OF GASTRIC LESIONS AND ITS MANAGEMENT IN DOG

Dr. Shobha Jawre (Advisor)

Dr. Rajay Verma (Researcher)

ABSTRACT

Endoscopy is a non invasive, atraumatic and sensitive tool for detection of morphologic alteration in the gastrointestinal tract. It allows descriptive and photographic documentation of findings and an effective minimally invasive approach for its correction.

Present study was designed to diagnose the canine gastric lesions with gastroscopy on the basis of clinical examination, hematological estimation and histopathological examination and to evaluate interventional gastroscopy for various gastric lesions.

In the study 14 dogs suspected for various upper gastro intestinal tract affections aged above 6 months irrespective of sex and breed brought to TVCC were selected for the present study. Gastroscopic examination was done on day 0 and 10. Clinical symptoms, laboratory examination and gastroscopic findings *i.e.* inflammation, hemorrhage, erosions and ulcerations were correlated and appropriate interventional gastroscopic procedures *i.e.* foreign body retrieval, gastroscopic biopsy and endoscopic haemostasis were performed and therapeutic regimen was followed. Efficacy of procedures was assessed with follow up gastroscopy on day 10.

During the study clinical parameters like rectal temperature, pulse rate and respiration rate revealed non-significant changes. Hematological parameters *i.e.* Hb, TLC count, neutrophil, lymphocyte and monocyte per cent were fluctuated nonsignificantly. However packed cell volume (PCV) was decreased and eosinophil per cent was increased significantly ($p<0.05$). All of them were within normal range. The study suggests that foreign body ingestion is common in young male dogs of Labrador breed.

Cases were classified depending upon type, level and severity of gastric affections and their response to treatment. Intra luminal pathologies such as haemorrhage, erosion and ulceration were found in all cases. Foreign bodies were retrieved in 4 cases with instrumental support and tissue sample was taken with endoscopic biopsy forceps.

Therefore on the basis of present findings it can be concluded that ingestion of foreign body was common gastric affection followed by gastric erosion, ulceration, haemorrhage and chronic gastritis. Interventional gastroscopy is the most suitable and non-invasive technique for foreign body retrieval and gastric haemostasis as it effectively reduces time, cumulative expense and secondary complications.

XENOGENIC DECELLULAR DIAPHRAGMATIC SCAFFOLD FOR PERINEAL HERNIOPLASTY IN DOG

Dr. Apra Shahi
(Advisor)

Suwarna Agrawal
(Researcher)

ABSTRACT

Perineal hernia occurs commonly in middle aged or aging intact male dogs and rarely in females. Currently available synthetic biomaterials are not free from complications. On the other hand biological materials may result in significant reaction and rejection. With these fact present study was planned to standardize the procedure for placement of xenogenic decellular bubaline diaphragmatic scaffold for repair of perineal hernia in dogs and compare it with synthetic polygalactin and polypropylene composite mesh for repair of perineal hernia in dogs. During the study period 13568 cases were registered in TVCC from July 2017 to March 2018. Out of which 21 cases were diagnosed to be hernia. In these 21 cases only 12 cases showed the perineal hernia. Incidence of hernia in TVCC was 0.15% and Incidence of perineal hernia in TVCC was 0.09%.

In phase I decellular buffalo diaphragm was prepared using 1 % sodium dodecylsulphate (SDS) as a detergent and stored at -20° C till use. In phase II 12 dogs suffering with perineal hernia were randomly divided in to two equal groups. In of group I perineal hernioplasty was done with Synthetic polygalactin and polypropylene composite mesh while in group II, with decellular bubaline diaphragmatic scaffold (DBDS).

In group II three different techniques viz Onlay, Inlay and Sandwich methods were evaluated. In onlay and inlay method chance of recurrence and SSI (surgical site infection) was high as compare to sandwich method. Exudation and irritation was more in onlay method. Self mutilation was observed in onlay method. Mean surgical time was 59.17±14.04 and 57.50±6.15 minute in group I and II respectively. Rectal temperature within the normal range for all dogs. Swelling and redness was not seen on day 0 in both the groups which increased significantly ($p<0.05$) at day 3 in both the groups. Subsequently it reduced on day 7 and returned to normal level in both the groups. In group II significantly ($p<0.05$) increased exudation was observed on day 3. Finding of degree of warmth was same as degree of swelling and redness. Degree of pain after surgery was significantly ($P<0.05$) decrease on day 3 in both the groups. Neutrophils was significantly ($p<0.05$) increase day 7 in group I. In group II there was no significant difference within the group. Lymphocyte was significantly ($p<0.05$) decreased day 7 in group I. In group II there was no significant difference within the group was observed. Monocyte and eosinophils were non-significant ($p>0.05$) between and within the groups.

Colour Doppler ultrasonographic examination revealed no vascularization on 0 day in both the groups. Neovascularuzation was observed on day 30 in group I and day 14 in group II on Colour Doppler ultrasonographic examination. It was increase on day 90 in both the groups.

The complication encountered in the present study includes local seroma, suture dehiscence self mutilation, constipation, fistula formation. Due to these finding, it can be conclude that sandwich technique was found to be more suitable in comparison to onlay an inlay technique. DBDS is well accepted by all animals and showed less complication.

EVALUATION OF DIFFERENT BIOMATERIALS FOR FRACTURE HEALING IN DOGS

Dr. Shobha Jawre **Astha Chaurasia**
(Advisor) **(Researcher)**

ABSTRACT

This study was conducted on 12 dogs of either sex and age of 1 to 8 years having long bone fractures with variable amount of bone loss. Radiographic and haemato-biochemical examinations were conducted at different time interval to evaluate the animal before internal fixation and to monitor fracture healing. The animals were randomly divided into three groups for internal fixation of fracture using a titanium elastic pin in group I and along with internal fixation decellularised xenogenic cancellous bone graft (DXBG) and β-tri calcium phosphate (TCP) were placed at fracture site in group II and III respectively.

The incidence of the fracture in dogs at TVCC was found to be (0.99%). The fracture was noticed more common in 1-3 years of dogs in male animals (66.66%) than females. The most of the animals under study were non descript (58.33%). An automobile accident was most common (50%) cause of trauma. The rectal temperature, pulse rate and respiration rate revealed significant decrease ($p<0.05$) at 30 minutes interval. The mean inflammation score decreases significantly at 7th day in group II and III as compare to group I. The mean value of haemoglobin showed significant decrease ($p<0.05$) at 7th day in the animals of all the three group while , the mean TEC showed non-significant decrease on 7th day, followed by increase on 15th and 30th day, in group I and III and non-significant increase on 30th day in group II. The mean TLC decrease in all the three groups of dogs and the neutrophil count showed a gradual non-significant decreasing trend in animals of group II and III, while significant increase in animals of group I .Whereas, the lymphocyte count showed significant increase in all the groups of dogs. The changes in eosinophil, basophil and monocyte count was non-significant. The serum alkaline phosphate significantly ($p<0.05$) increase from 15th day onward in group II and III and non-significantly in group I. Serum calcium showed significant decrease at 15th day interval in group II and III and non-significant decrease in group I, however non-significant decrease in serum phosphorus was observed in group I and III while it was significant in group II.

The animals of group II showed significantly ($p<0.05$) more weight bearing as compare to group I and III. Fracture healing was observed in serial radiographs. The radiographic score improved significantly ($p<0.05$) on 15 day in group II and III as compare to group I, indicating the initiation of periosteal proliferation, which was further increased at 30th and 45th day, showing high density of endosteal and periosteal callus. Radiographic score of 60th post-operative day was significantly ($p<0.05$) more 6.23 ±0.12 in group II, followed by animals of group III and I. Therefore, it can be concluded that the internal fixation with the titanium pin along with the use of decellularised xenogeneic cancellous bone graft and β- tricalcium phosphate at fracture site promote fracture healing in clinical cases of dogs.

"COMPARATIVE EVALUATION OF PROPOLIS WITH POVIDONE IODINE ON INFECTED WOUND HEALING IN DOGS"

Dr. B. P. Shukla
(Advisor)

Kuldeep Gautam
(Researcher)

ABSTRACT

Propolis has a potent anti-inflammatory, antioxidant, antimicrobial activity, which can accelerate wound healing. Looking toward beneficial effect of this drug the study was designed with objectives, to evaluate the wound healing efficacy of ethanolic extract of propolis with povidone-iodine on infected wound healing and to observe haemato-biochemical and histopathological changes during wound healing.

The study was conducted on 12 dogs. The animals of group 1 were treated with 30% propolis ointment and the animals of group 2, treated with povidone iodine. The non-significant changes were observed in haemato-biochemical parameters in both the groups. Better findings in Gross observations of wound, histopathological changes, percentage of wound healing and re-epithelialization at different time intervals in group 1 as compared to group 2, might be because of various polyphenols and flavonoids present in propolis, propolis showed faster healing of wound. Therefore, clinically propolis can be advocated for faster wound healing in dogs.

REGENERATIVE THERAPY FOR MANAGEMENT OF CORNEAL ULCER IN DOGS

Dr. Apra Shahi **Apoorva Mishra**
(Advisor) **(Researcher)**

ABSTRACT

Corneal ulceration, or ulcerative keratitis, is one of the most common ocular diseases identified in dogs. In the view of recent advancements the present study was designed with the following objectives: to evaluate the use of platelet rich plasma (PRP) drop and leucocyte-platelet rich fibrin (L-PRF) clot as regenerative therapy for the corneal ulcer healing in dogs and to compare PRP drop and L-PRF clot with conventional medicinal therapy. During the study period 30 dogs with corneal ulcer were presented at TVCC which were divided into III groups irrespective of age, breed, sex, location and grade of ulcer. Group I was the control group where conventional treatment was given whereas in group II animals homologous Platelet Rich Plasma drops were instilled and in group III animals Leucocyte-Platelet Rich Fibrin clot was affixed to conjunctiva. Microbiological examination was also performed to access the antibacterial activity of Moxifloxacin, PRP drop and L-PRF clot.

The incidence of corneal ulcer was found to be 17.04% among all eye affections. Pugs were mostly affected among all breeds with incidence of 53.33%. Males (56.67%) showed higher incidence followed by females (43.33%). Dogs in the age group of 0-2 yrs (46.67%) suffered more. The incidence decreased with progression of age and was lowest in dogs above 10 years (10%). Out of all affected eyes majority of the corneal ulcers were located in axial (40.00%) followed by perlimbal (23.33%), paraxial (16.67%) inferior nasal (13.33%) and inferior temporal (6.67%) positions. The average Shimmer Tear Test (STT) value was recorded as 22.13 ± 0.50 on day zero indicating increased lacrimation in corneal ulcer. Post treatment there was significant reduction in STT values from 21.10 ± 0.87 to 16.90 ± 0.38 in group1, from 21.80 ± 0.61 to 17.30 ± 0.37 in group2 and from 23.50 ± 0.98 to 18.20 ± 0.42 in group3. In all the groups STT value returned to normal on day 30.

Zone of inhibition showing antimicrobial activity of Moxifloxacin, PRP and L-PRF was significantly larger ($p<0.05$) for gram positive organism compared to gram negative and mixed culture. When compared with Moxifloxacin both PRP and L-PRF showed significantly larger ($p<0.05$) zone of inhibition against mixed and Gram negative organism. Similarly, minimum inhibitory concentration was lower for PRP compared to Moxifloxacin. Opthalmoscopic and Ultrasonographic examination were performed for grading of corneal ulcer, corneal vascularisation and corneal opacity. Corneal opacity, corneal vascularisation, size and depth of ulcer reduced earlier in group3 followed by group2 and thereafter group I animals. Hence, rate of healing was significantly earlier ($p<0.05$) in group III (8.40 ± 0.83 days) followed by group II (28.50 ± 5.53 days) and was most delayed in group 1 animals (41.00 ± 4.00 days).

Grade III ulcers with descemetocele or iris prolapse showed no healing and consecutive loss of vision in group I and group II animals whereas animals of group3 showed healing on 7th postoperative day with no loss of vision. Therefore, it was concluded that platelet concentrates are safe and can be easily prepared in laboratory and regenerative therapy for corneal ulcer healing was evaluated to be better in reducing inflammatory signs and eye pain than conventional therapy with exceptional results of sealing descemetocele by affixing L-PRF clot in the defect. Moreover, earlier healing with PRP and L-PRF is also attributed to remarkable antimicrobial activity against Gram positive, Gram negative and mixed bacterial infections.

CHARACTERIZATION OF CANINE MAMMARY TUMOURS BY NON INVASIVE ULTRASONOGRAPHY AND FINE NEEDLE ASPIRATION CYTOLOGY

Dr. Apra Shahi **Shashank Goyal**
(Advisor) **(Researcher)**

ABSTRACT

Canine mammary tumours are the most common neoplasms in intact female dogs. It is having three fold higher incidence when compared with breast tumours in human females. Therefore to increase the diagnostic accuracy and eliminate false negative results clinical examination, diagnostic imaging and biopsy are performed simultaneously with the following objective: To access benign and malignant canine mammary tumours (CMTs) by ultrasonography and to evaluate fine needle aspiration cytology (FNAC) of canine mammary tumours as an early diagnostic tool for predicting malignancy.

Total numbers of canine cases registered at Teaching Veterinary Clinical Complex (TVCC) during study period were 7887 (79.84%) out of which cases of cutaneous tumours were 73 (0.92%) and cases of mammary tumours were 18 (0.23%).Distribution of mammary

tumours among cutaneous tumours was 24.65% out of which maximum cases were observed in non descript dogs (44.44%) followed by Lhasa Apso and Labrador Retriever with lowest distribution (5.56%). Mammary tumours were observed mostly in inguinal mammary gland 27.78% and least in caudal thorasic mammary glands 5.55%. Tumours were found involving multiple pairs in 27.78% cases.

Ultrasonography was performed in group I animals where mammary glands of 8 apparently healthy dogs were scanned and revealed smooth and regular margin, heterogeneous echotexture, hypoechoic internal echogenicity along with absence of acoustic enhancement and acoustic shadowing in all the cases. Ultrasonography of associated lymph nodes in same animals showed mean S/L value 0.38, regular nodal margin in all animals. Hilus was present in 3 and absent in 5 dogs. Internal echogenicity was hypoechoic and acoustic enhancement was absent in all the dogs.

Ultrasonography was performed in group II animals where 18 dogs having mammary tumours were scanned by ultrasonographic techniques as B mode ultrasonography, colour flow mapping and pulse wave Doppler and revealed that grey scale ultrasonographic evalution of D/W was observed useful for differentiation between benign and malignant tumours because of its quantitativity and simplicity. Ultrasonographic evalution of D/W more than 0.7 is a strong indicator of malignant mammary tumour in 77% cases. Tumour echotexture, invasiveness and presence of anechoic cavities are also observed useful for differentiation between benign and malignant mammary tumors with minimum 77% accuracy. Colour Doppler ultrasonography showed both central and peripheral vascular pattern in 69% cases with numerous blood vessels per field. Spectral Doppler showed average maximum velocity (Vmax) of blood 23.8 cm/s and above for malignant tumours. The average Vmax was 30.96 cm/s. In benign tumours it was markedly less.

The cytological samples were obtained by fine needle aspiration in order to study the cell population. Out of 9 samples of fine needle aspiration, 8 samples are in agreement with the histopathological findings thus 88.89% cytological and histological diagnostic agreement is observed. FNAC is found a reliable and useful early diagnostic tool for glandular malignant mammary tumours.

Thus it can be concluded that D/W more than 0.7, mixed vascular pattern and Vmax more than 23.8 cm/s are strong indicator for malignancy in approximately 77% cases which can later be confirmed by FNAC and histopathology. Therefore ultrasonographic techniques and FNAC both in conjunction are very good diagnostic indicator of malignancy.

MANAGEMENT OF LONG BONE FRACTURES IN BIRDS BY INTERNAL FIXATION

Dr. Randhir Singh (Advisor)

Pramod V.S. (Researcher)

ABSTRACT

The avian skeleton is much lighter than that of mammals. A large part of their bones are pneumatic and instead of bone marrow, cavities are communicated with the respiratory system to decrease weight which makes flying easier. High calcium content in avian bones, make them more brittle and susceptible to fracture. Birds have several anatomical and physiologic characteristics that impede to consider anaesthesia in birds a trivial aspect, which leads to consider the bird as a high anaesthetic risk patient. So this study was conducted to evaluate the efficacy of isoflurane anaesthesia in birds along with the comparative evaluation of intramedullary stainless steel K- wire and stainless steel threaded K- wire in long bone fracture repair in birds.

The present study was conducted on 12 birds including wild birds, irrespective of species, age, weight and sex; brought to T.V.C.C, Jabalpur for the treatment of long bone fractures. These birds were randomly divided into two groups, consisting 6 birds in each. In group I internal fixation of fracture by stainless steel K- wire was done while in group II stainless steel threaded K- wire was used.

In group I average body weight of birds was 226.50 ± 62.72 g, whereas in group II it was 230.67 ± 52.96 g. Maximum number of fracture cases were reported in tibiotarsus (58.33%) followed by radius-ulna (16.67%) and ulna alone (16.67%). All birds were premedicated with butorphanol at 1mg/kg body weight I/M followed by mask induction with 5% isoflurane and were maintained with 1.5-2.5% isoflurane with oxygen flow rate of 0.5-1 L/min. The mean value for induction time was 0.69 ± 0.08 minutes in all the birds with mask induction.

The mean value of cloacal temperature showed significant ($p \leq 0.05$) decrease in different intervals of anaesthesia. The mean value of recovery time was 6.15 ± 0.68 minutes in all the birds. The recovery was fast with minimum complications. Isoflurane provided adequate depth of anaethesia without complications.

The total leukocyte count was higher in both groups at early stage of fracture fixation and a significantly higher heterophil count in early period of fracture fixation was observed in both the groups. Radiographic examination was done prior to surgical procedure and immediately after the internal fixation and then on day 15, 30, 45 and 60 post operatively. Significant increase in radiographic score was observed in both the groups at different time interval, however better radiographic union was observed in the birds of group II as compared to group I. The lameness score was lesser in the animals of group II as compared to animals of group I, indicating better weight bearing. Thus, it can be concluded that internal fixation is one of the methods of choice for stabilization of long bone fractures in birds and on the basis of radiolographic and lameness score fracture healing was earlier with the use of threaded k- wire.

COMPARATIVE STUDY ON THE EFFICACY OF ALOE VERA AND TRIDAX PROCUMBENS ON WOUND HEALING IN CALVES

Dr. Dharmendra Kumar **Abhishek Verma**
(Advisor) **(Researcher)**

ABSTRACT

Since time immemorial man has used various parts of the plants in treatment and prevention of many ailments. Studies on wound healing property of *Aloe vera* and *Tridex procumbens* in terms of gross, histological and histopathological changes were done. Twenty four male calves aged between 6 month to 1 year having wounds were randomly divided in four groups and were treated with Normal saline, Povidone Iodine, *Aloe vera* and *Tridax procumbens* in group A, B, C and D respectively. An incidence of 7.9 % of wound in all species was reported with highest cases of wound in canine followed by bovine and caprine. Males were having more cases of wound and maximum cases were observed in the age group of 1-3 years. Highest incidence of wound was recorded on limbs followed by trunk and maximum of it was lacerated wound. Presentation of case following occurrence of incidence was too observed and it was found that most of the cases were presented between 3-5 days after occurrence of incidence. General clinical parameters like temperature, pulse, respiration and haematological values fluctuated within the normal physiological limit. The data obtained were in accordance with Basha *et al*. (2011). Grossly on 0th day almost all the wound appeared lustreless whitish yellow and contaminated which later on converted to pinkish, reddish, reddish brown and brownish white on 5th, 10th, 15th and 20th post treatment day however, colours were more prominent in case of group B, C and D. Exudation gradually reduced in all cases, however its complete absence was observed on 10th post-treatment day in group B, C and D compared to group A, where it was observed till 15th day. Pain too decreased gradually in all groups but its complete absence was observed on 10th post-treatment day in group C. Degree of pain in group B and D on 10th day was meagre compared to group A, where it was more prominent. A gradual decrease in wound area, almost in all group was observed with maximum wound contraction in group C on 15th, 20th and 25th post-treatment day. Comparison between group B and D revealed higher wound contraction on 10th, 15th and 20th day in group B but it was superseded by group D on 25^{th}day. However, data of group B and D did not vary significantly. Least wound contraction was observed in group A throughout the study period. Histological section of 5^{th}post-treatment day revealed heavy infiltration of neutrophils and macrophages accompanied with serofibrinous exudates, haemorrhage and necrotic foci in wounds of group A, but these infiltration was of moderate nature in group B, C and D. Evidence of meagre amount of angioblasts and scant fibroblasts were too observed in the deep layer of dermis of wound in all the groups, however its density was more in group B, C and D as compared to group A. On 10th post – treatment day the more denser fiboblast cells than the previous day was observed and its density was more in group B followed by C, D and A. Histological findings on 15th day revealed dense collagen fibres in group C followed by group B, D and A. There was a neck to neck similarity in findings of group B and D. Elastic fibres were too discernible at this stage in all groups ,however its density was more in group C followed by group D, B and A. On 20th day abundant collagen fibres and moderate amount of elastic fibres was observed in all groups but its density was more in group A. Keratinisation of the epidermis was too observed at this stage with maximum density in group C. Slide of 25th day showed thick layer of epidermis almost covering the entire wound area in all the groups but maximum well differentiated epidermis with close rete pegs extending uniformly was observed in group B, C and D with maximum differentiation in group C and least in group A. From the above findings it can be concluded that all the medicaments facilitates wound healing but *Aloe vere* masks the healing of all other groups at each stage.

EFFICACY OF LEVOBUPIVACAINE WITH AND WITHOUT FENTANYL CITRATE AS CAUDAL EPIDURAL ANALGESIA IN GOATS

Dr. B. P. Shukla **Rekha Patel**
(Advisor) **(Researcher)**

ABSTRACT

One of the most commonly used regional anaesthetic techniques in ruminants is epidural anaesthesia. The quest for searching newer and safer anaesthetic agents has always been one of the primary needs in anesthesiology practice in ruminants. Levobupivacaine, the pure S (-)-enantiomer of bupivacaine, has a similar but an enhanced safety profile as compared to bupivacaine. Fentanyl citrate is an opioid analgesic that is particularly well suited for use in anaesthesia because of its high potency, rapid onset, absence of emetic activity and minimal hypotensive activity. Levobupivacaine provides a patient reduced need of analgesic drugs in the preoperative and intra-operative period. Looking towards the use of local anaesthetics and opioid analgesic the study was designed with following objectives:

1. To evaluate the efficacy of levobupivacaine as caudal epidural analgesia, with and without fentanyl citrate, in goats.
2. To study the clinico-haemato-biochemical changes in caudal epidural analgesia.

The study was conducted on 12 clinical cases of young goats of either sex, 1-2 year of age and weighing approximately 12-15 kg. Animals were divided in two groups (I&II) of 6 animals in each. The animals of group I received levobupivacaine hydrochloride (@1.8mg/kg body weight) in lumbosacral space, while animals of group II received Levobupivacaine hydrochloride (@1.8mg/kg body weight) with Fentanyl Citrate (@ 2µg/kg body weight) in lumbosacral space. The clinico-physiological and haemato-biochemical changes were recorded at different time intervals in both groups. The animals of group II showed quick onset, longer duration and good depth as compared to animals of group I. Rectal temperature, respiration rate and heart rate showed non significant decrease in both groups. Haematological examination showed non significant decrease. Biochemical examination showed non significant increase in serum aspartate transaminase, serum alanine transaminase, serum creatinine and blood urea nitrogen in both groups. All haemato-biochemical changes were transient and compensatory. On the basis of above study, it was concluded that for restraining and short surgical procedures levobupivacaine alone can be used whereas, levobupivacaine in combination with fentanyl citrate can be used for major surgical procedures.

COMPARATIVE EVALUATION OF FOLDABLE INTRAOCULAR LENSES FOLLOWING PHACOEMULSIFICATION FOR CATARACT IN CANINE

Dr. Apra Shahi **Babita Das**
(Advisor) **(Researcher)**

ABSTRACT

Cataract literally means, "To breakdown", and refers to the disruption of the normal lamellar architectural arrangement of the lens fiber or its capsule. Phacoemulsification for lens extraction and artificial intraocular lens (IOL) implantation offers a favorable success rate. In view of the latest development in IOLs material and design, current study was planned with following objectives: 1) To evaluate the phacoemulsification technique and its feasibility for foldable intraocular lens implantation in dogs with cataract. 2) To compare vision restoration following implantation of hydrophilic and hydrophobic square and round edge acrylic intraocular lenses.3) To observe the post lens-implantation sequelae with special reference to posterior capsular opacification.

Current study had been undertaken at TVCC, College of Veterinary Science &A.H., Jabalpur and M.P. State Veterinary Hospital, Bhopal for a period of 18 months from June 2017 to December 2018. An incidence of 1.98% of eye affection was found, out of which 22.92% cases belong to cataract. Twenty four dogs with clinical cataract were subjected to detailed preoperative diagnostic tests including ultrasonography and neuroopthalmic tests and were divided into 4 groups viz. Group 1: Phacoemulsification with square edge hydrophilic IOL: 6 eyes; Group 2: Phacoemulsification with round edge hydrophilic IOL: 6 eyes; Group 3: Phacoemulsification with square edge hydrophobic IOL: 6 eyes; Group 4 : phacoemulsification with round edge hydrophobic IOL: 6 eyes.

Results pertaining to age, breed and sex wise incidence indicated that 45.83% cases belongs to age group of 6-10 years with 66.66% incidence in males. Spitz 50.00%, Mongrel 20.83% and GSD 12.50% were most affected breeds. 58.33% dogs were having bilateral and with 41.66% dogs were with unilateral cataract. Most of the dogs i.e. 50.00% were found with mature cataract followed by 29.17% with hypermature and 20.83% with immature cataract stage.

All dogs were subjected preoperatively thorough physical examination, complete blood counts, serum biochemical estimations including blood glucose and blood pressure to ascertain any underlying systemic diseases. Preoperatively ocular examinations, ultrasonography, STT, IOP and neuroopthalmic tests prescribed were done. The groups differed non significantly among themselves for STT, IOP and neuroopthalmic test values. Intraoperative complications were also noted during phacoemulsification procedure and no incidence of iris bulging and vitreal prolapse were noted. Intraoperative miosis (50%), Chemosis (16.66%) and iris bleeding (16.66%) were encountered during procedure and were managed as prescribed.

Postoperatively, a significant ($p<0.05$) rise in IOP on first postoperative day was noted in all the groups which on subsequent days reduced. No significant difference was observed between IOP values of various groups on different observation days. No significant difference was observed between STT values of various groups on different observation days, however, a rising trend of STT values was observed on day 1 postoperatively in all the groups, which then adopted a declining trend and reached statistically ($p<0.05$) similar level on day 15 when compared to that of preoperative values.

Statistically non significant variations were found for all the post operative complications viz. miosis, aqueous flare, ocular discharge, corneal opacity and hyphaema among the groups. However, within the groups initially higher values were recorded and on subsequent days a declining trend of varying degrees were observed due to postoperative protocols.

The visual outcome in dogs of all treatment groups were assessed from the marks obtained for the grades of the neuro-opthalmic tests. The scores differed non significantly among various groups for tests. Functional vision was achieved in 3 dogs in (group-I), 3 dogs (group-II), 4 dogs (group-III) and 3 dogs (group-IV). Higher (100%) success rate was achieved in dogs with immature cataract, followed by (50.00%) in those with mature and (28.57%) in dogs with hypermature cataract. All the dogs positive with functional vision were observed for PCO scores on various days through slit lamp and no significant occurrence of PCO was recorded upto day 90 in all four groups.

Conclusions of present study are phaecoemulsification is a feasible technique for cataract in dogs with less intraoperative complications. Successful vision were achieved in 50% dogs of group I, II and IV within day 15 postoperatively, whereas in group III vision were achieved in 66.66%dogs. Posterior capsular opacification was not recorded during 90 day post operative observation.

VETERINARY MEDICINE

PREVALENCE AND EFFICACY OF DRUGS AGAINST HELMINTH PARASITES IN CAPTIVE WILD ANIMALS

Dr.R.K.Bagherwal **Shivani Bante**
(Advisor) **(Researcher)**

ABSTRACT

A total of 347 faecal samples examined from the different species of captive animals and birds of Kamla Nehru Prani Sangrahalaya, Indore, of which 149 samples were found positive with an overall prevalence of 42.90%. Among helminth parasites, the prevalence of nematode eggs (42.36%) was highest as compared to that of tematodes (0.28%) and cestode eggs (0.28%).The prevalent parasites were *Ascaridia* sp., Strongyle, *Capillaria* sp., *Trichuris* sp., *Strongyloides* sp. and *Amphistomes* sp.The highest degree of infection was recorded in the Tortoise (94.44%) followed by Peacocks (90%) and Jeckovin pigeons (88.88%).The most commonly detected helminth was *Ascaridia* sp.(11.81%) followed by Strongyle (10.08%) and *Capillaria* sp.(6.34%). Among all the categories of captive animals, the highest percentage of infection was reported in the Primates (80.65%) followed by Herbivores (53.85%), Carnivores (28.57%.) and birds (32.05%).The present investigation on efficacy evaluation of anthelmintics based on Eggs per gram (EPG) values revealed that Fenbendazole was more efficacious in herbivores group while Pyrantel pamoate was more effective in Carnivores and Primate category. In Birds, efficacy of both fenbendazole and Pyrantel pamoate was more or less similar. No re-occurrence of helminthic infection was reported till 42nd day post treatment in majority of groups.

Keywords: *Anthelmintics, Efficacy, EPG, Helminths, Prevalence.*

PRODUCTION AND STANDARDIZATION OF COMBINED VACCINES FOR HAEMORRHAGIC SEPTICAEMIA AND BLACK QUARTER DISEASES

Dr. K.S.Misraulia **Nivedita Kushram**
(Advisor) **(Researcher)**

ABSTRACT

Vaccination is an important tool for controlling different infectious diseases of the livestock. Haemorrhagic septicaemia and Black quarter are most common bacterial diseases affecting cattle and buffalo in india. Prophylactic programme is carried out by vaccination against various type of infectious disease(s).Combined vaccine reduce the cost, time, and labour of vaccination.

An experiment was designed to evolve a dependable combined vaccine against Haemorrhagic septicaemia and Black quarter. Four group of combined vaccines were studies; 1) Group A- 1ml H.S Casein sucrose yeast extract agar washed vaccine + 4 ml B.Q. Fluid thioglycolate broth vaccine without shaker; 2) Group B- 1ml H.S Casein sucrose yeast extract agar washed vaccine + 4 ml B.Q. Fluid thioglycolate broth vaccine with shaker ; 3) Group C-1.5 ml H.S Casein sucrose yeast extract agar washed vaccine + 3.5 ml B.Q. Fluid thioglycolate broth vaccine without shaker and 4) Group D -1ml H.S Casein sucrose yeast extract agar washed vaccine + 4 ml B.Q. Fluid thioglycolate broth vaccine with shaker .Group B- 1ml H.S Casein sucrose yeast extract agar washed vaccine + 4 ml B.Q. Fluid thioglycolate broth vaccine with shaker combined vaccine conferred 100% protection against H.S. disease and 75% against B.Q. disease in rabbits and guinea pigs, respectively in potency test performed for individual vaccines The vaccine was also found to be sterile and safe to use.

STUDIES ON SEROPREVELANCE AND THERAPEUTIC MANAGEMENT OF PESTE DES PETITS RUMINANTS IN GOATS

Dr. K.S. Misraulia **Ashish Mudgal**
(Advisor) **(Researcher)**

ABSTRACT

Peste des Petits Ruminants (PPR) is a major constraint in the development of small ruminants system since it causes heavy economic losses. The present study was conducted to detect the development of protective antibodies in PPR- Antibody negative goats after immunization, to detect the PPR antigen in affected goats showing suggestive symptoms of PPR, To study the clinico - haemato - biochemical changes in PPR sandwich–ELISA test positive goats and to treat them.

Screening of samples was done by PPR c-ELISA and s-ELISA kits developed by national Rinderpest Laboratory, Division of Virology, in IVRI, Mukhteshwar, for detection of antibody titre and occurrence of PPRV antigen respectively in Laboratory of Division of Biotechnology in IVRI.

A total of 3,115 sera sample screened for protective antibody titre were collected on different days from same flock, before and after immunization of 623 goats in Indore, Dhar and Khargone Districts of Madhya Pradesh. 1,158 samples were found positive for protective antibody titre yielding 37.17% seroprevelance in the screened samples.

Antibody was detected as early as 7 day post immunization Thus the 9.47% of total immunized goats were developed protective antibody titre. Similarly Samples were collected on day 14, were revealed that 20.38% goats were developed protective antibody titre. On day 21, 76.40% of the goats attained protective antibody titre whereas, on day 30, 79.61% goats were developed protective antibody titre.

A total of 119 occulo-nasal discharge of goats suspected for PPR, 62 were found positive in PPR s-ELISA test, yielding 52.10 per cent prevalence.

Clinical symptoms revealed that coughing and bronchopneumonia which observed sequel of PPR causes respiratory distress to goats. The temperature of goats were increased in infected goats as compared to healthy goats. The Average pulse rate and respiration rate of goats were decreased in infected goats as compared to healthy goats.

Haemato-biochemical studies revealed that Average values were recorded before and after treatment revealed measurable difference. Average value of haemto-biochemical parameter were found elevated before treatment while leucopenia observed before treatment whereas normal haematological vaues were obtained after treatment of goats.

Biochemical studies revealed that the serum ALT and AST were found higher than its normal level before treatment while after treatment serum ALT and AST level were attain its normal concentration.

The strategies used in early stages of the disease were concluded that systematic treatment of PPR infected goats with broad spectrum antibiotic, antihistaminic, anti-inflammatory, anti diarrhoeal and supportivehterapy and proper monitoring simultaneously can be able to decrease mortalty rate in PPR infected goats.

‘’STUDIES ON ACARICIDAL RESISTANCE OF TICK (*HYALOMMA ANATOLICUMANATOLICUM)*’’

Dr. H.K.Mehta
(Advisor)

Manjusha Kushram
(Researcher)

ABSTRACT

The multi host tick, Hyalomma anatolicum anatolicum is the commonest Hyalomma species in India and cattle serves as the main host of this species. A study was conducted to evaluate the acaricidal efficacy and resistance of Hyalomma anatolicum anatolicum against deltamethrin and cypermethrin.The engorged ticks were collected from near by villages, dairy forms to study the period of egg laying and hathing under laboratory condition.The efficacy and resistance against cypermethrin and deltamethrin was also studied. The average period for eggs laying was 8.7 day while the average period of hatching of eggs was 18.7 days.A total number of 150 larvae were use for the larval packet test at concentration of 15,30,45 and 60 ppm.The efficacy of deltamethrin at 15 ppm was 83.12% while 100% efficacy was observed at 30,45 and 60 ppm while 16.88% resistance was observed at 15 ppm and no resistance was seen at 30,45 and 60 ppm.Efficacy of cypermethrin at 15.30,45 and 60 ppm was 27.31%,47.48%,57.55% and 64.76% respectively while resistance were 72.69%,52.52%,42.45% and 35.24% at same concentrations.

HAEMOPROTOZOAN INFECTION IN GOATS WITH SPECIAL REFERENCE TO THERAPEUTIC MANAGEMENT OF CAPRINE BABESIOSIS

Dr. P.C. Shukla (Advisor)

Amrata Patel (Researcher)

ABSTRACT

In India, caprine haemoprotozoan infection is common due to favourable climate for growth of parasites and their vectors. It causes economic losses particularly in tropical and subtropical countries. The present work in goats was aimed to study the prevalence of caprine haemoprotozoan infection in and around Jabalpur City, to study the various clinical and haemato-biochemical alterations in caprine babesiosis and to evaluate the therapeutic efficacy of drugs against caprine babesiosis.

A total of 800 blood samples of goats were collected from Amanala goat unit, Livestock farm, Adhartal, goats brought to TVCC, Jabalpur, Government Veterinary Hospital, Omti, private clinics and areas in and around Jabalpur city from August 2012 to May 2013. Confirmation of haemoprotozoan was done by microscopic examination of the stained blood smears. For prevalence study apart from various clinical signs age, sex and breeds of all the goats positive for babesiosis were also recorded. For haematological and biochemical estimations 5 ml blood was collected aseptically on day 0 (pre-treatment) and day 15 and 30' (post-treatment) from the three treatment groups as well as control group. To study the efficacy of drugs against caprine babesiosis, 18 goats positive for *Babesia* organism were taken and divided into 3 groups (T_1,T_2 and T_3) having 6 goats in each group. Besides these a group of 6 healthy goats was kept as control group. Group T_1 was administered with inj. Oxytetracycline LA @ 20 mg/kg b.wt, I/M, 2 doses at 96 hrs intervals, group T_2 was administered with inj. Diminazene aceturate @ 3.5 mg/kg b.wt., I/M, 2 doses at 24 hrs intervals while in group T_3 inj. Buparvaquone @ 2.5 mg/kg b.wt., I/M, 2 doses at 96 hrs intervals was administered.

The overall prevalence of caprine haemoprotozoan, *Babesia* and *Theileria* was reported to be 3.9%, 3.5% and 0.4% respectively. Among caprine haemoprotozoan infection and *Babesia* the higher prevalence was found in age group >3 years of age *i.e.* 5.71% in age group >5 years of age and 4.21% in age group 3 to 5 years and minimum in age group <1 year of age *i.e.* 1.71%. The goats affected with *Theileria* were between 1 to 3 years of age thus the prevalence of *Theileria* in age group 1-3 years of age was 1.33% *i.e.* 3 out of 225 goats. The sex wise prevalence study revealed prevalence of caprine haemoprotozoan infection in males and females was 3.37% and 4.51% respectively. The sex wise prevalence of *Babesia* in males and females goats was 2.92% and 4.23% respectively. Prevalence of *Theileria* in males and females goats was 0.45% and 0.28% respectively. Breed wise prevalence of caprine haemoprotozoan infection was noticed higher in well defined breeds (Sirohi, Barbari and Jamunapari) *i.e.* 5.34% followed by non-descript goats *i.e.* 1.36%. Among *Babesia* infection the maximum breed wise prevalence was noticed in well defined breeds (Sirohi, Barbari and Jamunapari) *i.e.* 4.75% followed by non-descript goats *i.e.* 1.36%. In *Thelieria* infection the breed wise prevalence was noticed in only on well defined breeds (Sirohi, Barbari and Jamunapari) *i.e.* 0.59%.

Clinical signs in goats affected with *Babesia* were pale mucous membranes (85.7%), loss of appetite (75%), nasal discharge (35.7%) and coughing (32.1%), followed by diarrhoea (60.1%), emaciation (53.4%) and haemoglobinuria (7.1%) along with presence of ticks on body in 82.1% caprine. Among the various clinical parameters temperature, pulse rate and respiration rate increased significantly ($P \leq 0.01$) with that of healthy control group on the day 0 pre treatment.

Among the various haematological parameters total erythrocyte count (millions/µl), haemoglobin concentration (g/dl), packed cell volume (%) and neutrophil (%) was significantly decreased ($p \leq 0.01$) while, total leukocyte count (thousands/µl) and lymphocyte (%) were significantly increased ($p \leq 0.01$) than healthy control group on day 0 pre treatment. However, non-significant changes occurred in monocyte (%) and eosinophil (%) between healthy and affected goats on the day 0 pre treatment. The results of biochemical parameters showed that a statistically significant increase ($p \leq 0.01$) occurred in alanine amino transferase (U/l), aspartate amino transferase (U/l), alkaline phosphatase (U/l), blood urea nitrogen (mg/dl), creatinine (mg/dl) and total bilirubin (mg/dl) while, significant decrease ($p \leq 0.01$) was noticed in total plasma protein (g/dl) and blood glucose (mg/dl) in affected goats as compared with healthy goats.

The results showed that group T_2 was superior to groups T_1 and T_3 as all the 6 goats (100%) were recovered on day 15 post treatment, as compared to group T_1 and T_3 *i.e.* 5 out of 6 (83.33%) and 1 out of 6 (16.67%) goats respectively.

ASSESSMENT OF SPECIFIC FLUID THERAPY FOR *PARVOVIRUS* INFECTION IN DOGS

Dr. Dr. P.C. Shukla (Advisor)

Manisha Nakul (Researcher)

ABSTRACT

Canine parvovirus (CPV) infection is a highly contagious viral infection that can affects dogs of all ages. The disease is caused by Canine parvovirus-*2* (CPV-2). There are two forms of CPV-2: intestinal and cardiac form. The more common form is intestinal form, which is characterized by frequent vomiting and diarrhoea which results in dehydration, weight loss and anorexia. On account of dehydration, the fluid and electrolyte balance of the dogs become critically affected. So, in view of the above facts the present work was framed to study the epidemiological pattern of *Parvovirus* infection in dogs in and around Jabalpur, to study the haemato-biochemical alterations in dogs suffering from *Parvovirus* infection and to find out the specific fluid therapy in *Parvovirus* infected dogs.

A total of 1200 dogs between August 2012 to May 2013 brought to TVCC, Jabalpur and Government Veterinary hospital, Omti were examined. Amongst these, on clinical examination the dogs which showed gastroenteritis were screened by Scanvet Parvo^{tm} kit (Immunochromatographic assay based kit) for the diagnosis of CPV infection. To study the epidemiological pattern of CPV apart from various clinical signs age, sex, breed and feeding habits of the dogs positive for CPV infection were also recorded. For haemato-biochemical estimation 5 ml blood was collected from CPV infected dogs pre treatment (0 day) and day 7 and 14 post treatment including dogs of control group. To assess the specific fluid therapy, 36 dogs positive for Canine parvovirus infection were taken and divided into 6 groups with 6 dogs in each group. Besides these a group of 6 healthy dogs was kept as control group. The group T_1 was treated with inj. Ringer's lactate @ 10 ml/kg b.wt., BID, I/V for 5 days, the group T_2 was treated with inj. Isolyte @ 10 ml/kg b.wt.. BID, I/V for 5 days, the group T_3 was treated with inj, Normal saline @ 10 ml/kg b.wt., BID, I/V for 5 days, the group T_4 was treated with inj. Hemaccel @ 5 ml/kg b.wt., SID, I/V for 5 days + inj. Ringer's lactate @ 10 ml/kg b.wt., BID, I/V for 5 days, group T_5 was treated with inj. Hemaccel @ 5 ml/kg b.wt., SID, I/V for 5 days + inj. Isolyte @ 10 ml/kg b.wt., BID, I/V for 5 days and group T_6 was treated with inj. Hemaccel @ 5 ml/kg b.wt., SID, I/V for 5 days + inj. Normal Saline @ 10 ml/kg b.wt., BID, I/V for 5 days

The overall prevalence of CPV infection was 7.08% (85 out of 1200 dogs). The age wise prevalence showed maximum between 0-3 months of age *i.e.* 11.25%, followed by 3-6 month of age (7.58%), 6-12 month of age (5.92%) and above 12 month of age it was 1.10%. Among 1200 dogs examined, the sex wise prevalence study revealed 7.76% prevalence in males as compared with 6.23% in females.The maximum breed wise prevalence was noticed in non-descript dogs *i.e.* 11.69% followed by Spitz, Daschund, Dalmatian, German shepherd, Labrador, Lhasa apso and Doberman *i.e.* 7.25%, 5.26%, 4.16%, 3.56%, 2.99%, 2.38% and 1.00% respectively. During the present study the dogs reared on vegetarian diet showed higher prevalence *i.e.* 9.79% as compared with 2.79% in dogs reared on non-vegetarian diet.

The clinical symptoms exhibited as anorexia (84.70%), vomition (100%), paleness of mucous membrane (25.88%) and the haemorrhagic diarrhoea (89.41%) in all the cases under the study; however the increased body temperature was noted in 52.94% dogs. The degree of dehydration was varied as mild, moderate and severe in 23.53%, 49.41% and 27.06% dogs respectively under the present study.

Regarding various haematological parameters the total erythrocyte count (millions/µl) and lymphocyte (%) were significantly lower ($p \leq 0.01$), with significantly higher ($p \leq 0.01$) packed cell volume (%) and neutrophil (%) than that of the healthy control group on the day 0 pre-treatment. However, no statistically significant changes were observed in Total leukocyte count (thousands/µl), haemoglobin concentration (g/dl), monocyte (%) and eosinophil (%). The results of biochemical parameters showed a statistically significant ($p \leq 0.01$) higher value of alanine transaminase (U/L), aspartare transminase (U/L), total bilirubin (mg/dl) and creatine kinase (U/L), while significantly lower ($p \leq 0.01$) value was noticed in glucose (mg/dl), total protein (g/dl), albumin (g/dl) and globulin (g/dl) with that of healthy group.

The present study revealed that among the various treatment groups T_5 (inj. Hemaccel + inj. Isolyte) was found to be superior as all the 6 dogs recovered from dehydration with appreciable health status by day 3 post treatment.

“PRODUCTION AHD STANDARDIZATION OF MODIFIED ADJUVANTED HAEMORRHAGIC SEPTICAEMIAVACCINES’’

Dr. K. S. Misraulia
(Advisor)

Ramkrishan Shakya
(Researcher)

ABSTRACT

Haemorrhagic septicaemia (H.S.), an acute septicaemic disease principally affecting cattle and buffalo. As the treatment of H.S. is of limited value due to the acute nature of the disease, prophylaxis is the accepted method of H.S. control throughout the world. Vaccination is one of the most cost effective approaches for controlling various infectious diseases of livestock and thereby reducing the economic losses. In order to reduce the dose and production cost and enhance the effects of vaccines adjuvants are requently used. In the present study, first of all the culture of *Pasteurella multocida* was revived and its purity was checked using nutrient agar, blood agar and by Gram staining. Then purity and pathogenicity of vaccine seed strain was checked on blood agar and in rabbit and buffalo calf, respectively.

Nutrient agar was used for production of harvest. After collection, formalization, purity and pooling of the harvest was done followed by sterility and safety testing of harvest in media and laboratory animals, respectively. Before addition of adjuvants, the opacity of the bacterial suspension was adjusted and dry weight of the culture was calculated. Five types of vaccines were successfully prepared by adding different adjuvants as -Oil adjuvant H.S. vaccine, Oil adjuvant H.S. vaccine with Tween 20, Montanide ISA H.S. vaccine, Montanide gel H.S. vaccine (mineral oil) and Alum precipitated H.S. vaccine. For standardization, all the above vaccines were subjected to sterility, safety, and potency tests using media and experimental animals. All the vaccines were found sterile, safe and efficacious.

EFFICACY OF DIFFERENT DOSES OF AZADIRACHTA INDICA (NEEM) AGAINST GASTROINTESTINAL NEMATODES IN HORSES

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ABSTRACT

The group of equine strongyle nematodes is very diverse and consists of about 60 described species. Climate variation, pasture and stable management, anthelmintic treatment and nutritional status of horses are the major epidemiological features which have been recognized. In the present investigation work was primarily designed to study the incidence of gastrointestinal nematodes in horses in and around Jabalpur and to evaluate the comparative therapeutic efficacy of different doses of *Azadirachta indica (*neem) against gastrointestinal nematodes in horses.

The overall incidence of gastrointestinal nematodes in horses was found as 59.25% (80/135). On the basis of Mean EPG, the higher incidence was found in unorganized sector (65.45%) in comparison of organized sector (32%). Species of nematodes identified in the study includes single infestation like, strongyle (25%), *Parascaris equorum* (18.75%) followed by mixed infestation like Strongyles and *Parascaris equorum* (47.50%), Strongyles, Strongyloides and *Parascaris equorum* (5.0%) and Strongyle and Strongyloides (3.75%). The results of the present investigation revealed a relatively higher incidence of mixed infestation in the horses. The incidence of gastrointestinal nematodes in horses was maximum in the age group of 1-6 years (69.09%) followed by 6-12 years (62.96) and above 12-18 years (34.78%) respectively. The highest mean EPG was found in 12-18 years (1229.2) followed by 1-6 years (1079.50) and 6-12 years (887.29). The incidence of gastrointestinal nematodes in horses was higher in females (60.97) in comparison to males (58.51). The highest mean EPG was found in females (1162.51) in comparison of males (942.24).

A total of 24 infected horses were included for therapeutic trial and were randomly divided in to 4 groups (each comprising of 6 horses). Group T1 was treated with fenbendazole @ 7.5 mg/kg b.wt in single dose orally showed feacal egg count reduction (FECR) was recorded to be 78.5%, 89.25% and 94.21% on 7th, 14th and 21st day after treatment against gastrointestinal nematodes infection. In treatment group T4, with Neem (*Azadirachta indica*) dry leaves powder @ 525 mg/kg b.wt once, showed percent reduction in FECR on day 7th, 14th & 21st day post treatment as 11.03%, 16.91% and 23.53% respectively. In group T3 the animals treated @ 450 mg/kg b.wt of Neem revealed the increasing FECR% from the 7th, 14th and then 21st day post treatment *i.e.* 8.85%, 14.25% and 17.69% with satisfactory health status but comparatively have lesser FECR count than the groups of the animals treated @ 525 mg/kg b.wt on day 21st post treatment *i.e.* 23.5%. The results of the animals under groups T2 treated @ 375 mg/kg b.wt Neem (*Azadirachta indica*) indicated the similar trend of FECR% on 7th, 14th and 21st day as 5.93%, 10.17% and 15.25% post treatment. The results revealed that, in the animals of groups T1, treated with fenbendazole the percent reduction FECR was observed to be 78.5%, 89.25% and 94.21% with mean EPG values *i.e* 433.3±33.33, 216.7±47.73 and 116.7±16.67 on 7th, 14th and 21st day post treatment respectively, revealing maximum efficacy of the drug in all the horses treated with fenbendazole. However, the horses of the group T4 treated with Neem as anthelmintics showed no satisfactory results by treating the Neem @ 375mg/kg b.wt, and @ 450 mg/kg b.wt/animal as single dose. However, the results in the animals of group T4 treated with the Neem @ 525 mg/kg b.wt as single dose showed a marked reduction in FECR% on 7th,14th and 21st day post treatment. Hence, it is concluded from the results obtained from the present study that the Neem (*Azadirachta indica*) @ 525 mg/kg b.wt in single dose was also proved to be efficacious but not comparable to fenbendazole as an anthelmintics for gastrointestinal nematodes in horses.

DIAGNOSTIC APPROACH AND NEWER THERAPY IN COMPLICATED BABESIOSIS OF DOGS

Dr. P.C. Shukla (Advisor)

Sonal Shrivastava (Researcher)

ABSTRACT

Canine babesiosis is caused by tick transmitted apicomplexan parasites of *Babesia* species, which parasitize erythrocytes. It primarily affects erythrocytes leading to progressive anemia, but can involve multiple organs. The disease is classified as uncomplicated if the clinical changes are attributed directly to hemolytic anemia, and complicated if the symptoms are not directly attributable to acute hemolysis. Hence, in view of the above facts the present study was planned to study the epidemiological pattern of prevalent hemoprotozoa of dogs in and around Jabalpur, to study the prognostic values of various hemato-biochemical alterations in uncomplicated and complicated babesiosis in dogs and to evaluate the comparative therapeutic efficacy of different anti-babesial drugs in dogs.

A total of 1680 dogs brought to the OPD Medicine (TVCC, College of Veterinary Science & A.H., Jabalpur), State Veterinary Hospital (Omti, Jabalpur), and private clinics of Jabalpur were examined during November 2012 to October 2013. After confirmation of *Babesia sp.* infection by microscopic examination of blood smear stained with Leishman's stain, dogs were selected for the study. Age, sex, breed, history and clinical signs of each dog were recorded. For hemato-biochemical estimation 5 ml blood was collected from affected dogs pre treatment (0 day) and 10, 20 and 30 days post treatment and also from control group of animals. To assess the therapeutic efficacy of drugs, 60 dogs having complicated babesiosis were divided into 5 groups (T_1–T_5). Each treatment group comprised of twelve animals of which 4 were of hepatic complications, 4 of renal complications and 4 showing multiple organ dysfunction syndrome. The dogs in the groups T_1, T_2, T_3, T_4 and T_5 were treated with Diminazene Aceturate (5 mg/kg, IM), Doxycycline (10 mg/kg, PO, BID) X 21 days, Clindamycin (25 mg/kg, PO, BID) + Doxycycline (10 mg/kg, PO, BID) X 21 days, Enrofloxacin (2 mg/kg, PO, BID) + Doxycycline (10 mg/kg, PO, BID) X 21 days and Metronidazole (10 mg/kg, PO, BID) + Doxycycline (10 mg/kg, PO, BID) X 21 days, respectively. Supportive therapy including administration of fluids and electrolytes (Inj. Ringers Lactate 20-50 ml/kg b.wt. IV and/or Inj DNS 5% 20-50 ml/kg b.wt. IV), corticosteroids (Inj. Dexamethasone 0.5-1 mg/kg b.wt. q12-24h IV), antacids (Inj. Ranitidine @0.5 mg/kg b.wt. BID I/M), antiemetics (Inj. Prochlorpromazene @ 0.5 mg/kg b.wt. BID I/M or Inj. Metoclopromide 0.2-0.5 mg/kg b.wt. BID IM) and diuretics (Inj. Furosemide 4 mg/kg b.wt. IV) were given according to the system involved and symptoms produced. Hematinics (containing Malt Extract I.P- 4.52, Calcium Gluconate I.P- 360 mg, Ferric Ammonium Cirtrate- 100 mg, Copper Suphate - 12mg, Cobalt Chloride 1.5 mg, Cholecalciferrol I.P- 400 IU, Nicrotinamide I.P- 45mg, Biotin B.P- 75 mg, Folic Acid I.P- 1.5 mg and Cyanocobalamin I.P- 15 mcg in each 21g @ 5-10 g daily PO for 30 days) and ectoparasiticidal drugs (Carbaryl 10% dusting powder or Amitraz 12.5% wash @ 2ml/litre of water) were given in all the treatment groups.

The overall prevalence of hemoprotozoa during November 2012 to October 2013 was 10.60 percent (178 out of 1680 dogs). The prevalence of *Babesia sp.* was 10.48 per cent *i.e.* 176 out of 1680 dogs, whereas *Hepatozoon canis* was reported in 2 dogs out of 1680 dogs showing 0.12 per cent prevalence. Out of 176 dogs positive for babesiosis 117 dogs (66.48%) fulfilled the criteria of complicated babesiosis while 59 dogs (33.52%) were suffering from uncomplicated babesiosis.

Based on estimation of hemato-biochemical parameters in uncomplicated babesiosis the total erythrocyte count, hemoglobin concentration, platelet count, bilirubin-total and blood glucose were reported to affect the outcome of the disease. In complicated babesiosis total erythrocyte count, hemoglobin concentration, packed cell volume, platelet count, alanine transaminase, alkaline phosphatase, bilirubin- total, total protein, creatine kinase, blood urea nitrogen, creatinine and glucose significantly affected the prognosis of the disease.

The therapeutic study revealed that all the drugs under study could clear the *babesia sp.* infections from the affected dogs, however, based on the earlier clinical improvement, lowered degree of parasitemia and higher survival rate in group t_3 clindamycin+doxycycline was considered as the most efficacious antibabesial therapy in the complicated babesiosis; followed by metronidazole+doxycycline, enrofloxacin+doxycycline, diminazene aceturate and doxycycline therapy. In the present study additive effects of combinations of the therapeutic agents have proved to be efficacious for the treatment of complicated canine babesiosis.

THERAPEUTIC MANAGEMENT OF MALASSEZIA DERMATITIS IN DOGS

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(Advisor)

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ABSTRACT

Malassezia dermatitis, a non-contagious common skin disease of yeast *Malassezia spp*. etiology in dogs, generally represents a flare-up of the underlying canine atopic dermatitis (CAD), associated with genetic, immunological, hormonal and environmental factors. Part of the normal skin flora, especially of the wild and domestic carnivores different strains of the yeast may produce immune responses contributing to chronic inflammation in the stratum corneum and dermatitis. In view of the above facts the work was planned to study the epidemiological pattern of prevalent *Malassezia spp.* dermatitis in dogs in and around Jabalpur and to compare the therapeutic efficacy of systemic anti-fungal azole derivative and herbal preparation in Malassezia dermatitis in dogs.

A total of 800 dogs of different age, breed and sex brought to the OPD Medicine (TVCC, College of Veterinary Science & A.H., Jabalpur) and State Veterinary Hospital (Omti, Jabalpur), and private clinics in and around Jabalpur were examined during November 2013 to April 2014. *Malassezia spp.* dermatitis was confirmed by microscopic examination of impression smear from skin stained with modified Wright stain followed by culture on SDA media, dogs were selected for the study. Age, sex, breed, history and clinical signs of each dog were recorded. For cytological estimation, impression smear from skin of affected dogs were collected on day 0 pre treatment and day 14 and 28 day post treatment. For haemato-biochemical estimation 5 ml blood was collected from affected dogs on day 0 pre treatment and 14 and 28 days post treatment and also from control group of animals. To assess the therapeutic efficacy of drugs, 36 dogs affected by *Malassezia spp.* dermatitis were divided into 6 groups (T_1 - T_6). Each treatment group comprised of six animals, group T_0 was kept as healthy control group. The dogs in the group T_1 and T_2 were treated with Ketoconazole @ 5 mg and @ 10 mg/kg b.wt. o.d., PO two successive days/week x 4 weeks, respectively. Dogs in the group T_3 and T_4 were treated with Fluconazole @ 5 mg and @ 10 mg/kg b.wt. o.d., PO two successive days/week x 4 weeks, respectively. Dogs in treatment group T_5 and T_6 treated with Neem Tablet @ 25 mg and @ 50 mg/kg b.wt. PO b.i.d. x 4 weeks. Dogs in each treatment group (T_1 to T_6) also treated with Cephalexin @ 20 mg/kg b.wt. PO b.i.d. x 5 days and Neem oil Topical, b.i.d. x 4 weeks. Supportive therapy was given as hepatoprotective (Sylimarin) @ 5 ml P.O. b.i.d. for 4 weeks and antifungal shampoo containing Miconazole Nitrate and Chlorhexidine Gluconate would be recommended for bathing the dog once in a week, in each treatment group.

The therapeutic study revealed that among all the drugs used under study, based on clinical improvement and lowered degree of infection, in the group T_3 Fluconazole @ 5 mg/kg/b.wt. was considered as the most efficacious in the treatment of Malassezia dermatitis; followed by neem tablet @ 50 mg/kg b.wt., Fluconazole @ 10 mg/kg b.wt., Ketoconazole @ 10 mg/kg b.wt., neem tablet @ 25 mg/kg b.wt. and Ketoconazole @ 5 mg/kg b.wt.

“EVALUATION EFFICACY OF HERBALPREPARATION FOR TREATMENT OF CANINE MANGE”

Dr. H.K. Mehta **Preeti Makwana**
(Advisor) **(Researcher)**

ABSTRACT

In present study, a total number of 960 dogs were presented at (TVCC) Veterinary hospital, College of Veterinary Science and A.H., Mhow. Among them 101 dogs were showed the signs of skin disorders, were examined by skin scrapping, among that 41 dogs were found positive for mange. For treatment trial a total of 24 dogs positive for mange were divided into three groups with eight dogs in each group were selected for study. In therapeutic trials in group I neem oil, group II neem leaf extract and in group III herbal medicine prepared by mixing leaves of neem, Datura, Sitaphal and Ark was applied localy on affected area QID for 20 days and drug efficacy and improvement in clinical signs were observed on 10th, 20th and 30th day post treatment. Overall incidence of mange was 4.27% while among confirmed cases, incidence of demodectic mange and sarcoptic mange was 1.35% and 2.9% respectively. Age wise incidence of demodectic mange was higher in the age group of above 5 yr 17.07% and lowest in 0-6m of age group i.e. 2.4% and sarcoptic mange was higher in the age group of 18m - 5 yr 29.26% and lowest in 0 – 6m of age group i.e.9.7%. The sex wise incidence of demodectic and sarcoptic mange was higher in males 21.95% and 36.58% respectively .The breed wise incidence of demodectic mange were found higher in German shepherd, Labrador and other 7.3% and lowest in pug and pomeranian 2.4%. Whereas the highest incidence of sarcoptic mange were found in Labrador19.5% and lowest in pomeranian and pug 4.8%. Various haematobiochemical parameters like Hb, PCV, TEC, TLC, DLC, ALT, AST, Total protein, Albumin, Globulin of affected dogs were observed. There was significant ($P<.05$) increase in Hb, PCV, TEC, Total Protein, Albumin were observed. Along with these TLC, SGPT,SGOT were significantly ($P<.05$) decreased in dogs treated with herbal preparations. Evaluation efficacy of herbal preparations such as neem oil, neem leaf extract, mixture of leaves of neem, datura, sitaphal and ark were studied. The efficacy of different therapeutic regimens were assessed based on disappearance of clinical symptoms and restoration of altered hemato-biochemical parameters. It was found that the regimens comprising leaves of neem, datura, sitaphal and ark was 100% effective for the treatment of canine mange.

MOLECULAR DIAGNOSIS AND THERAPEUTIC REGIMEN FOR CAPRINE CONTAGIOUS AGALACTIA

Dr. P.C. Shukla
(Advisor)

Amita Tiwari
(Researcher)

ABSTRACT

The present work was aimed to study the prevalence, molecular detection and to evolve a suitable therapy against contagious agalactia in goats. For this study, total 705 female lactating goats belonging to organized and unorganized sectors of in and around areas of Jabalpur were screened over a period of 12 months i.e. from April 2014 to march 2015. Out of 705 lactating females, 282 females suspected for contagious agalactia were selected for further study. Seroprevalence of mycoplasmosis was done by slide agglutination test and the presence of *Mycoplasma agalactiae* was confirmed by polymerase chain reaction (PCR). The DNA required for PCR was extracted from the milk sample. On confirmatory diagnosis of contagious agalactia, 24 clinical cases were randomly grouped as T1, T2, T3 and T4 having 06 goats in each group and were subjected to different therapeutic regimens. Also 06 apparently healthy goats were selected to serve as healthy control (Group C).The response of therapeutic study was evaluated on the basis of clinical score card, clinical parameters and PCR results on day 0 (before treatment) day 7 and day 14 (post treatment).

The overall prevalence of mycoplasmosis in lactating goats using slide agglutination test was 9.50 % while among mastitic cases it was 31.16 %. Overall prevalence of contagious agalactia was 4.39 % and among mastitic goats, it was 14.42%. *Mycoplasma agalactiae* was detected and confirmed as causative agent of contagious agalactia by using PCR. The prevalence of both mycoplasmosis and CA in organized goatry was significantly higher as compared to unorganized goatry. The age wise prevalence does not differ significantly. Non-descript goats showed lesser prevalence as compared to defined breed of goats under study. The response of therapeutic study revealed significant improvement in temperature, pulse and respiration in all the treatment groups. On the basis of score card and PCR, animal of group T4 showed earliest recovery. Thus, combination of tylosin, tocopherol and sodium selenite was found most efficacious followed by tylosin alone, combination of oxytetracycline, tocopherol and sodium selenite and lastly oxytetracycline alone.

MOLECULAR DIAGNOSIS AND THERAPEUTIC STRATEGIES AGAINST CONTAGIOUS CAPRINE PLEUROPNEUMONIA IN GOATS

Dr. P.C. Shukla **Devendra Kumar Gupta**
(Advisor) **(Researcher)**

ABSTRACT

The present investigation was conducted on a total of 1427 goats (organized and unorganized goatry) over a period of 12 months i.e. from April 2014 to March 2015. For epidemiology, a total of 413 pneumonic goats showed clinical signs (i.e. fever, coughing, nasal discharge, respiratory distress, mouth breathing etc.) were included in the study. Pneumonic goats were investigated by inspection, clinical examination, sero diagnosis (slide agglutination test) of mycoplasmosis and confirmed by polymerase chain reaction using specific primers of Mccp. The DNA required for PCR was extracted from the nasal swab samples. On confirmatory diagnosis of CCPP, 24 confirmed clinical cases of CCPP were randomly selected for therapeutic study and were grouped as G1, G2, G3 and G4 having 6 goats in each group. Beside these, 6 apparently healthy goats (with no history of respiratory distress) were selected to serve as healthy control (Group C). The goats in the group G1, G2, G3 and G4 were treated with Oxytetracycline @15 mg/ kg B.Wt.; Tylosin @ 20 mg/ kg B.Wt.; combination of Oxytetracyclines (@15 mg/ kg B.Wt) and Levofloxacin (@ 5 mg/ kg B.Wt.); and combination of Tylosin (@ 20 mg/ kg B.Wt.) and Levofloxacin (@ 5 mg/ kg B.Wt.) respectively I/M once a day for 5 days. In addition to antimicrobials, symptomatic and supportive therapy was done by administration of fluids, anti-histaminic, bronchodilators and alterative as per the clinical condition. The response of therapeutic study was evaluated on the basis of clinical condition which was accessed by clinical parameters (temperature, pulse, respiration), clinical score card and PCR results on pre and post treatment.

Out of 1427 goats screened, on the basis of clinical symptoms a total of 413 pneumonic goats were found suspected for CCPP. Out of 413 pneumonic goats, 178 goats showed nasal discharge, 35 goats showed coughing and 200 animals showed mixed signs of respiratory distress, pyrexia, ocular secretion etc. The overall prevalence of mycoplasmosis in goats using slide agglutination test was 10.65 % (152/1427) while among pneumonic goats it was 36.8 % (152/413). The prevalence of mycoplasmosis in organized goatry was significantly higher (13.54%) as compare to unorganized goatry (9.01%). No significant difference was reported in age and sex wise prevalence of mycoplasmosis. Non descript goats showed lesser prevalence of mycoplamosis as compared to defined breed of goats under study. Confirmatory diagnosis of suspected cases of CCPP was done by PCR using specific primers of Mccp. The PCR product positive for Mccp organism yielded a band of 316bp. The overall prevalence of CCPP was 3.36 % (48/1427). The prevalence of CCPP was significantly higher in organized sector (7.93%) as compared to unorganized sector (0.77%) of goatry. The highest (4.30 %) prevalence was shown by animals of 6-12 months of age. Among the breed wise prevalence Barbari showed 11.96%, Sirohi showed 7.69%, Black Bengal showed 7.50%, Jamunapari showed 2.42% and lowest being in nondescript i.e. 0.90%. The response of therapeutic study revealed that significant improvement in temperature, pulse and respiration was observed in all the treatment groups. On the basis of clinical score card, the goats of group G4 showed complete recovery on day 5th post treatment. Goats of group G3 showed complete recovery on day 7th post treatment. However, one goat of group G2 and two goats of group G1 showed mild illness even on day 7th post treatment. All the goats under treatment showed negative PCR results on day 7th post treatment. Therefore, combination of Tylosin and Levofloxacin was found to be most efficacious followed by combination of Oxytetracyclin and Levofloxacin, Tylosin alone and least being Oxytetracycline alone.

EFFICACY OF *PSIDIUM GUAJAVA* (GUAVA) LEAVES AS AN ANTI DIARRHOEAL IN CALVES WITH SPECIAL REFERENCE TO *E.COLI*

Dr. P.C. Shukla
(Advisor)

Payal Gupta
(Researcher)

ABSTRACT

Diarrhoea in calves is one of the most important disease complex evident by rapid and frequent passage of semisolid and liquid faecal material through the gastrointestinal tract. It involves both increase in motility of gastrointestinal tract, with loss of electrolytes, particularly sodium (Na^+) and water which may leads to disease and eventually death of the calves. The present work was aimed to study the prevalence and suitable therapeutic approach against *E.coli* infection. During the study period, a total of 50 calves (upto 3 month of age) of either sex including male and female belonging to organized and unorganized sectors were screened. The confirmation of *E.coli* F5 antigen in suspected cases was done by immuno- chromatographic strips. On confirmatory diagnosis of *E.coli* infection, 24 calves were randomly selected for therapeutic study and were grouped as T1,T2,T3, and T4 having 6 calves in each group. Besides these, 06 apparently healthy calves were selected to serve as healthy control. The calves in the groups T1, T2, T3 and T4 were treated with C Flox-Tz @ 1 tab for 25 kg b.wt BID, P.O. *Psidium guajava* leaf powder @ 300 mg/kg BID, P.O. *Psidium guajava* aqueous leaf extract @ 300mg/kg b.wt BID, P.O. *Psidium guajava* aqueous leaf extract @ 500mg/kg b.wt BID, P.O. respectively. In all the groups Ringer's lactate was given as rehydration fluids.

The overall prevalence of *E.coli* F5 antigen infection was found to be 50 per cent. Among the clinical parameters, no significant changes were observed in body temperature, pulse and respiration rate of the ailing animals when compared with healthy animals. Analysis of heamatological and biochemical parameters revealed significant difference in Haemoglobin, Packed cell volume, Total erythrocyte count, Total albumin, globulin and chloride whereas, no significant alterations were observed in potassium, sodium and A:G ratio. It can be concluded from the results obtained during present study that out of various therapeutic regimens adopted in the treatment of diarrhoeic calves, Group T1 (Cflox T-z) was found to be 100 percent efficacious followed by group T4 (*Psidium guajava* aqueous leaf extract @ 500mg/kg)which was 85 percent efficacious, then group T3 (*Psidium guajava* aqueous leaf extract @ 300mg/kg) which was 65 per cent efficacious as evident by the improvement of clinico-haemato biochemical parameters. However, In group T2 the efficacy of *Psidium guajava* leaf extract @ 300mg/kg was observed as 50 per cent.

EFFICACY OF CEFTIOFUR IN THE TREATMENT OF SUBCLINICAL AND CLINICAL MASTITIS IN CATTLE

Dr. H.K.Mehta **Kausar Qadri**
(Advisor) **(Researcher)**

ABSTRACT

Mastitis is the most important disease of dairy animals. Antibiotic resistance is major concern.Therefore a study was conducted to see the efficacy of newer antibioticlike ceftiofur hydrochloride alone and in combination with ceftiofur sodium. The overallincidence of subclinical mastitis was 79.00% while that of clinical mastitis was 12.00%. The highest incidence of subclinical and clinical mastitis was observed as40.00% and 6.00%in age group of 5-7 years while lowest incidence *i.e.*,3.00% and 0% in above 10 years of age group. The highest incidence of subclinical mastitis was observed in RH quarter 19.00% while in clinical mastitis was in RH quarter 3.00%. Maximum number of cows *i.e.*, 46 RHquarters showed (++) CMT results in subclinical mastitis while in clinical mastitis maximum number of cows *i.e.*, 9 RH quarters showed (+++) CMTresults. The values of TLC and neutrophils were significantly reduced towards normal side in group 2 and 4 as compared to group1 and 3. Thevalues of somatic cell count are represented as 105/ml. The mean valuesof somatic cell count in the animals of group 1 was 34.21±3. 19, 7.95±0.52, 3.36±0.120 and 3.30±0.08 while in the group2 was 36.10±1.78, 8.41±0. 72, 3.15±0.19 and 2.98±0.20. The mean values in group3 was 13.29±0.77, 5.93±0.16, 2.35±0.08 and 2.25±0.08 while in the animals of group 4 was15.83±1.80, 7.08±0.59, 2.31±0.07 and 2.18±0.07 at 0, 3rd, 7th and 14th day respectively. The values were Significantly reduced towards normal side in group 2 and 4 as compared to group 1 and 3. On the basis of alteration in clinical observation, results of california mastitis test, somatic cell count and haemato-biochemical changes, the better effect of drug was observed in group 2 and 4 where combination of ceftiofur sodium (intramuscular) and ceftiofur hydrochloride (intramammary) were used.

EVALUATION OF GLUCOGENIC THERAPY FOR SUBCLINICAL KETOSIS IN CATTLE

Dr. P.C. Shukla (Advisor)

Mukesh Nigam (Researcher)

ABSTRACT

Cattle contribute around 37.28% of the total livestock population. The total number of cattle in the country as per 2012 Census is 190.90 millions out of this, M.P. holds the largest share i.e. 10.27% of the total cattle population. Though infectious diseases are the most common contributory factors for decline in productivity of dairy cows, the role of ailments related to metabolism also poses great challenges. Among metabolic diseases, subclinical ketosis holds a significant role in reducing the production potential of milch animals.

Sub clinical ketosis is defined as elevated concentrations of circulating ketone bodies in absence of clinical signs. A threshold value of 1400 μmol/L Beta Hydroxyl Butyric Acid (BHBA) in blood has been described to distinguish between cows with and without sub clinical ketosis. Sub clinical ketosis causes economic losses through decreased milk production, impaired reproductive performance, increased risk of displaced abomasum, and higher risk of clinical ketosis.

A total of 200 post parturient cattle were taken from livestock farm Adhartal and private dairy farms in Jabalpur to know the incidence of SCK. Different parameter viz, Hb, TEC, TLC, PCV, DLC, were done and Biochemical analysis of blood glucose and quantitative analysis of blood ketone body were performed. The Urine pH, milk pH,Urine Ketone bodies, Milk Ketone bodies analyzed by Rothera's test.

During the study an overall occurrence of SCK (Subclinical Ketosis) was found to be (40/200) i.e. 20%, whereas, on the basis of days post partum it was found to be maximum (62.5%) on day 20th. The parity wise results indicated that maximum (37.5%) cattle suffered with SCK were in 5th parity. Whereas, no significant variation ($P>0.05$) was observed in the animals affected with SCK in all the treatment groups at all the intervals in rectal temperature, respiration rate, pulse rate, Hb, TEC, PCV, TLC and DLC values.

The mean values of Blood ketone bodies were significantly higher in all the affected animals but it got decreased significantly on 5th and 10th day post treatment and came to the normal in T_1 group. The mean urine pH value increased significantly on 5th and 10th days post treatment and came to the normal limits in T_1 group. Blood glucose value raised to the maximum (62.25±1.72) in animals of T_1 group. However, these values came to the normal in all the treatment groups on 10th day post treatment.

The mean value of milk pH in treatment group was lower as compared to control group on 0 day (Pre treatment) but in all the treatment groups the mean value of milk pH was increased on day 5 and 10 post treatment. However, significant increase was observed in animals of group T_1. The mean value of milk yield showed non significant increase in T_2 and T_3 and slight increase in group T_1 on 5th day of post treatment whereas, on 10th day post treatment increase in milk yield was observed in all the treatment groups with maximum increase in animals of group T_1.

On the basis of blood glucose level, blood ketone bodies, urine pH, milk pH and milk yield, maximum improvement was observed in the animals of group T_1. Thus combination of Nicotinic acid (6 gm) and Propylene glycol (125 gm) BID for 5 days (PO) per cattle was

THERAPEUTIC EFFICACY OF HERBAL FORMULATIONS IN DIARRHOEIC CALVES

Dr. P.C. Shukla **Rohini Gupta**
(Advisor) **(Researcher)**

ABSTRACT

Diarrhoea is defined as an increased frequency, fluidity or volume of faecal excretion. In this clinical episode, the complex haemato-biochemical changes are characterized by imbalanced fluid, electrolytes and acid base status. Diarrhoea in pre-weaned calves is one of the most important cause of morbidity and mortality in the replacement livestock. Calf diarrhoea adversely affects the health status and longevity in the herd and long-term herd productivity. Overfeeding of colostrum, stress, anxiety, food allergy and drug side effects represent the non infectious causes, and do not need antimicrobial therapy. The present work was aimed to study the prevalence of diarrhoea in calves. During the study period, 100 buffalo calves (up to 3 months of age), of either sex in the organized and unorganized sectors were screened. Diarrhoea was confirmed by history and thorough clinical examination of suspected calves.

For therapeutic trial 24 diarrhoeic calves were randomly divided into 4 groups, (T_1,T_2,T_3 and T_4) comprising 6 calves in each group. Additionally, 6 apparently healthy calves served as the control group (T_c). Calves of group T_1 were treated with *Aegle marmelos* (Bael) unriped fruit powder @ 5g t.i.d, PO 5 days, T_2 group with *Aegle marmelos* (Bael) unriped fruit powder @ 5g t.i.d. and Synbiotic @ 5g t.i.d., PO for 5 days, group T_3 with *Holarrhena antidysenterica* (Kutaja) bark powder @ 5g t.i.d., PO for 5 days, calves of T_4 *Holarrhena antidysenterica* (Kutaja) bark powder @ 5g t.i.d. and Synbiotic @ 5g t.i.d., PO for 5 days. In each treatment group, Oral Rehydration Solution (ORS) was prepared in the laboratory and given @ 50ml/Kg b. wt. b.i.d. PO for 5 days.

The overall prevalence of diarrhoea was reported as 29%. The prevalence of diarrhoea in male was found higher (38.63%) as compared to female calves. The highest prevalence of diarrhoea was recorded in calves upto 1 month postpartum 39.58%. No significant changes were observed in rectal temperature, pulse rate, respiration rate and body weight in all the treatment groups.

Haemato- biochemical profile revealed significant difference in haemoglobin, packed cell volume, serum total protein, albumin, chloride, sodium and potassium concentration in all the treatment groups. However, no significant changes were observed in total erythrocyte count, total leucocyte count, mean corpuscular volume, Mean corpuscular haemoglobin, mean corpuscular haemoglobin concentration, globulin, and A/G ratio.

The therapeutic trial in the study revealed that the most efficacious herbal formulation was T_4 followed by T_2, T_3 and least was T_1. These findings were based on the results of early improvement in the general body condition and physical well being obtained with combination therapy in group T4 (*Holarrhena antidysenterica* (Kutaja) bark powder @ 5g t.i.d. and Synbiotic @ 5g t.i.d., PO for 5 days).

"MOLECULAR DIAGNOSIS AND THERAPEUTIC EVALUATION OF SUBCLINICAL STAPHYLOCOCCAL MASTITIS IN CATTLE"

Dr. P.C. Shukla (Advisor)

Pawan Maheshwari (Researcher)

ABSTRACT

Mastitis, caused by multifactorial etiopathological factors, is one of the costliest disease of dairy animals across the globe. The study consisted of 8 apparently healthy animals and 32 field cases of Staphylococcal subclinical mastitis. Epidemiological study, clinical examination of animals and their udder/milk and phenotypic and genotypic characterization of *Staphylococcus* spp. was carried out. The field cases of Staphylococcal SCM were randomly divided into 4 groups. The study was conducted for a period of more than 1 year i.e. from February 2015 to February 2016. For the epidemiological study 550 lactating cattle were screened by modified California mastitis test (MCMT). The overall occurrence of SCM was reported to be 27.81% (153/550) animal wise and 10.13% (212/2092) on quarter wise. During the study highest occurrence of SCM observed in right hind quarter (13.35%) followed by left hind quarter (9.88%), right fore quarter (9.09%) and left fore quarter (8.15%). The age wise occurrence was found to be highest in 5-7 years of age group (36.36%). The highest occurrence of SCM was observed in 3rd parity (41.83%), in early lactation stage (47.46%) and in cross bred (36.43%) animals. Occurrence in organized and unorganized dairy farms does not differ significantly. A score of 1+, 2+ and 3+ in MCMT was noticed in 57.55%, 31.60% and 10.85% of quarters in cattle afflicted with SCM, respectively. Apparently healthy cattle had a mean value of SCC 1.26 ± 0.90 X 10^5 cells/ml. The mean SCC in SCM (15.55 ± 1.20 X 10^5 cells/ml) was significantly increased as compared to control. Apparently healthy cattle had a mean value of milk pH 6.43 ± 0.08. Mean milk pH in SCM (7.30 ± 0.09) significantly increased as compared to control.

The overall occurrence of Staphylococcal SCM was reported to be 16.36% (90/550) animal wise and 6.07% (127/2092) quarter wise as identified on the basis of colony morphology, characteristic colour changes on Mannitol salt agar, positive catalase test, haemolysis pattern on blood agar and DNase activity on DNase agar. Thirty one isolates were found coagulase positive as revealed by coagulase test and 96 were found to be coagulase negative Staphylococci (CNS). The occurrence was highest in right hind quarter (8.77%) followed by right fore quarter (5.60%), left hind quarter (5.59%) and left fore quarter (4.27%). Occurrence of Staphylococcal SCM was highest in age group of 5-7 years (23.77%). The highest occurrence of staphylococcal SCM was observed in 5th parity (25.64%), in early lactation (31.64%) stage and in cross bred (22.48%) animals. Occurrence in organized and unorganized dairy farms does not differ significantly. The occurrence recorded using PCR for identification of *nuc* was 14.62%. Results of antibiogram revealed that most effective antimicrobial agent was enrofloxacin (100%).

The response of therapeutic study revealed significant decrease in SCC and pH in all the treatment groups. On the basis of MCMT, SCC, pH and post treatment bacterial culture animals of group D showed highest recovery. Thus, combination of enrofloxacin, cefquinome and aloe vera was found most efficacious followed by combination of enrofloxacin and cefquinome, aloe vera alone oral and topical and lastly enrofloxacin alone

PREVALENCE, MOLECULAR CHARACTERIZATION AND THERAPEUTIC REGIMEN FOR *CRYPTOSPORIDIUM* INFECTION IN GOAT KIDS

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Pooja Dixit (Researcher)

ABSTRACT

The study was conducted to know the prevalence, molecular characterization and to evolve a suitable therapeutic regimen for *Cryptosporidium* infection in goat kids. To know the prevalence of the infection in goat kid, faecal samples of 205 kids (below 3 months age) were examined by mZN staining. In addition these samples were also examined for other gastrointestinal parasites using standard parasitological techniques. The prevalence study was conducted for a period of one year i.e. from March 2015 to Feb 2016. At the time of collection of samples age, sex, breed, season and presence or absence of diarrhoea was also recorded. Out of 205 kids, 54% (111/205) were diarrhoeic and 46% (94/205) were non-diarrhoeic. The overall prevalence of gastrointestinal parasite was 98% (201/205) of which strongyles 80% (164/205), *Strongyloides* spp. 37.56% (77/205), *Trichuris* spp. 18.05% (37/205), amphistome 19% (39/205) and *Eimeria* spp. were 86.34% (177/205). The infection percentage was almost similar in summer and monsoon but in winters it was comparatively less (96%). These differences were non-significant. No significant difference was seen in different breeds for parasitic infections. Age wise prevalence was significantly higher ($P<0.05$) in kids of above one month to three months age than that of up to one month age. Highly significant difference ($P<0.01$) was observed in prevalence of strongyle and amphistome between kids of above one month to three months age than that of up to one month age. Though infection percentage was slightly higher in male kids than that of female kids but the difference was non-significant. The infection percentage was though higher in kids kept under farm conditions but the difference was non-significant. The percentage of animals suffering from mixed infection was significantly higher ($P<0.01$) as compared to that of mono infection. The overall prevalence of *Cryptosporidium* spp. was 14.63% which was highest in monsoon (21.31%) followed by winter (12.15%) and summer (10.81%) but this difference was non-significant. No significant difference was observed in breed wise prevalence of *Cryptosporidium* spp. The infection was slightly higher in kids kept in farm conditions than that of kids kept in field conditions but the differences were non-significant. In this study, the infection percentage was more in non-diarrhoeic kids. These differences were non-significant. Scoring of infection was also done on basis of oocyst count per microscopic field. The intensity of the infection was of 1 score in 76.60% kids while in 23.30% kids only the infection intensity was of 2 score.

Out of 30 positive faecal samples six were subjected to molecular characterization by PCR-RFLP. DNA was isolated and its quality and quantity was checked. PCR was done and amplicons of both primary and secondary (nested) PCR assay were analyzed by agarose gel electrophoresis. These samples showed a clear 1317 bp band in primary PCR and 834 bp band in secondary (nested) PCR. The *Ssp*I digestion of 834 bp nested PCR product showed three bands at 449 bp, 267 bp and108 bp. *Vsp*I digestion of 834 bp nested PCR product revealed two bands at 628 bp and 105 bp. These band patterns represented *Cryptosporidium parvum*.

In therapeutic study, 25 infected kids were divided into five groups of five kids in each group and one group was kept as healthy control i.e. Group G_1. In group G_2, only ringer's lactate was given while in group G_3, G_4, G_5 and G_6 tylosin @ 20 mg/kg BW IM, Tylosin @ 20 mg/kg BW orally, Toltrazuril @ 20 mg/kg BW and tylosin plus toltrazuril both once a day for five days were given respectively in addition to ringer's lactate. The percentage reduction in OPG was comparatively more in kids where tylosin was given intramuscularly, after five days of treatment (44%) as compared to three days after treatment (16%). In group where tylosin was given orally also the percentage reduction in OPG was higher at five days after treatment (41%) than that of three days of treatment (37%). In group in which toltrazuril was given maximum reduction in percentage of OPG was seen at ten days after treatment (33%). In group treated with tylosin and toltrazuril both, maximum reduction in percentage OPG count was seen at ten days interval (74%).When group G_3, G_4, G_5 and G_6 were statistically compared with group G_2, the differences were found statistically significant ($P<0.05$) in group G_3, G_4 and G_6 while in group G_5 the differences were non-significant.

STUDIES ON THERAPEUTIC EFFICACY OF HERBAL GALACTAGOGUES IN HYPOGALACTIC BUFFALOES

Dr. P.C. Shukla **Shivangi Pathak**
(Advisor) **(Researcher)**

ABSTRACT

The present study was undertaken with the aims of determination of prevalence, haemato-biochemical parameters and to know the efficacy of herbal galactagogues in hypogalactic buffaloes in an around Jabalpur.

Total of 290 lactating buffaloes were screened, out of this 86 buffaloes were from to organised and 204 from unorganised sector. The overall prevalence of hypogalactia obtained was 6.97% in organised and 80.39% in unorganised sector. The lactation wise prevalence of hypogalactia in buffaloes was recorded higher in the buffaloes in 5th lactation (50%) followed by 4th lactation (33.33%), and 3rd lactation (16.67%) in organised sector. While, in unorganised sector the prevalence was higher in buffaloes in 5th lactation (55.44%) followed by 4th lactation (34.14%) and 3rd lactation (13.42%)

The overall mean values TEC of T2 (7.29^{a} ±0.07) group were significantly higher than T3 (7.0^{b} ±0.05) and T4 (6.99^{b} ±0.06) groups which were statistically similar to control group. The overall mean haemoglobin concentration was statistically similar in group T2 (10.32^{a}±0.08), T3 (10.38^{a}±0.06) and T4 (10.41^{a}±0.05) but when compared to control group it is significantly higher. The overall PCV % in group T2 (34.65^{a}±0.25), T3 (35.46^{a}±0.28) and T4 (34.96^{a}±0.28) was statistically similar and it was significantly higher than T1 (control group). The blood glucose concentration was found to be statistically similar in T2 (62.81^{a}±0.65), T3 (60.96^{ab}±0.78) and T4 (60.87^{ab}±0.08) groups but when compared to control group it was significantly higher.

No significant difference was observed in serum calcium concentration among the treatment groups when compared to control group. The mean phosphorus value in T3 (4.53^{b}±0.02) and T4 (4.49^{b}±0.02) group was statistically similar to control group while, in T2 (4.88^{a}±0.03) group it was found to be significantly higher. The overall mean value of serum total protein showed significant difference among treatment groups. It was significantly higher in T2 (7.01^{a}±0.04) followed by T3 (6.88^{b}±0.03) and T4 (6.70^{c}±0.02) group when compared to control group. The overall mean value of serum albumin is significantly higher in T2 (2.51^{a}±0.02) group than T3 (2.41^{b}±0.01) group followed by T4 (2.35^{c}±0.01) group when compared to control group. The serum globulin was found to be statistically similar and significantly higher in T2 (4.49^{a}±0.03) and T3 (4.47^{a}±0.03) group than T4 (4.37^{b}±0.02) group when compared to control group.

The mean value of milk fat was found to be significantly higher in T2 (8.58^{a}±0.04) as compared to control group. Milk Solid Not Fat percent values in T2 (9.55^{a}±0.04) group were reported to be significantly higher than T3 (9.47^{b}±0.03) followed by T4 (9.40^{c}±0.02) when compared to control group. The total milk yield in T2 group was found to be maximum on 15th day post treatment in group T2 showing the efficacy of herbal galactagogue (*Asparagus racemosus* and *Lipidium sativum)* but on 30th day and 60th day post treatment it get waned due to discontinuation of treatment in all groups.

THERAPEUTIC EFFICACY OF POMEGRANATE FRUIT PEEL AND CUSTARD APPLE LEAVES EXTRACT IN BUFFALO CALF DIARRHOEA

Dr. (Mrs.) Kabita Roy
(Advisor)

Nishant Pandey
(Researcher)

ABSTRACT

Diarrhoea is defined as an increased frequency, fluidity or volume of faecal excretion. In this clinical episode, the complex haemato-biochemical changes are characterized by imbalanced fluid, electrolytes and acid base status. Diarrhoea in pre-weaned calves is one of the most important cause of morbidity and mortality in the replacement livestock. Calf diarrhoea adversely affects the health status and longevity in the herd and long-term herd productivity. Overfeeding of colostrum, stress, anxiety, food allergy and drug side effects represent the non infectious causes, and do not need antimicrobial therapy. The present work was aimed to study the prevalence of diarrhoea in calves. During the study period, 200 buffalo calves (up to 3 months of age), of either sex in the organized and unorganized sectors were screened. Diarrhoea was confirmed by history and thorough clinical examination of suspected calves.

During the study period (November 2016 to May 2017), 200 buffalo calves (up to 3 months of age), at Instructional Livestock Farm Complex (ILFC), Adhartal and private units were screened. Diarrhoea was confirmed by the history and through clinical examination of the suspected calves. For therapeutic trial, total 24 diarrhoeic buffalo calves were randomly divided into four treatment groups (T_1, T_2, T_3 and T_4), each comprising of 6 calves. Additionally, 6 apparently healthy buffalo calves served as control group (T_c). Calves of group T_1 were treated with Ofloxacin + Ornidazole (combination antibiotic) @ 20 mg/kg b. wt. BID, PO for 5 days, T_2 group with methanolic extract of leaves of Custard apple @ 25g OD, PO for 7 days, group T_3 with ethanolic extract of fruit peel Pomegranate @ 10g OD, PO for 7 days, calves of T_4 with methanolic extract of leaves of Custard apple @ 12.5g + ethanolic extract of fruit peel of Pomegranate @ 5g OD, PO for 7 days. In each treatment group, fluid therapy was given according to dehydration scores.

The overall prevalence of diarrhoea was reported as 49.5%. In males it was higher (58.3%) and also in calves 0-15 days of postpartum (40.4%). However, these were statistically not significant. Futher, in all treatment groups, significant difference was observed in rectal temperature, pulse rate and respiration rate.

Haemato-biochemical profile revealed significant difference in, packed cell volume%, haemoglobin concentration, total erythrocyte count, total leukocyte count, serum total protein, albumin, globulin, sodium, potassium and chloride concentrations in all treatment groups. However, no significant difference were observed in body weight, erythrocyte indices and A:G ratio.

The therapeutic trial revealed that the most efficacious regimen was T_1 (standard) followed by herbal extract T_3 and T_2. The efficacy was lowest in T_4. This conclusion was based on the early improvement in the general body condition and physical well being in conformity with the evidence-based restoration of homeostasis.

EPIDEMIOLOGY AND THERAPEUTIC EVALUATION OF SUBCLINICAL COLIFORM CAPRINE MASTITIS.

Dr. P.C. Shukla **Deepak Lal Kumhar**
(Advisor) **(Researcher)**

ABSTRACT

The present study was conducted on 260 lactating goats of in and around Jabalpur for subclinical mastitis using modified California mastitis test(MCMT).The overall incidence of infected animals was found to be 36.15% (94/260) on animal basis and 22.65% (116/512) on halves basis. The higher incidence of SCM in does were reported in the age group of 5-6 years (45.74%) followed by 4-5 years (32.97%), 3-4 years (11.07%) and 2-3 years (9.57%) respectively. The breed wise incidence of SCM was observed to be 40.0% in Jamnapari followed by 35.89% in Barbari, 35.13% in non- descript and 32.50% in sirohi breed. Among the breeds Jamnapari is found to have the higher incidence of mastitis.

Halves wise incidence indicated 51 (54.25%) right half involvement whereas, 30 (31.92%), showed left half involvement. In remaining 12 animals (12.76%) both halves were infected. Lactation wise incidence of SCM was recorded highest in does of 4th parity (42.3%), 3rd lactation (33.84%), 2nd lactation (9.4%) and in 1st lactation (2.82%) respectively. Highest incidence of SCM was recorded during 1st month of lactation (44.18%) followed by 30.08% in 2nd month of lactation 8.46% in 3rd month of lactation and 5.64% in 4th month of lactation.

During the present investigations the milk samples were collected between July to mid- April. However, the study revealed that highest incidence in rainy season 64.61%, in winter season 18.47% and in summer season 16.92% respectively.

In this study total positive MCMT samples was 94, out of these positive samples *E.coli* was found 38 (40.42%) after culture examination in selective media. The pre and post treatment of coliform count was found to be ranging between 0.95±0.15(T5) to 2.83±0.17 (T1) on day 0 (Pre treatment). However on post treatment there were varied between 0.48±0.13 to 2.35±0.13 on day 3rd, 0.85±0.08 to 1.66±0.15 on day 7th and 0.50±0.05 to 0.73±0.09 on 15th day respectively. The overall results indicated significant difference in mean values of coliform count in various groups of goats. The results of study revealed that mean value of coliform count was lowest in T3 group (1.17×10^3cfu/ml).Drug given in T3 group is superior over the other groups in terms of reducing the infection. MCMT score of +1, +2 and +3 in MCMT was noticed as 67.24%, 20.68 % and 12.06 % of quarter respectively in does affected with SCM.

Apparently healthy does had a mean value of milk pH 6.55 ± 0.01. The mean value of milk pH in SCM showed a significant increase as compared to their mean control value. Apparently healthy does had a mean value of SCC $5.50 \pm 0.36 \times 10^5$ cells/ml. The mean value of milk SCC in SCM (9.50 ± 0.46 10^5 cells/ml) showed a highly significant increase in T2 as compared to that of their mean control value.

In this study SCM affected does was divided in four groups and each groups had six does. In these groups T1(Inj. Levofloxacin @ 5 mg/kg body weight I/M OD for 3 days), T2(Ashwagandha* (BD) 3gm PO for 7 days), T3(Inj. Levofloxacin @ 5 mg/kg body weight I/M for 3 days + Ashwagandha** Topically (BD) for 7 days) and T4(Ashwagandha* 3g PO + Ashwagandha** Topically BD for 7 days)

Results indicated that Levofloxacin and Ashwagandha given in group T3 was found to be best amongst all groups i.e. T2, T1 & T4 as evident by reduction in PH, SCC, Coliform count and clinical recovery.

DIAGNOSTICS AND THERAPUETIC STRATEGIES AGAINST BRUCELLOSIS IN COWS.

Dr. Devendra Kumar Gupta **Sandeep Shrivastava**
(Advisor) **(Researcher)**

ABSTRACT

The present work on diagnostics and therapeutic strategies against brucellosis in cows was carried out in the Department of Veterinary Medicine, College of Veterinary Science and Animal Husbandry, Nanaji Deshmukh Veterinary Science University, Jabalpur during the period from October 2016 to April 2017.

A total of 200 lactating cows were screened for brucellosis from private Birla dairy farm Satna, Jain and Yadav dairy farms Jabalpur. The information pertaining to age, parity, history of abortion and vaccination status of individual cow was recorded. For epidemiological study, milk and sera samples were collected and tested by MRT, RBPT and STAT. For therapeutic study, 24 brucella infected cows positive for serological tests i.e. MRT, RBPT and STAT were randomly divided into 4 groups viz. T_1, T_2, T_3 and T_4, each comprised of 6 cows. Cows of group T_1, T_2, T_3, were treated using long acting antimicrobials at 72 hours interval for 7 occasions. Cows of group T_4 received no treatment and served as positive control. Six apparently healthy cows (brucella seronegative for MRT, RBPT and STAT) were grouped as T_5 (negative control).

The overall occurrence of the brucellosis in cows was recorded as 13.50% by MRT, 18.00% by RBPT and 26.00% by STAT. Higher occurrence of brucellosis was found in crossbred cows in comparison to indigenous cows. Age wise highest occurrence recorded in cows above 6 years age while no seropositivity was observed in cows up to 2 years of age. However, the highest occurrence was revealed in cows of 6th and above 6th parity.

Response to therapy was evaluated on the basis of results of serotitre by STAT on pre and post treatment (15th, 30th and 45th days). The combination of long acting Oxytetracyclline, Dihydrostreptomycin, Rifampicin and Isoniazid was found to be most effective followed by combination of long acting Marbofloxacin, Dihydrostreptomycin, Rifampicin and Isoniazid and least being combination of long acting Enrofloxacin, Dihydrostreptomycin, Rifampicin and Isoniazid.

DIAGNOSIS AND THERAPEUTIC MANAGEMENT OF KETOSIS IN BUFFALOES

Dr. D.K. Gupta **Priya Waliya**
(Advisor) **(Researcher)**

ABSTRACT

The present work was carried out to study the diagnosis and therapeutic management of ketosis in buffaloes. For epidemiological study, a total of 159 lactating buffaloes were screened for ketosis from various organized and unorganized dairy farms in and around Jabalpur. The information pertaining to anamnesis of buffaloes like, age, stage of lactation, managemental practices followed, feeding standards adopted, physical condition, normal eating or inappetance and milk yield were collected. For therapeutic study, 18 ketotic buffaloes were randomly divided into 3 groups viz. T_1, T_2 and T_3, each comprised of 6 buffaloes. Buffaloes of group T_1 received dextrose 25% and short acting insulin, T_2 received dextrose 25% and dexamethasone sodium phosphate while T_3 received anti-ketotic supplement (*Saccharomyces cerevisiae*, niacin, tannic acid and jaggery) and six apparently healthy buffaloes were grouped as T_4 as healthy control. Blood, urine and milk samples were collected and various parameters (i.e. blood glucose and ketone bodies, urine pH) were analysed pre and post treatment. The milk production was also recorded. Based on these parameters performance, therapeutic efficacy of different treatments was decided.

The overall occurrence of the ketosis in buffaloes was recorded as 18.60% (30/159). Higher occurrence of ketosis was recorded in the unorganized sector 24.32% in comparison to organize sector. Highest occurrence of ketosis was found in buffaloes of 4-6 parity (32.80%) and in their early stage of lactation. On the basis of history; sudden drop in milk production was reported almost in all the ketotoic buffaloes. However, 10-20 % milk yield drop was noticed in majority of ketotic buffaloes. Whereas, no significant variation was observed in the ketotic buffaloes of all treatment groups at different intervals in rectal temperature, respiration and pulse rates. The mean values of ketone bodies in blood and urine, were found significantly ($p<0.05$) higher in all the ketotic buffaloes before treatment but after treatment it decreased significantly on 5th and 10th day of post treatment and reached to normal physiological range. Significant decrease in the mean values of blood glucose, milk yield, milk and urine pH were observed which increased significantly on 5th and 10th day of post treatment.

On the basis of restoration in clinical signs, milk yield and biochemical parameters (ketone bodies, blood glucose level); treatment with dextrose 25% + Insulin was found to be most effective for ketosis followed by dextrose 25% and dexamethasone sodium phosphate and least with antiketotic supplement (*Saccharomyces cerevisiae*, niacin, tannic acid and jaggery)

IN VITRO EFFICACY OF DELTAMETHRIN AGAINST HYALOMMA ANATOLICUM ANATOLICUM"

Dr. R.K. Bagherwal
(Advisor)

Pratibha Thakur
(Researcher)

ABSTRACT

Time to time assessment of efficacy of commonly used acaricides becomes mandatory in order to know their status of effectiveness against various stages of ticks for implementation of effective control measures in field conditions. Synthetic pyrethroids are novel acaricides and least toxic to mammals with minimum deleterious effects on the environment. Present study recorded the period of oviposition and hatching of eggs as 10.2 ± 0.51 and 22.3 ± 0.18 days, respectively at a temperature of 28 ± 1°C and a relative humidity of 85 ± 5%. The efficacy of deltamethrin was studied at various concentrations of deltamethrin, *viz*. 25, 50, 75 and 100 ppm. At 25 ppm concentration the efficacy of deltamethrin, was recorded as 61.16% and at 50 ppm concentration the efficacy was recorded as 94.22%. Whereas, 100% larval mortality was only observed after increasing 3 (75 ppm) and 4 (100 ppm) times higher concentration than the recommended dose of deltamethrin.

PREVALENCE OF CALF DIARRHOEA AND CLINICO-THERAPEUTIC EVALUATION OF HERBAL ANTIDIARRHEAL FORMULATION

Dr. K.K. Mishra **Abhilasha Mishra**
(Advisor) **(Researcher)**

ABSTRACT

The present study was conducted with the objective to evaluate the prevalence of calf diarrhoea due to *E. coli* in and around Rewa District of MP and comparative therapeutic potential of herbal antidiarrhoeal formulation *vis-a-vis* standard treatment with antibiotics and parenteral/oral fluids in the treatment of diarrhoea in calves. In Phase I of the study, for calculating the prevalence of entero-colibacilosis in calves, the calves suffering with diarrhoea were screened for presence of *E. coli.* The microbiological samples were processed for the isolation of *E. coli* and isolates were identified on the basis of cultural, morphological and biochemical characteristics. The *E. coli* isolates obtained were sent to National Salmonella and Escherichia Centre (CRI, Kasauli, H.P., India) for serotyping on the basis of O antigen and were also subjected to antibiotic sensitivity test for determining antimicrobial sensitivity/resistance pattern. Maximum prevalence for enterocolibacillosis were recorded in the age group of 0-7 days (27%) followed by 7-15 days (26%) and females calves were found more susceptible to entero-colibacillosis as compared to males. Most frequently recorded serotype was O88 which was reported in 54.25% of cases, followed by O5, O35, O101, O126 and O128 each having sero-prevalance of 6.24%.Majority of the *E. coli* isolates showed maximum susceptibility for Ciprofloxacin (98.5 %) followed by Ceftriaxone (98%) , chloramphenicol (96.17%) , norfloxacin (95.62%) and Amikacin (93.98%).On the other hand, tetracycline, cotrimazole, cefotaxim and gentamicin expressed resistance. In the Phase II, the diarrhoeic calves were randomly divided into various groups and were assigned various treatments i.e. standard antibiotic treatment (Ciprofloxacin and tinidazole) along with IV fluid and electrolyte support (G II), along with ORS supplemented with zinc (G-III), herbal mixture consisting of bark of Kutaz/ Conessi tree (*Holarrhena antidysenterica*), root tuber of Nagarmotha/Mustaka/Nutgrass (*Cyperus rotendus*), root of Atees/Ativisha/ Indian Atees (*Aconitum heterophyllum*) and unripe fruit of Bael/Bilva/ Apple wood (*Aegle marmelos*) and administered @ 10 gm orally twice daily for five days either alone (G-IV),or along with ORS supplemented with Zn (G-V),or along with antibiotics as described above (G-VI). Significant improvements were recorded in clinical scores (Faecal consistency, depression and dehydration) as well as haemato-biochemical parameters (reduction in PCV, TLC, Neutrophil %, serum Potassium and elevation in serum Sodium and Chloride levels) of diarrheic calves, when treated with herbal mixture orally especially when combined with ORS supplemented with zinc, although statistically comparable improvements were recorded between all treatment groups and also when compared to pretreatment values. No adverse effect of any treatment in diarrhoeic calves including the herbal formulation could be noticed on liver and kidney functions.

“INCIDENCE OF TRYPANOSOMOSIS AND EFFICACY OF TRYPANOCIDAL DRUGS IN BUFFALOES BY MOLECULAR METHOD”

Dr. Nidhi S. Choudhary
(Advisor)

Rashmi Sharma
(Researcher)

ABSTRACT

The present investigation was undertaken to record the incidence of trypanosomosis in buffaloes in and around Indore and Ratlam districts and also to evaluate the efficacy of diminazene aceturate alone and in combination quinapyramine sulphate and quinapyramine chloride against *Trypanosoma evansi*. Incidence was found to be 12.8% and 16.8%, in Indore and Ratlam districts, respectively. Buffaloes >4 years of age had highest incidence as compared to >2-4 and 0-2 years in both districts. Female buffaloes were found to be more affected than male. The highest incidence was recorded in summer season and in monsoon season in Indore and Ratlam districts, respectively. The efficacy of quinapyramine sulphate and quinapyramine chloride was better than diminazene aceturate. The values of Hb, PCV and TEC significantly increased from 0 to 4th and 7th days in group II, while in group I significant changes in Hb, PCV and TEC was observed on 7th day after treatment. The value of TLC, lymphocytes and glucose significantly increased from 0 to 4th and 7th day of treatment in both groups.

EVALUATION OF ACARICIDAL THERAPIES FOR SARCOPTIC MANGE IN CATTLE

Dr. Amita Tiwari **Anjali Singh**
(Advisor) **(Researcher)**

ABSTRACT

The present study was undertaken to know the prevalence of sarcoptic mange in and around Jabalpur, to evaluate acaricidal therapies for sarcoptic mange in cattle and to compare the economics of various acaricidal therapies. Out of 684 cattle screened from various organized and unorganized sectors in and around Jabalpur, 112 cattle were showing signs of dermatological disorders and were selected for further study. Confirmation of sarcoptic mange was done by microscopic detection of *Sarcoptes scabiei* mite in the skin scraping. After confirmation of the presence of mite *Sarcoptes scabiei,* 24 cattle were selected for therapeutic study and 6 apparently healthy cattle were selected for healthy control group. Cattle of groups T_1, T_2, T_3, T_4 were treated with Individually prepared formulation, Tablet ivermectin, 1% injection ivermectin and 3.15% injection ivermectin, respectively. Skin scraping examination and estimation of hemato biochemical parameters were done on day 0 and on days 14, 28, 42, respectively. On the basis of clinical recovery response on day 42 post treatment and skin scraping examination results therapeutic evaluation of various acaricidal drugs were done. The assessment of economics of various acaricidal therapies were done by comparing the total cost of treatment per cattle after completion of therapy.

The overall prevalence of sarcoptic mange in cattle was found to be 4.5% and among dermatological disorders it was 27.67%. The age wise prevalence of sarcoptic mange was highest in age group of 0-6 months (28.23%). Gender wise prevalence was more in female cattle (28.57%). All the clinical parameters viz body temperature, pulse rate and respiration rate varied within normal physiological range before and after treatment. A significantly lowered ($p<0.05$) haemoglobin and total erythrocyte count were observed in groups T_1, T_2, T_3 and T_4 as compared to T_5 (healthy control group) on day 0 (pre treatment). After treatment the significant increase ($p<0.05$) was observed in groups T_1 and T_2. Significantly higher ($p<0.05$) total leukocyte count was observed in groups T_1, T_2, T_3 as compared to group T_5 on day 0 pre treatment. No significant difference was observed in all the hemato biochemical parameters within different treatment groups at different intervals. All the values of these parameters varied within normal physiological range. The observed clinical signs in sarcoptic mange affected cattle were found to be pruritus (100%), alopecia (100%), erythema (54.17%), exocoriation (79.16%) and thickening and wrinkling of skin (70.83%).

On the basis of clinical observation and presence of mite injection ivermectin 1% @ 200 mcg/kg b.wt. was found to be most efficacious. The comparative cost of all the treatment in different groups revealed lowest treatment cost in group T_4 (injection ivermectin 3.15%).

THERAPEUTIC MANAGEMENT OF CHRONIC GENERALIZED DEMODICOSIS IN DOGS

Dr. Amita Tiwari **Priya Maravi**
(Advisor) **(Researcher)**

ABSTRACT

Present study was undertaken to determine the occurrence of chronic generalized demodicosis in dogs in and around Jabalpur, to evolve a suitable therapy and to compare the economics of various treatments of chronic generalized demodicosis. A total of 341 dogs were screened for chronic generalized demodicosis at TVCC, College of Veterinary Science and A.H., Jabalpur from August 2017 to April 2018. All the dogs were thoroughly examined for the presence of any visible skin lesions and microscopically for the presence of *Demodex canis* mite. For therapeutic study a total of 24 dogs having demodectic mange were divided randomly into four groups i.e. T_1 –T_4, each group comprising of 6 dogs. Six apparently healthy dogs which were negative for *Demodex* mites on skin scrapings examination were selected to serve as healthy control (T_5). Groups T_1, T_2, T_3 and T_4 were treated with Tab Ivermectin, Inj Doramectin, Imidacloprid 10% + Moxidectin 2.5% and Individually prepared formulation, respectively. Skin scraping examination and haematobiochemical estimation was done on day 0 (pre-treatment) and on days 15, 30, 45 (post treatment). On the basis of clinical recovery and presence of mite therapeutic response evaluation was done. The assessment of economics of various acaricidal therapies were done by comparing the total cost of treatment per animal after completion of therapy.

The overall occurrence of chronic generalized demodicosis in dogs was found to be 19.64%. The age wise occurrence was higher in dogs upto 2 years of age i.e. 23.7%. Among breeds, German Shephard was more affected whereas gender wise occurrence was more in male dogs (22.74%). The observed clinical symptoms in affected dogs were pruritus (91.7%), alopecia (87.5), erythema (87.5%), papules (29.2%) and hyperkeratosis (41.7%). All the values of clinical parameters viz. body temperature, pulse rate and respiration rate in all the treatment groups varied within normal physiological range. On haemato-biochemical estimation, the mean haemoglobin values were significantly higher in dogs of group T_1 (12.29±0.23), T_2 (12.36±0.24) and T_3 (12.08±0.35) as compared to T_4 (11.16±0.38) and T_5 (11.00±0.26) on day 45 (post treatment). Significant higher values of packed cell volume was observed in group T_1 on day 45 (post treatment) as compare to T_5 and significant increase in mean values of total erythrocyte count were observed between day 0 and 45 in groups T_2 and T_3. Significantly higher values of total leukocyte count was observed in all treatment groups as compared to healthy control group on day 0 pre treatment which were improved in group T_2 on day 45 (post treatment). Non significant difference was observed in differential leukocyte count, aspartate amino transferase, alanine amino transferase, blood urea nitrogen, creatinine, albumin, bilirubin values in different treatment groups at different intervals. However, significantly lower value of total serum protein was observed in group T_3 (5.86±0.25) as compared to T_5 (7.10±0.18) and significantly lower values of mean globulin in groups T_2, T_3 and T_4 as compared to healthy control group T_5 was observed on day 45 post treatment. All the values of haemato-biochemical parameters varied within the normal physiological range.

On the basis of clinical recovery and presence of mite, Inj Doramectin @200 mcg/kg/week s/c (T_2) was most efficacious. Although the efficacy of individually prepared formulation was comparatively lesser than the other drugs yet the results were encouraging and efficacy may be increased by increasing the frequency of application. The comparison of the all cost of treatment in different treatment groups revealed that the lowest treatment cost was observed in group T_4 (Individually prepared formulation).

"*IN VITRO* EFFICACY OF CYPERMETHRIN AGAINST HYALOMMA ANATOLICUM ANATOLICUM"

Dr. R. K. Bagherwal **Lalta Prasad Yadav**
(Advisor) **(Researcher)**

ABSTRACT

Hyalomma anatolicum anatolicum is one of the most common tick of livestock in India. It causes economic loss in dairy and beef industry by inducing decrease in weight gain and milk production in infested cattle. The present investigation was undertaken to evaluate *in vitro* efficacy of cypermethrin against *Hyalomma anatolicum anatolicum*. The engorged female ticks were collected from near-by villages, dairy farms of mhow to study the period of oviposition and hatching of eggs under laboratory condition. The efficacy of cypermethrin against *Hyalomma anatolicum anatolicum* was also studied. The period of oviposition (Mean ± SE) of *Hyalomma anatolicum anatolicum* was recorded as 9.4 ± 0.54 days while period of hatching of eggs (Mean ± SE) of *Hyalomma anatolicum anatolicum* was recorded as 21.9 ± 0.69 days. A total number of average 125-150 larvae were used. Efficacy of cypermethrin at 100, 200, 400 and 800 ppm was 89.30%, 93.36%, 100% and 100%, respectively

THERAPEUTIC MANAGEMENT OF PARVOVIRUS INFECTION IN DOGS

Dr. D. K. Gupta
(Advisor)

Dharam Singh Khare
(Researcher)

ABSTRACT

The present work on therapeutic management of parvo virus infection in dogs was carried out in the Department of Veterinary Medicine, College of Veterinary Science and Animal Husbandry, Nanaji Deshmukh Veterinary Science University, Jabalpur during the period from August, 2017 to January, 2018.

On screening, 980 dogs were found to be suffered from gastroenteritis. The parameters pertaining to age, sex, breed and feeding habits of each suspected dog were recorded to study the epidemiological pattern of canine parvovirus (CPV). The cases were confirmed by Scanvet canine parvovirus antigen detection kit (Scan vet Parvo^{tm} kit). For therapeutic study, a total of 32 confirmed cases of CPV were selected and randomly divided into 4 groups as T_1 to T_4, each group comprised of 8 dogs. Group T_1 received the antibiotic amikacin @ 10 mg/kg b. wt., group T_2 received antibiotic amikacin along with immunomodulator, group T_3 received antiviral acyclovir @ 20 mg/kg b.wt. and group T_4 received antiviral acyclovir along with immunomodulator. However, 8 apparently healthy dogs were selected as healthy control (T_C).

The overall prevalence was found to be 7.24% (71/980). The age wise prevalence recorded was significantly higher (11.9%) in the pups of 0-3 months of age followed by 3-6 months of age (7.09%), 6-12 months of age (5.31%) and least in the dogs of above 12 months of age (1.11%). No significant difference was observed in sex wise prevalence of CPV. Significantly higher prevalence was noticed in the pups kept on vegetarian diet (9.34%) in comparison to non-vegetarian diet. Vomiting was observed to be the most common clinical finding in almost all the cases of CPV.

There was no significant difference in clinical, haematological and biochemical parameters in different treatment groups. However, there was significant difference in pre-treatment and post-treatment values of clinical, haematological and biochemical parameters at different interval within the group. Response to therapy was evaluated on the basis of results of clinical score. The 5 clinical attributes of each patient: attitude, appetite, vomiting, temperature and feces were recorded at different interval from each clinical case under the treatment group. The clinically normal parameters were represented by score '0' which got increased as per the severity of signs maximum up to score '3' for each variable. The combination of antiviral acyclovir along with immunomodulator was found to be superior than the therapy used in other treatmen.

“PREVALENCE OF HAEMOPROTOZOAN DISEASES AND COMPARATIVE EFFICACY OF DIMINAZENE ACETURATE AND IMIDOCARB IN CANINE BABESIOSIS”

Dr. H.K. Mehta **Mahima**
(Advisor) **(Researcher)**

ABSTRACT

The current study was carried out to observe the prevalence of haemoprotozoan diseases in dog, in Indore district (M.P.) on the basis of month, age, sex and breed. Ultrasonographic changes and comparative efficacy of certain drugs were studied in 12 babesia positive dog. Out of 3500 dogs the overall prevalence of haemoprotozoan diseases was observed to be (1.142%). The prevalence of canine babesiosis, anaplasmosis and mixed infection was recorded as (1.028%), (0.057%) and (0.057%) respectively. Highest prevalence month, age, sex and breed wise (1.87) in August, (1.23%) above 18 months old, (1.23%) in male, (27%) in German shepherd were observed. Ultrasonographic study, hepetomegaly observed in 7 dogs, kidneys structure not clear in 4 dogs, splenomegaly in 9 dogs, cystitis in 5 dogs and gall bladder distended in 3 dogs under 12 babesiosis positive dogs. It has been reveled that Diminazene aceturate and Imidocarb were found equally effective in canine babesiosis.

DIAGNOSTIC ULTRASONOGRAPHY AND THERPEUTIC MANAGEMENT OF SUBCLINICAL MASTITIS USING DRY COW THERAPY

Dr. P.C. Shukla
(Advisor)

Arun Mourya
(Researcher)

ABSTRACT

Subclinical mastitis is defined as the absence of physical signs of inflammation to the udder and milk and it is the most common and prevalent form of mastitis and prevalent 15 to 40 times more than clinical mastitis. The present work was aimed to study the prevalence, ultrasonographic changes in udder disease and comparative efficacy of dry cow therapy and internal tea sealent on intramammary infection during subsequent lactation. In this study, total of 412 lactating cattle were screened by modified california mastitis test (MCMT), somatic cell count (SCC) and milk pH.). The overall prevalence of infected animal was found to be 31.55 per cent (130/412) on animal basis and 20.18 per cent (330/1635) on quarter basis. was During the study highest prevalence of SCM observed in right fore quarter i.e. 22.14 per cent (91 out of 411 quarters) followed by 21.08 per cent (86 out of 408 quarters) in right hind quarter, 19.32 per cent (79 out of 409 quarters) in left fore quarter and lowest 18.18 per cent (74 out of 407 quarters) in left fore quarter. The age wise prevalence was found to be highest in 5-7 years of age group (38.50%). The highest prevalence of SCM was observed in 4th parity (44.12%), in early lactation stage (56.25%) and in cross bred (35.06%) animals. Prevalence in organized and unorganized dairy farms is 29.82% and 41.66% respectively. MCMT score wise prevalence recorded as 1+, 2+ and 3+ was 58.18%, 29.09% and 12.73% of quarters in cattle afflicted with SCM, respectively. Apparently healthy cattle had a mean value of SCC $1.97 \pm 3.11 \times 10^5$ cells/ml. The mean SCC in SCM ($11.80 \pm 4.18 \times 10^5$ cells/ml) was significantly increased as compared to control. Apparently healthy cattle had a mean value of milk pH 6.20 ± 0.08 whereas in SCM milk pH was 6.68 ± 0.09. Further, treatment groupsT2, T3 and T5 showed significant changes.

Ultrasonography of the normal udder parenchyma revealed homogenous hypoechogenic parenchyma with interspersed anechoic blood vessel, milk alveoli and lactiferous duct. The gland cisterns appeared as a large homogenous anechoic area with few hypoechoic dots corresponding to the milk. Teat wall appeared as three fold layer structure. The appearance of rosette of furstenberg as short hyperechoic line extending from the teat cistern into the papillary duct which could be defined as a thin, bright white line at the end of the teat. Subclinical mastitis positive cows has homogenous hypoechoic udder parenchyma with lack of clarity of visualization of milk alveoli and lactiferous duct. There is loss of anechogenicity of gland cisterns and appeared as mixed hypoechogenic content and outline of the teat canal irregular, cistern, homogenous hypoechogenic contents and loss of three layered appearance of the affected teat wall. There were overlapping of papillary duct, papillary orifice and rosette of furstenberg and difficult to differentiate.

The response of therapeutic study revealed significant decrease in SCC and pH in all the treatment groups. On the basis of MCMTand SCC animals of group T3 showed highest recovery. Thus, combination of Ceftiofur hydrochloride and Internal Teat sealant was found most efficacious followed by Ceftiofur hydrochloride and Teat sealant (Bismuth subnitrate) alone.

DEPARTMENT OF EXTENSION

AN ASSESSMENT OF ROLE PERFORMANCE AND CONTRIBUTION OF TRIBAL WOMEN IN ANIMAL HUSBANDRY PRACTICES

Dr. M.K. Mandal
(Advisor)

Suman Sant
(Researcher)

ABSTRACT

Recently, there has been a growing realization of the active participation and substantial economic contributions of women in various facets of rural life. The house work performed by the women and family members is totally unpaid everywhere in the World. They are treated as unproductive creatures in the society. The tribal women, in that sense, are not different from farm women. Evidently, the livestock rearing and management related activities still continues predominantly to be the responsibility and domain of the tribal women. Therefore, it is imperative that productive works performed by tribal women at home is essential to the community but invisible to the economy, be quantified and evaluated in monetary terms. Thus, the present study was conducted to assess the role performance and contribution of tribal women in A.H. practices. The study was conducted in randomly selected four villages of Anuppur block of Anuppur district. Data were collected through a structured interview schedule from 100 respondents by personal interview method. Coefficient of correlation ('r') was computed to test relationship between the dependent and independent variables.

The analysis of data revealed that respondents were predominantly middle age group, illiterate, belonged to Hindu religion, with nuclear and small family size. Agricultural labour was the major occupation. They belonged to small land holding category with small herd size and low information source utilization. The participation of the women was found higher in management and health care followed by feeding, marketing and breeding activities. The decisions were made by wife alone in the activities like colostrums feeding, caring of animals. Husband dominated in the marketing activities. Time spent pattern of the tribal women in various A.H. activities in descending order, were in feeding (76.40 man days/yr.), management (61.32 man days/yr.), health care (8.51 man days/yr.), marketing (4.53 man days/yr.) and breeding practices (3.63 mandays/yr.). The invisible economic contribution in monetary terms made by tribal women was Rs. 15439/ year.

Land holding, occupation, herd size, Information source utilization and gross income from A.H. practices were positively and significantly correlated with income employment status of tribal women. On the other hand, age, occupation, herd size and Information source utilization had positive and significant correlation with decision making pattern of tribal women.

Thus, it is concluded that, the overall role performance of tribal women in A.H. practices was more than the men folk and they also contribute noticeably in this sector as invisible workers.

SOCIO-ECONOMIC IMPROVEMENT OF TRIBAL PEOPLE OF MANDLA DISTRICT THROUGH GOAT FARMING PRACTICES.

Dr. M.K. Mandal
(Advisor)

Harikant Bilwar
(Researcher)

ABSTRACT

The present study was conducted on socio-economic improvement of tribal people of Mandla district through goat farming practices in randomly selected three villages of Narayanganj block of Mandla district. Data were collected through a structured interview schedule from 100 tribal goat owners by personal interview method.

The analysis of data revealed that respondents were predominantly middle age group (32-53 yrs.), had low level of education with medium sized (4-6 members) joint family. Agricultural labour was the major occupation. They belonged to landless category with low (< Rs. 12000) annual gross income category. They had medium flock size and reared goats in free-range system. The uncontrolled mating within the household flock was predominant in the study areas. No systematic care was taken with regard to health care of goats. Vaccination and deworming of the goats was also not carried out in any of the villages surveyed. Direct marketing was prevalent in the study area although middlemen also existed. The major constraints identified were high incidence of diseases, higher rate of mortality, lack of knowledge and extension services.

Suitable extension interventions like 03 awareness cum animal health treatment camps, 02 exposure visits, 02 training programmes were applied in the study areas. Three SHGs were formed and they were provided with one Sirohi goat unit (10 doe+ 1 buck).

The study showed a significant improvement in the knowledge and attitude of tribal goat owners after extension interventions. Regarding economic improvement, on an average each SHG received an income of Rs. 20317/- during the experimental period (upto 8 months). Thus, it can be concluded that proper extension cum technological interventions on goat farming can improve the socio-economic status of tribal people through SHG approach.

IMPACT ASSESSMENT OF GOAT FARMING BASED TRIBAL SELF- HELP GROUPS IN MANDLA DISTRICT OF MADHYA PRADESH

Dr. M.K. Mandal
(Advisor)

Gajendra Uikey
(Researcher)

ABSTRACT

The present study was conducted to assess the impact of goat farming based tribal self-help groups in Narayanganj and Niwas blocks of Mandla District of Madhya Pradesh. Data were collected through a structured interview schedule from 30 members of 06 tribal SHG by personal interview method.

The analysis of data revealed that majority of the tribal SHG members (73.33%) were middle age group (32-53 yrs.), illiterate (60.00%), agricultural labour (73.33%) with medium sized (66.67%) joint family (83.33%). Majority of the SHG members (76.67%) belonged to landless category with low (< Rs. 8000) annual family income category (80.00%). The study shows that, 90 per cent and 86.67 per cent respondents had low level of low level of knowledge and attitude, respectively.

The members of SHGs were asked to prioritize the specific reasons for joining in the group. The study revealed that, the main reasons for joining in the SHG was to repay old debt and to maintain households expenditure. Suitable extension interventions like awareness cum animal health treatment camps, exposure visits and training programmes were applied in the study areas.

Regarding impact analysis, the study showed a significant improvement in the knowledge and attitude of SHG members after extension interventions. Each SHG received an income of Rs. 65467/- during the experimental period (upto 15 months). Thus, it can be concluded that proper extension cum technological interventions on goat farming can improve the socio-economic status of tribal SHG members.

IMPACT ASSESSMENT OF TECHNOLOGICAL INTERVENTIONS ON IMPROVED BUFFALO MANAGEMENT PRACTICES

Dr. Ruchi Singh
(Advisor)

Rashmi Vishwakarma
(Researcher)

ABSTRACT

The present study was conducted on 'Impact Assessment of Technological Interventions on Improved Buffalo Management Practices' in adopted villages of Jabalpur. Data were collected through a structured interview schedule from all buffalo owners of adopted village (n=60) by personal interview method.

The analysis of data revealed that respondents were predominantly old age group (48.34%), had middle school level of education with medium sized (80.00%), nuclear family (56.66%) and belonging to other backward class (81.66%) their main occupations were agriculture with animal husbandry. They belonged to medium land holding size (28.34%) with high (Rs. >50,000) annual gross income category.

The majority of the buffalo owners (78.33%) had small herd size in adopted village with 48.33 per cent had high (>10 years) buffalo farming experience. They were allowed for grazing on pasture land. Only 36.66 and 25.00 per cent of the farmers regularly fed common salt and mineral mixture respectively to their buffalo. Majority (85.00%) of the buffalo owners followed pregnancy diagnosis. It was also observed that 68.34 per cent of the respondent were treated their sick animal by Veterinary Doctor/A.V.F.O. and majority isolated their sick animals from healthy animals.

Suitable extension interventions like 02 animal health treatment camps and 02 exposure visits were applied in the study areas. Regarding extension interventions, the study showed a significant improvement in the knowledge and adoption level of buffalo owners.

Technological interventions (deworming and feeding of mineral mixture) were done in two villages to compare the increase in milk yield at 15 days interval for 180 days between (treatment and control group), revealed significant difference in milk yield gain after technological interventions.

Thus, it can be concluded that proper extension cum technological interventions on buffalo management practices are profitable and can improve the productivity of buffalo along with socio-economic status of buffalo owners.

KNOWLEDGE AND ADOPTION OF IMPROVED CATTLE FARMING PRACTICES IN JABALPUR DISTRICT (M.P.)

Dr. Ruchi Singh **Priyanka Kushram**
(Advisor) **(Researcher)**

ABSTRACT

The present study was conducted in two adopted village namely Kailwas and Chatarpur, 115 farmers randomly selected from two villages of Jabalpur district to assess the knowledge and adoption level of cattle farmers and also to establish the relationship between the dependent and independent variables of cattle farmers. The data were collected through pre-structured interview schedule developed for this purpose and by holding personal interview with the farmers during 2016-17.

The analysis of data revealed that respondents were predominantly middle age group (67.82%), had low level of education (29.56%) with medium sized (59.13%), nuclear family (54.72%) and belonging to schedule caste/schedule tribal (47.82%). The main occupation of respondents was labour. They belonged to landless with medium (Rs. 37395.83-72082.43) annual gross income category. The majority (53.91%) of respondents had received medium level of extension service.

The majority of cattle owners (77.39%) had small herd size in adopted village with 63.47per cent had medium (5-10 year) cattle farming experience. The majority of cattle owners reared cattle in free-range system and the major feed resource was natural pasture. The uncontrolled mating was predominant in the study areas. No systemic care was taken with regard to health care of cattle. Very few respondents performed vaccination and deworming of the cattle while majority of them was not carried out by themselves in surveyed villages. Further data analysis revealed that majority of respondents had high level of constraints i.e. 55.65 per cent.

Regarding the overall knowledge level of respondent in cattle farming practices, majority of respondent (69.56%) had medium level of knowledge, whereas 26.08 per cent had low level of knowledge. The data analysis pertaining to adoption level shows that 64.36 per cent of the respondent had medium level of adoption.

The relationship indicates that with the increase in age there is a decrease in knowledge. The positive correlation of education indicates that as education increase, the extent of adoption increase and vice versa. Regression analysis implies that variables namely education, farming experience, extension service received and milk production were important to explain the variation towards knowledge and adoption of farmers. It also implies that education of the farmers makes them to think logically and analytically which motivate them to acquire latest knowledge and adoption technology.

Hence, for improving the knowledge and adoption level of cattle farmers one has who take into account these variables as they play an important role in part of knowledge and adoption.

IMPACT OF EXTENSION STRATEGIES ON GOAT FARMING IN ADOPTED VILLAGES OF JABALPUR

Dr. Ruchi Singh **Sandeep Kumar Singh**
(Advisor) **(Researcher)**

ABSTRACT

The present study was conducted on impact of extension strategies on goat farming in adopted villages of Jabalpur. Data were collected through a structured interview schedule from all goat owners of adopted village (N=80) by personal interview method.

The analysis of data revealed that respondents were predominantly middle age group (32-53 yrs.), had low level of education with medium sized (4-8 members), nuclear family belonging to schedule caste/schedule tribal. The main occupation of respondents was labour. They belonged to landless category with medium (Rs. 24895-148492) annual gross income category. The Majority of respondents had utilized Information- source was neighbors.

Flock structure of goat in adopted village was found higher in village Silua (234 Numbers). Respondent had small flock size (< 5) i.e. 37.50% with less (< 5 year) experience i.e. 50% in goat farming and reared goats in free-range system. The uncontrolled mating within the household flock was predominant in the study areas. No systematic care was taken with regard to health care of goats.

Suitable extension interventions such as 02 awareness camps, 02 animal health camps and 02 exposure visits were applied in the study areas. Regarding extension interventions, the study showed a significant improvement in the knowledge (χ^2 -21.25) and adoption (χ^2 -22.66) of goat owners.

Technological interventions (deworming, vaccination and feeding of mineral mixture) were done in two adopted village namely: Ghana and Deori (i.e. control and treatment group) to compare the increase in body weight gain of goats at 15 days interval with control group (i.e without technological interventions). Un-paired ‘t’ test was used, which revealed significant difference in body weight gain after technological interventions. Thus, it can be concluded that proper extension cum technological interventions on goat farming are profitable and can improve the socio-economic status of goat owners. The contribution of goat enterprise to household income is high and ranks second to crop production.

AN EXPLORATORY ANALYSIS OF BIO SECURITY PRACTICES FOLLOWED IN SMALLHOLDER GOAT VALUE CHAINS OF REWA DIVISION OF MADHYA PRADESH

Dr. Hari R.
(Advisor)

Surendra Singh Jaitawat
(Researcher)

ABSTRACT

Value chains can be defined as groups of people linked by an activity to supply a specific commodity. In the context of small ruminants, it includes all the actors and institutions involved in production and transport of products including the final consumer. Bio security means the measures designed to protect a population against harmful biological or biochemical substances. The value chain assessment provides a practical framework for disease risk assessment and animal disease management**:** The present study was conducted in two divisions of Rewa division viz, Rewa and Sidhi. 160 small holder goat farmers (80 from each district) was selected from both Rewa and Sidhi district after employing a multistage sampling technique. Semi structured interview schedules were employed to collect data from the farmers. Delphi techniques and key informant interviews were employed for developing value chain. Direct interviews were conducted with 30 veterinarians for identification of risk communication and value chain dynamics. 30 stakeholders, 15 from each district were interviewed for completing value chain mapping and risk communication analysis. The following variables were assessed as part of analysis bio security practices. Socio economic variables, Adoption practices, Risk communication, Attitudes and constraints in adopting practices. For analyzing results suitable statistical methods were employed. Results indicated that socio economic variables like age, education and flock influenced the adoption practices. The adoptions of bio security practices were very low among the farmers. Attitudes towards bio security were only also very low for majority of the farmer in both districs. Risk communication channel were not efficient in reporting the disease. Majority of the veterinarians said they were not able to report bio security problems due to work schedule and other infrastructural problems. Other members of the value chain also failed to adopt the bio security practice for spread of disease. The major constraints in adopting bio security practices were lack of knowledge and economic reasons. There are no formal practices of biosecurity for small holder goat farmers at national level. More works need to be done in this sector in India.

POULTRY SCIENCE

EFFECT OF PROBIOTIC AND HERBAL SUPPLEMENTS ON THE GROWTH PERFORMANCE OF COMMERCIAL BROILER CHICKS

Dr. J. P. Singh
(Advisor)

Prabhat Gupta
(Researcher)

ABSTRACT

A study was undertaken to assess the effect of probiotic (*Lactobacillus sporogenes, Lactophillus acidophilus, Sacchromyces cerivisiae)* vis-à-vis herbal supplement (ambla pulp powder, turmeric, neem leaf powder)and in combination on the body weight, growth rate, feed intake, feed conversion ratio, carcass traits and economic of broiler production of commercial broiler chicks. A total of 180 straight run, day old 'Vencob' broiler chicks were randomly divided into four treatment groups of 45 chicks each viz., control (T0), T1, T2, and T3. Each group was further divided into three replicates of 15 birds each. The birds of the first treatment group were fed on a basal diet (control group). The second group birds were fed on a basal diet supplemented with herbal mixture (1% ambla pulp powder, 0.5% turmeric powder, 0.5% neem leaf powder). The third group was fed on a basal diet supplemented with probiotic i.e. *Lactobacillus sporogenes, Lactophillus acidophilus, Sacchromyces cerivisiae* @ 50g/quintal of the basal and the last treatment group where fed with combination of herbal supplements and probiotic.

All experimental birds in each treatment group were reared on deep litter system under ideal and identical management and environmental conditions throughout the period of six weeks. Water was offered *ad lib.*

“STUDIES ON THE GROWTH PERFORMANCE OF KADAKNATH BREED OF FOWL UNDER INTENSIVE SYSTEM OF HOUSING.

Dr. Shrikant Joshi **Praveen Dubey**
(Advisor) **(Researcher)**

ABSTRACT

Present study was undertaken to study the growth rate, feed conversion efficiency, carcass characteristics and mortality pattern of Kadaknath breed of fowl from 0-5 months of age. Economics of raising up to 5 months of age was also worked out. The experiment was carried out on 500 straight run chicks under intensive system of housing. The mean weekly feed consumption ranged from 21.29±0.11 to 244.52±2.62 g, up to 8 week of age. From 3rd to 5th month of age it was 1682.09±38.59, 1739.05±11.84 and 1622.83±7.14 g., respectively.

The average weight of day old chicks was found to be 28.55±0.5 g. The pooled mean over replications ranged from 1 to 8 week of age was 36.10±0.31 to 407.73±3.18 g. The overall mean body weight observed at 3rd, 4th and 5th month of age was 668.30±6.59, 842.87±10.11 and 974.28±17.96 g, respectively. The overall mean weekly body weight gain ranged from 7.54±0.10 to 86.34±5.65 g. The mean monthly body weight gain at 3, 4 and 5 month of age was found to be 260.52±7.49, 174.58±7.50 and 131.41±18.84 g., respectively. The overall mean weekly feed conversion ratio ranged from 2.09±0.08 to 2.84±0.12 up to 8 week of age. The overall mean monthly feed conversion ratio at 3, 4 and 5 month of age was 6.46±0.06, 9.97±0.37 and 12.56±1.98, respectively. The mean feed consumption, body weight, body weight gain and feed conversion ratio pooled over replications at five month of age was 5973.12, 974.28, 945.73 g. and 6.31, respectively.

The average yield of giblet, breast muscle, thigh muscle, organ weight and abdominal fat was 5.35±0.02, 19.41±0.13, 14.91±0.25, 0.88±0.04 and 1.59±0.21 percent of live weight. The dressing percent recorded was 70.43±1.79 at 5 month of age. Maximum mortality (11.4 %) was recorded at first week of age followed by second week (2.6 %) and 16th week (2.4 %) of age. Maximum number of chicks died due to yolk sac infection (14 %). The total cost of production/bird of Kadaknath birds up to 5 month of age was Rs. 153.02. The net profit obtained per bird was Rs. 139.26.

"EFFECT OF HOUSING SYSTEM, DIETARY ENERGY AND DRIED GARLIC POWDER ON PERFORMANCE OF COMMERCIAL DUAL PURPOSE COLOURED BIRDS"

Dr. R.P. Nema
(Advisor)

Dharmendra Singh Rajput
(Researcher)

ABSTRACT

Indian poultry industry divided in to commercial poultry farming and rural back yard poultry farming. In rural production without investment is the most potent attribute of dual purpose breeds which are raised in backyard since centuries in rural area. Dual type coloured commercial (25% kadaknath: 75% Jabalpur colour) birds having better growth and egg production performance than indigenous birds.

There are evidence that garlic (*Allium sativum*) has cholesterol lowering effect due to the presence of sulphur-containing bioactive compound, several enzymes, amino acids and minerals and feeding result in better growth.

Two way analysis of variance with interaction design (Completely Randomized design) was utilized in present study having 3 energy levels 2500, 2700 and 2900Kcal ME/kg(D_1,D_2, D_3) with isonitrogenous diet and supplementation of garlic powder with 2700Kcal ME/Kg(D_4). The experimental population consists of randomly selected 160 day old commercial dual purpose coloured chicks. The chicks were distributed equally to two housing system. H_1 chicks will be reared in battery brooder and H_2 group in the deep litter pens, as per replicate wise and treatment wise. Each treatment will be consisting of 2 replicates containing 10 chicks in each unit.

Housing effect show significant differences and heavier body weight at 1-5 and 7thweek age for battery brooder and show non significant differences at 6 and 8 week of age. Dietary effect are highly significant on body weight from 1-7 week of age and show non significant effect at 8th week. At 7th week of age D_4 diet level chicks having dried garlic powder has attained 776.80 ± 13.07 gm body weight which has highly significantly difference of 49.92g heavier body weight than D_2 which having similarly energy level as D4 diet but do not added with dried garlic powder Analysis of variance revealed that average intake/bird/day were highly significant from 2-8 weeks of age for housing system where as diet effect were also highly significant for 1, 3, 4, 5, 7 & 8 week. Cumulative food conversion ratio (0-8 week) was not affected by housing, dietary and their interaction effect.

Conformation trait are least affected by housing system but breast angle show significant result. Carcass trait's are not affected by housing system and show non significant result.

Dietary effect show significant result only on breast angle whereas shank and keel length are non significant. Carcass traits show significant results for breast wt. % & fat % and non significant for other carcass traits due to different energy levels. Housing and energy level interaction are non significant for most of the carcass traits except breast angle.

EFFECT OF GENOTYPE AND PLANE OF NUTRITION ON THE PERFORMANCE OF DUAL TYPE COLOUR BIRD"

Dr. J.K. Bhardwaj **Bhoite Mayur Hanuman**
(Advisor) **(Researcher)**

ABSTRACT

The present study was planned to investigate the effect of genotype and plane of nutrition on the performance of two triple cross dual type colour chicks i.e. genotype G_1 and G_2 respectively produced by direct crossing and backcrossing of Jabalpur colour (JBC), Kadaknath (Kd) and Colour synthetic broiler female line (CSFL). These genotypes were developed for rural poultry production and each having 25% local native fowl Kadaknath inheritance. A total number of 320 day old chicks, 160 from each genotype (G_1 and G_2) were randomly distributed into eight dietary treatments in two replicates containing 10 chicks in each group and reared under deep litter system. Chicks were fed different dietary treatment consisted of four different protein level 16%, 18%, 20% and 22% with two energy level (2600 kcal ME/kg and 2800 kcal ME / kg) of diet throughout the experimental period (day old to twelve weeks) in 2x4x2 factorial design experiment. The performance of both the genotypes were evaluated in terms of growth, feed intake, feed efficiency, percent mortality, conformation (eighth and twelfth weeks age) and carcass traits.

Genotype G_2 (25%Kd : 25% JBC : 50 CSFL) was heavier in body weight, better in body conformation and had low percent losses and percent of abdominal fat with comparable percent total meat yield and percent of cut up part yields than G_1 genotype (25%Kd:75%JBC). Different dietary protein levels (16%,18%,20%,22% CP) exerted significant influence on biweekly body weight, feed efficiency, shank length, keel length and breast angle of males and females, percent total meat yield of both the genotype stock. Diet containing higher 22% CP (P_4) resulted better feed efficiency at two, four, six week ages whereas 18% CP (P_2) showed better feed utilization at higher ages (ten and twelve weeks age). Two energy level of diet (2600 kcal ME/kg, 2800 kcal ME/kg) affected significantly only at ten and twelve week body weight measurement. Lower level of energy (2600 kcal ME/ kg) resulted superiority in body weight, more shank length and keel length, whereas higher level (2800 kcal ME/ kg) energy recorded better feed utilization, wider breast and higher percent total meat yield. Conformation traits measurements were higher in males than females. Results revealed that different dietary protein and energy combination considered under study supported for better health with 100% survivability of chicks. Significantly higher dressing percent was obtained in males of G_2 genotype whereas in females of G_1 genotype. Higher level of dietary protein (22%CP) yielded better dressing and percent total meat yield in males whereas P_2 (18% CP) showed better yield in females. Genotype G_2 showed significantly less percent abdominal fat ranges from 0.54 to 0.66% than G_1 genotype 0.72 to 0.73% in male and females.

The interaction involving genotype x protein, protein x energy, genotype x energy and higher order interaction genotype x protein x energy exerted highly significant influence on biweekly body weight measurement and carcass traits. Tendency of higher body weight with increased level dietary protein was observed in both the genotype. Genotype G_1 showed higher body weights, better feed utilization efficiency and carcass yield with diet containing 22% CP and 2600 kcal ME / kg of diet whereas genotype G_2 with the diet having 18 % CP and 2600 kcal ME/ kg of diet. These interactions indicating higher importance for body weights and less importance for conformation and carcass traits.

From present results it can be concluded that there is necessity for proper balancing of percent protein and energy level of diet and G_1 x P_4 x E_1 diet containing 22% CP and 2600 kcal ME / kg for genotype G_1 whereas G_2 x P_2 x E_1 18% CP and 2600 kcal ME / kg of diet for genotype G_2 is sufficient for obtaining proper growth with better feed efficiency for raising of these dual type colour variety.

EFFECT OF INTENSIVE AND EXTENSIVE HOUSING SYSTEM ON GROWTH PERFORMANCE OF NARMADANIDHI AND CROSSBRED KADAKNATH CHICKEN

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ABSTRACT

This experiment was planned to investigate the effect of intensive and extensive housing system on growth, feed conversion and carcass performance of Narmadanidhi and crossbred Kadaknath chicken which were produced by direct crossing and back crossing of Jabalpur colour and Kadaknath breed. These varieties were developed for rural poultry farming. Narmadanidhi having 25% and crossbred kadaknath 50% local native fowl kadaknath inheritance. A total of 180 day old chicks, 90 from each varieties reared upto 6th week of age under intensive (deep litter) housing system, thereafter randomly distributed and reared into three groups i.e. intensive, semi intensive and free range housing system. Each system having 30 chicks of each variety into two (15 chicks) replication. Brooding chicks were fed ration containing 20% CP and 2800 ME kcal/kg of diet and growing (7-14 weeks) 16% CP and 2600 ME kcal/kg of diet. Only 40% of grower feed was offered to chicks of semi-intensive and only kitchen waste to chicks of free range housing system. The performance of both the varieties were evaluated in terms of growth, feed conversion ratio, percent mortality, conformation traits and carcass characteristics.

Narmadanidhi variety was heavier in body weight, gained body weight at faster rate, better in feed conversion ratio, superior in body conformation had less percent losses, and percent abdominal fat, higher percent breast and back with neck weight and comparable percent total meat yield than crossbred Kadaknath. Irrespective of the sex Narmadanidhi exhibited highest gain in intensieve system between 12-14th week age. Feed conversion ratio from dayold to 6 weeks measured was 1.48±0.03 for Narmadanidhi and 1.73±0.07 for crossbred Kadaknath. Better feed efficiency (2.19) was obtained for Narmadanidhi than crossbred Kadaknath.

Different housing system exerted significant influence on weekly and biweekly body weights, feed intake g/bird/day, weekly feed conversion ratio, breast angle and keel length measurement and on percent fat of both the varieties. Intensive housing system had significantly higher body weight, better feed conversion than semi intensive housing followed by free range system of management. Free range system exhibited lowest abdominal fat percent. Both these varieties recorded 100% survivability under intensive and extensive housing system. The interaction involving variety x housing system was found significant for 8th and 10th week males and females body weight, percent shrinkage and non significant for feed intake. Variety x housing x period interaction was highly significant for feed intake. Feed intake was seen to increase with increase in age (Period P_1-P_4). Narmadanidhi showed higher dressing yield and total meat yield under semi-intensive whereas crossbred Kadaknath under intensive housing system. Interactions indicating more importance for growth, moderate for conformation and less for carcass traits. The net income per bird over feed cost realized Rs. 128.66, 127.62 & 109.84 with corresponding benefit cost ratio 2.04, 2.85 and 3.80 for Narmadanidhi and 106.05, 103.91, 85.01, with B:C ratios 1.82, 2.56 and 3.48 for crossbred Kadaknath under free range, semi-intensive and intensive housing system respectively.

From the present results it can be concluded that Narmadanidhi variety with respect to growth, feed efficiency and carcass performance is more economically suitable for rearing under extensive (free range, semi-intensive) housing system than crossbred Kadaknath. Free range housing system most economical among three housing system for rearing of these dual type colour variety. Interaction effects were more important for growth, moderate for conformation and less for carcass traits.

"EFFECT OF PEPPERMINT LEAVES AND PROBIOTICS ON PERFORMANCE OF JABALPUR COLOUR HENS"

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ABSTRACT

A factorial designed experiment was conducted to study the effect of dried peppermint leaves and probiotic on production traits of Jabalpur Colour hens during late laying period (60wks-72wks). A total of 108 healthy birds were randomly allocated in individual cages, comprising of nine treatment group having 12 birds in two replicates. A basal diet containing 17% protein and 2800KcalME/kg diet was supplemented with 3 levels of dried peppermint leaves powder @ 0g/kg (P_0), 10g/kg (P_1) and 20g/kg (P_2) diet. Each of this diet was further supplemented with 3 levels of probiotic (*Saccharomyces cerevisiae*, 10 billion CFU/10g and *Lactobacillus acidophilus* (1×10^9 CFU/kg) @ 0g/100kg (B_0), 10g/100kg (B_1) and 15g/100kg (B_2) diet. Thus making nine dietary treatments. Daily measured amount of nine rations were offered to experimental flock for a period of 84 days, to assess production performance traits.

The results shown that weekly average egg production (EP) and egg weight (EW) in each period were non significantly different between P_1 and P_2 and significantly higher than P_0. Similar results were observed for egg mass. B_2 probiotic level had significantly better EP, EW and egg mass than B_0 and B_1 probiotic. Feed intake (FI) between P_1, P_2 and B_1, B_2 did not differ significantly and these were significantly better than P_0 and B_0 respectively. Periodically average FE/kg egg mass and FE/dozen of egg was found better in P_1 with significant difference from P_0. Probiotic levels B_2 showed significantly better FE/kg egg mass and per dozen of eggs produced.

Interaction result shown that EP was significantly higher in P_2B_2 whereas EW was significantly better in P_1B_2 treatment than all other interactions. Period II and III showed significantly higher egg mass in P_2B_2. During period III egg mass in P_1B_1, P_1B_2 and P_2B_2 was non significant. FI of P_1B_1 and P_2B_2 was non significantly different and significantly higher than all other interactions during II, III and in period average. Weekly and overall mean FE per kg egg mass and per dozen eggs was non significantly differ in P_1B_2 and P_2B_2 and these were significantly better than other combinations. DPLP in diet improved egg quality traits. Probiotic improved albumen index and shell thickness. Feed cost per kg egg mass and per dozen of egg was found lowest in P_0B_2 treatment. During 84 days period earning was higher in P_0B_2 treatment followed by P_1B_1 and then P_0B_1. Profits with other combinations were lower than control group.

The result concluded that DPLP and probiotic improved EP, EW, EM, FI and individually or in combination. Treatment P_2B_2 and P_1B_2 favored performance trait significantly followed by P_1B_1 and P_0B_2. Feed cost per kg egg mass was lower and net profit earned was higher in P_0B_2 treatment, followed by P_1B_1 and then P_0B_1.

"EFFECT OF CORIANDER SEEDS ON GROWER AND PRELAYING PERFORMANCE OF JABALPUR COLOUR AND KADAKNATH BIRDS"

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ABSTRACT

The data of present investigation evaluated the production performance of Jabalpur colour and Kadaknath (Grower and Prelaying) hens of three body weight groups High body weight (B_3), Medium body weight (B_2) and Low body weight (B_1) and also assess the two dietary treatment of Coriander seed powder 0.6% in grower and 1.0% in Prelaying phases and basal diet C_0 and their interaction effect on body weight, feed consumption, egg weight and egg quality. A 2 X 3 X 2 factorial design was applied to this study. The experimental population consists of two genotypes Jabalpur colour generation (A_1) and an indigenous Kadaknath (A_2) birds. From these two population total number of 192 healthy 12th week old female grower were randomly sorted according to their body weight (B) i.e. Large (B_3), Medium (B_2) and low (B_1). There were two dietary treatments i.e. basal diet (C_0) and basal diet + 0.6% and 1.0% dried coriander seed powder (C_1) in grower (13th – 20th) prelayer phase (21st – 28th week) respectively. Performance were evaluated in terms of body weight at 12, 16, 20, 24 and 28 week of age and their 4 weekly gain in weight. Other traits recorded were average feed consumption, age at sexual maturity, egg weight, egg production and egg quality traits.

Result suggest that Jabalpur colour (A_1) on growers and pullets had more body weight, body weight gain and feed consumption, more egg production and egg weight. They having better egg weight (EW), Shell thickness (ST) and yolk index (YI) than the Kadaknath birds (A_2). Grower and pullets of large body weight (B_3) so, better body weight, more feed consumption, average age at sexual maturity and better egg weight, shape index, albumin index, Haugh unit, yolk index and shell thickness is better or similar to medium body weight group (B_2) and better than (B_1) low body weight group. The dietary treatment group (C_1) in which dried coriander seed was fed at the rate of 0.6% and 1.0% to grower and prelayer phases revealed that they have heavier body weight more average feed consumption (FC) per bird / day, more egg production ,egg weight significantly better average age at sexual maturity. There having better egg weight, shape index, albumin index, Haugh unit, yolk index and shell thickness.

Effects due to A X B interaction were significant for body weight, average feed consumption, egg weight and egg quality traits, whereas A X C interactions were significant for body weight, age at sexual maturity most of egg quality traits whereas B X C interactions were significant for egg weight, age at sexual maturity, yolk index, albumin index and shell thickness. Three way interaction due to A X B X C treatment groups suggest significant interaction for egg weight, age at sexual maturity and most egg quality traits. Significant interaction effect that performance of genotype, body weight groups and dietary treatment change at different levels of their main effects.