

# **FEEDING HIGH YIELDING ANIMALS**

**DEPT OF ANIMAL NUTRITION  
CoVSc & A.H., JABALPUR**

## **FEEDING OF MILCH ANIMALS DURING EARLY LACTATION**

- **The rate of milk letdown in high yielders (producing above 15 kg of milk/day) in the first six weeks of lactation, is so high that the secretion of nutrients into the milk exceeds the rate of uptake of nutrients from the digestive tract.**
- **The nutrient deficit is compensated by the diversion of nutrients from the body reserves (mobilization of body fat and protein) resulting in weight loss. Too large a loss in body weight can prove harmful and uneconomical.**
- **The appetite of the animal during the early lactation (up to 8 weeks) is reduced by 2 to 3 kg per day. So all the nutrients needs of the animal are to be provided within this appetite limit.**

- **It is difficult to meet the nutrient requirements, particularly the energy requirement of such high yielders (more than 15 kg of milk production per day in cows and 12 kg milk yield per day in buffaloes) through normal concentrate mixture and fodder.**
- **High energy diets are to be formulated and challenge feeding has to be adopted.**
- **Adequate fiber (36% NDF in the total ration) is critical for maintenance of normal milk fat.**
- **Usually, all such cows and buffaloes will remain under negative energy balance during first 5 months of lactation.**

- **In the light of advances made in the field of protein metabolism, the protein requirements in ruminants are calculated based on rumen protein degradability.**
- **Mobilization of body reserves during early lactation can be prevented by feeding high fat, high protein oilseeds such as cottonseed which supply both protein and long chain fatty acids (LCAs) for post ruminal digestion (bypass protein and by pass fat).**

# **FEEDING SOYBEAN TO HIGH YIELDING COWS/BUFFALOES**

- **Soybean has to be fed as both whole oil seed and solvent extracted soybean meal to cows during lactation, more so during the first 3 to 5 months, to overcome the negative energy balance.**
- **A milch cow was fed 6 kg of concentrate mixture (maize 40%, soybean meal 30%, groundnut meal 10%, rice polish 10%, molasses 7%, mineral mixture 3%), 1 kg of soybeans, 30 kg green fodder and *ad-lib.* wheat straw throughout the 10 months of lactation.**
- **The cow yielded 4836 kg milk during the lactation period. It was inferred that better milk yield persistency seemed to be as a result of supplementing extra energy and additional protein from one kg whole soybean.**

- **20 Murrah buffaloes yielding 9.2 kg milk per day were used to assess the usefulness of feeding full fat soybean on milk production traits.**
- **The study was conducted for 11 weeks. Milk fat booster (MFB) was prepared by mixing soybean 60%, SBM 30% and maize 10% (CP -36% and EE -10%). Each animal was offered fat booster 2 kg, CSC 1 kg, maize- 2 kg and straw *ad-lib*.**
- **The results showed an improvement in fat percent from 6.69 to 7.48 while there was not much difference in milk yield. Since most of the high yielders are expected to be in negative energy balance during first trimester of lactation, the soybean feeding can be advantageous to boost milk or milk fat %.**

## SOME EXAMPLES OF CONCENTRATE MIXTURES

| <b>Ration 1</b>   |            |
|-------------------|------------|
| Groundnut cake    | 35         |
| Wheat bran        | 20         |
| Maize             | 15         |
| Oat/Bajra/Sorghum | 15         |
| Gram chunnies     | 12         |
| Mineral Mixture   | 2          |
| Common Salt       | 1          |
| <b>Total</b>      | <b>100</b> |

## Ration 2

---

|              |    |
|--------------|----|
| Mustard cake | 20 |
|--------------|----|

---

|            |    |
|------------|----|
| Wheat bran | 45 |
|------------|----|

---

|                     |    |
|---------------------|----|
| Green gram chunnies | 32 |
|---------------------|----|

|                 |   |
|-----------------|---|
| Mineral Mixture | 2 |
|-----------------|---|

|             |   |
|-------------|---|
| Common salt | 1 |
|-------------|---|

---

|       |            |
|-------|------------|
| Total | <b>100</b> |
|-------|------------|

---



### **Ration 3**

---

|               |    |
|---------------|----|
| Tapioca chips | 20 |
|---------------|----|

---

|                |    |
|----------------|----|
| Groundnut cake | 30 |
|----------------|----|

---

|            |    |
|------------|----|
| Gram chuni | 22 |
|------------|----|

---

|           |    |
|-----------|----|
| Rice bran | 25 |
|-----------|----|

|                 |   |
|-----------------|---|
| Mineral mixture | 2 |
|-----------------|---|

|             |   |
|-------------|---|
| Common Salt | 1 |
|-------------|---|

---

|              |            |
|--------------|------------|
| <b>Total</b> | <b>100</b> |
|--------------|------------|

---

## Ration 4

|                |    |
|----------------|----|
| Groundnut cake | 20 |
|----------------|----|

|           |    |
|-----------|----|
| Rice bran | 25 |
|-----------|----|

|            |    |
|------------|----|
| Wheat bran | 10 |
|------------|----|

|           |    |
|-----------|----|
| Gram husk | 27 |
|-----------|----|

|                  |    |
|------------------|----|
| Cotton seed cake | 15 |
|------------------|----|

|                 |   |
|-----------------|---|
| Mineral Mixture | 2 |
|-----------------|---|

|             |   |
|-------------|---|
| Common Salt | 1 |
|-------------|---|

|              |            |
|--------------|------------|
| <b>Total</b> | <b>100</b> |
|--------------|------------|

# **HIGH YIELDING DAIRY CATTLE NUTRITION**

- **Cows yielding more than 20 kg/day and buffaloes yielding more than 15 kg per day are high yielding animals.**
- **Nutrient requirements vary with the stage of lactation and gestation. Five distinct feeding phases can be defined to attain optimum production, reproduction and health of dairy cows**

**Phase 1** : Early lactation—1 to 70 days (peak milk production) after calving (postpartum).

**Phase 2** : Peak DM intake—70 to 140 days (declining milk production) postpartum.

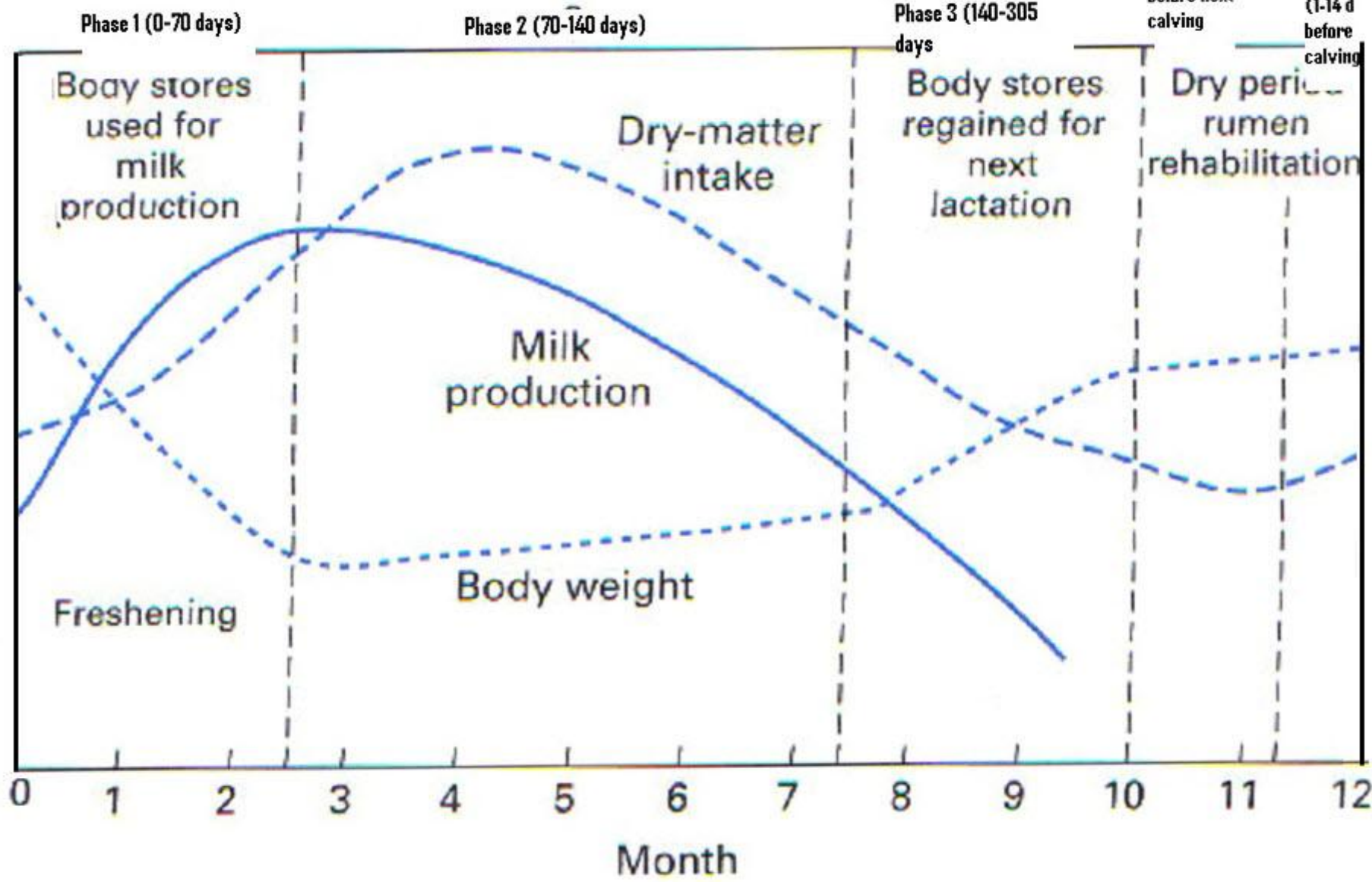
**Phase 3** : Mid- and late lactation—140 to 305 days (declining milk production) postpartum.

**Phase 4** : Dry period—60 to 14 days before the next lactation.

**Phase 5** : Transition or close-up period—14 days before to parturition.

# Period

dry period (60-14 d days before next calving)  
Transition (1-14 d before calving)



Nutrient and milk yield relationships during lactation and gestation. Courtesy of Hoffmann-LaRoche, Inc. Nutritional Needs of Dairy Cows (Growth lines). Fall 1989.

# **PHASE 1: EARLY LACTATION - 0 TO 70 DAYS POSTPARTUM**

**The important features of this phase are**

- **Milk production increases rapidly during this period and the peak milk production occurs at 6 to 8 weeks after calving.**
- **Feed intake is not adequate because the appetite of the animal during the early lactation (up to 8 weeks) is reduced by 2 to 3 kg per day. So there will be shortfall in the intake of energy and protein needed for high levels of milk production.**

- **The protein will also be diverted for mammogenesis, body growth in case of heifers and young animals, protein may also be diverted for synthesis of lactose (milk sugar) .The animal loses body weight since it mobilizes body tissues for sustaining milk production.**
- **During this period, the cow could lose as much as 0.7 kg/day.. Because of reduced dry matter or feed intake, dietary energy is the most limiting factor in milk production.**

## **FEEDING DURING EARLY LACTATION 0 TO 70 DAYS POSTPARTUM**

- **Feed intake is the key factor in maintaining high milk production.**
- **Cows should be encouraged to maximize their intake during early lactation.**
- **Each additional kg of dry mater consumed can support 2-2.4 kg more milk.**
- **The roughages should be of high quality with not more than 40-45 % NDF**
- ***Protein:* A protein level of 16-18% CP can support 20 kg milk in cows and 15 kg in buffaloes.**
- **For those cows or buffaloes yielding more milk, the ideal protein content of the ration should be 19 % with 30-35 % RDP.**
- **A guideline is to feed 0.5 kg of a 34 to 50% protein concentrates for every 5 kg of milk produced above 20 kg of milk.**



- **A minimum level of fibre (17 to 18% Crude Fiber or 21 to 22% ADF or 28 percent NDF in the ration) is necessary because excessive levels of concentrates (over 60 percent of the total DM) fed during early lactation can cause acidosis and low milk fat percentage.**
- **To avoid any digestive problems (e.g. acidosis, depressed intake), concentrates should be added gradually at a rate of about 0.5 to 0.7 kg/day for the first two weeks. Do not feed more than 2.5-3.5 kg of concentrates per feeding.**
- **The roughage should not be ground or pelleted but should be chopped to a length of 2 inches or longer.**

- The energy content of the ration is increased by feeding of full-fat oilseeds like cottonseed, sunflower seed and soybean.
- They are also rich in TDN; thus their supplementation in the diet is useful for meeting energy requirements of high yielding animals.
- Cottonseed is the most popular amongst farmer and it also helps in increasing milk fat.
- The energy content of the ration can also be increased by using fats or oil at 4% in the concentrate mixture or 0.5 kg / day

# CHALLENGE FEEDING

- Challenge feeding starts two weeks before the expected date of calving (Steaming up), if no concentrate is fed during the dry period.
- High milk producing animals are fed increasing quantity of feed challenging them to produce at their maximum potential.
- This challenge feeding will condition her digestive system for the increased quantity of feed to provide sufficient nutrients to initiate lactation on a higher plane.
- This effect has been found to have higher total milk yield in the lactation.

## CHALLENGE FEEDING

- This helps in adaptation of the rumen microbes with the grain/concentrate during the ensuing lactation period when nutrient requirement cannot be met, especially in high-yielding (more than 20 kg milk) cows without grain or concentrates.
- Generally, the animals are started with 1.5 to 2.0 kg concentrate mixture (@0.3 to 0.5 % of body weight) on the date 2 weeks before calving,
  - followed by an increment of 0.3 to 0.5 kg daily, so that they will be receiving about 1 kg concentrate mixture per 100 kg body weight at calving.
- This is also called challenge or lead feeding, as it is the practice of feeding higher levels of concentrate to challenge the cow to reach her maximum milk production potential.

## Challenge feeding schedule:

| Period                               | Concentrate allowance  |
|--------------------------------------|--|
| Last 2 weeks before calving          | Starting from 500g, increase 300 - 400g daily until the cow is eating 500 – 1000g per 100kg body weight. |
| First 2 weeks of lactation           | Increase 500g per day to free choice level.  |
| Second week to peak yield (test day) | Free choice  |
| From test day onwards                | According to production as per thumb rules. E.g. 1Kg for every 2 1/2 kg milk produced                    |
| Remaining lactation                  | Concentrate adjusted to monthly test of milk Production  |
| All periods                          | Green fodder and dry fodder given adequately   |

## OTHER FEEDING STRATEGIES FOR HIGH PRODUCING DAIRY CATTLE DURING EARLY LACTATION

- Cows usually eat after milking. So fresh feed should always be available since high producing animals may eat up to 12 times in a day
- **If concentrates are being fed separately from forages, they should be fed several times a day.**
- *Feeding frequency:* Increased feeding frequency reduces daily variations in rumen pH and thus helps stabilizing the rumen environment. The proper range and consistency of ruminal pH is critical in fiber digestion.
- *Feeding sequence:* If forage and concentrates are being fed separately, forages should be fed first in the morning followed by a portion of the concentrates.

## **PHASE 2. PEAK DM INTAKE - SECOND 10 WEEKS POSTPARTUM**

- **During this phase the feed intake is near maximum and can supply nutrient needs.**
- **Cows should not be losing body weight, and are either maintaining weight or slightly gaining weight**
- **Animals are expected to take dry matter at 4 % of body weight .**
- **Concentrate intake should not exceed 2.5 percent of the cow's body weight and intake of good quality forage should be minimum 1.5 percent of the cow's body weight (DM basis) to maintain rumen function and normal levels of milk fat.**

- **Protein requirements during mid lactation are lower than in early lactation.**
- **Therefore rations for dairy cows in mid-lactation should contain 15-17% crude protein**

**To maximize nutrient intake:**

- **Feed forages and grain several times a day.**
- **If urea is included in the rations, limit urea to 100 g per cow per day.**



### **PHASE 3. MID - TO LATE LACTATION - 140 TO 305 DAYS POSTPARTUM**

- **This phase will be the easiest to manage.**
- **Milk production is declining, the cow is pregnant, and nutrient intake will easily be met or exceed requirements.**
- **Concentrate feeding should be at a level to meet milk production requirements and the animals begin to replace body weight lost during early lactation.**
- **Young cows should receive additional nutrients for growth (20 percent during 1<sup>st</sup> lactation and 10 % during 2<sup>nd</sup> lactation of the maintenance requirement**
- **Consider NPN as a source of supplemental protein.**

## **PHASE 4. DRY PERIOD - 60 TO 14 DAYS BEFORE PARTURITION**

- The dry period is a critical phase of the lactation cycle to increase milk yield during the following lactation and minimize metabolic problems at or immediately following calving.

### **The reasons for the dry period**

#### **(a) Involution of the udder**

- The principal reason for the dry period is to allow the secretory tissue of the udder to involute.
- During this period, the secretory cells of udder actually break down and are resorbed, and a new set of secretory cells is formed.
- This cell renewal process takes approximately six weeks and, if a cow is allowed no dry period at all, will result in a loss of milk of at least 30% in the subsequent lactation.

## (b) Foetal development

- During the last eight weeks before calving the foetus gains almost 60% of its birth weight, an overall rate of gain for the cow of about 0.75 kg/day.
- At the very least, the cow must be fed for foetal growth.

## (c ) Replenishment of body reserves

- Mineral reserves are an entirely different matter to energy reserves.
- The high-producing cow will have severely depleted her body reserves of minerals, especially Ca and P, during her lactation. These reserves can only be completely replenished when the cow is dry.

- Adequate mineral nutrition during the dry period is very important. If the cow is very weak or underweight, the dry period helps her to replenish body reserves and she may be fed to gain about 20-25 kg body weight during the dry period.

#### (d) The length of the dry period

- It is wise to aim for a dry period of eight weeks (56 days).
- Rations should be formulated to specifically meet the nutrient requirements of dry cows: body maintenance, fetal growth, and for replacing any additional body weight not replaced during phase.
- Pregnant animals are to be offered extra nutrients during the last two months of gestation.

- The aim is that by the end of gestation period the cows should not only gain their initial body weight but also put on an extra 25 to 30 kg of body weight.
- This is necessary to enable the animal to withstand the stress of parturition and to maintain the persistency of milk production during the subsequent lactation period,
- The provision of extra nutrients should be given in the form of concentrate mixture and not as forage because roughages are not as efficient as concentrates in increasing the body weight.
- The rest of the ration must contain sufficient green feeds so that the colostrum secreted after parturition should be rich in vitamin A.

- DMI will be near 2 % of the cow's body weight. A minimum of 12 % CP in the DM is recommended.
- Meet Ca and P needs, but avoid large excesses. Ca intakes of 60 to 80 g and P intakes of 30 to 40 g are sufficient for most cows.
- Avoid excess calcium and phosphorus intakes
- Dry cow rations above 0.6 percent calcium and 0.4 percent phosphorus (DM basis) have substantially increased milk fever problems.
- Provide adequate amounts of vitamin A, D, and E in rations to improve calf survival and lower retained placenta and milk fever problems.
- Trace minerals, including selenium for most producers, should be adequately supplemented in dry cow diets.
- Change to a transition ration starting 2 weeks before calving .  
During the last 3 days prior to calving,
- amount of concentrate mixture should be reduced and a little warm bran is fed to keep the animal in laxative condition before calving.

## **PHASE 5. TRANSITION PERIOD - 14 DAYS BEFORE TO PARTURITION**

- **The transition or close-up dry cow feeding program is critical to adjusting dry cows to the lactation ration and preventing metabolic problems.**
- **During the last 3 days prior to calving, the amount of concentrate mixture should be reduced and a little warm bran is fed to keep the animal in laxative condition before calving.**
- **After parturition, the cow /buffalo should be given fresh warm water and a mash consisting of 1 kg wheat bran, 1-1.5 kg ground grain, 0.5 kg jaggery and 25 g each of common salt and mineral mixture.**
- **This mash may be continued for 3 to 4 days after calving; the regular feed may be gradually introduced to the cow.**

- Some concentrate mixture, if not previously fed, should be fed starting two weeks before freshening.
- Introduction of concentrate mixture is necessary to begin changing the rumen bacteria population over from an all-forage digestion population to a mixed population of forage and grain digesters.
- Also, addition of some ingredients used in the lactation ration during this period minimizes the stress of ration changes after calving. Some suggested management strategies during this period include:
  - Increase protein in the ration to between 14 and 15 percent of the ration DM.
  - Feeding some of this additional protein in the form of undegradable protein may be beneficial in supplying amino acids for fetal growth.



# **SUMMARY OF NUTRIENT REQUIREMENTS OF HIGH YIELDING DAIRY CATTLE DURING DIFFERENT PHASES OF LACTATION**

## **(a) Water requirements**

- Lactating dairy cows need 60–70 litres of water each day for maintenance, plus an extra 4–5 litres for each litre of milk produced.**
- Water requirements increase by 6 lts/day for every 4 °C raise in air temperatures.**
- Lactating cows will drink 150 to 200 litres of water per day in the summer months.**

## **(b) Crude protein requirements**

- **Stage of lactation**                      **% CP in the ration**
- **Early lactation**                      **16 - 18 %**
- **Mid lactation**                      **14 - 16 %**
- **Late lactation**                      **12 - 14 %**
- **Dry period**                      **10 - 12 %**
- **Undegradable or bypass protein (UIP) should be 35 to 40 percent of the CP in early lactation and 30 to 35 percent of CP in late lactation.**
- **(d) Crude Fibre requirements**
- **(e) Energy in the ration**

## **TDN**

- **Early lactation – 75 % of dietary DM**
- **late lactation - 65 % of dietary DM**
- **dry period - 55 % of dietary DM**

### **(f) Non-fiber carbohydrates:**

- **35 to 40 percent of the dietary DM.**

### **(g) Fat**

- **Maximum of 7 percent of the total ration DM with no more than 4 percent from supplemental fat..**
- **Salt: 0.5 percent of the ration DM or 1 percent of the concentrate mixture.**

## (i) Mineral

- Approximately 1 percent of the grain mix should be a calcium-phosphorus mineral.

## (j) Urea

- 3 % of concentrate mixture or 1 percent of the total dry matter intake.
- *Vitamins*: Supplemented A, D, and E in rations to meet requirements.
- *Ration form*: Avoid too fine chopping of forages and concentrates

## **LEVEL OF NUTRITION AND REPRODUCTION IN COWS**

- **The cow has a dry period of about 2 months but in practice it may be longer.**
- **During this period, cow should build up the body reserves, lost in early lactation and will require nutrients to provide for the rapid growth of the foetus which occur during the later stage of pregnancy and for the regeneration of mammary tissue.**
- **Low levels of protein and energy in the diets of cows and buffaloes are liable to affect the reproductive system in a number of ways:**
  - **disturbing the estrous cycle**
  - **prolonging postpartum anoestrous period**
  - **increasing number of services per conception**
  - **The mechanism of inhibitory action is on the hypothalamus affecting the release of Leutinising Hormone (LH) releasing factor from anterior pituitary**

- **In case, the energy requirement is met fully from time to time during lactation, there may be further increase in milk production as well as better persistency from such cows.**
- **High protein diets are reported to be beneficial for higher milk production and superior growth rate. It has been estimated that two third of increase in milk yield is due to adequate protein and one-third is a result of optimum energy in the rations.**

# FEEDING OF BREEDING BULL CALVES AND BULLS

- **Feeding of bull calves**
- Animals which are earmarked to be raised as future breeding sires, should generally be kept on a liberal amount of milk for the first six months or more of their life. Milk is also supplemented with calf starter from two weeks of age onwards along with good quality hay.
- Young males to be used for draft purpose should only be castrated at 12 to 15 months of age and their feeding schedules should be identical to that of heifers. To economize the cost of feeding more green fodder and hay can be fed ( upto 15 -20 kg /day ).

- Breeding bulls should attain body weight of 350 -400 Kg body weight at 30 month of age and at this age they are ready to be used for breeding.
- As in case of females, in males also low plane of nutrition delay puberty. The adverse effects of malnutrition are more pronounced if they occur in early life than post weaning.
- In controlled experiment, low protein feeding delayed puberty of bulls by 5 months and such bulls had poor testicular development and small ejaculate volume as compared to their normal counterpart.
- Vitamin A and Zn deficiency can also delay puberty, reduce libido and may affect integrity of testicular tissue and hence special care need to be taken to prevent deficiency of these two critical nutrients.



- About 40 to 60% restriction of energy and protein during growing phase causes retardation of testicular growth and the effect persists throughout the life.
- On the other hand feeding high concentrate diets (80% concentrate in DM) to growing bulls reduced testicular sperm reserve and also reduced semen quality as compared to total roughage diet.

It has been recommended that breeding bulls should be given 100% higher CP and 20% higher energy than maintenance requirement for mature female buffaloes.

- Breeding bulls should be fed with good quality balanced ration. However, care should be taken to avoid overfeeding as fatness lead to reduced libido and reduced reproductive performance.

## **Nutrient requirement of breeding bulls (Ranjhan,1998)**

- When berseem/lucerne/cowpea are available they can be fed along with the straw or other good quality roughages like oats without any concentrate. However, when straws form the basal ration, concentrate are to be fed.
- When non-leguminous green fodders, like oat, maize, sorghum, good grazing etc, form the basal roughage there is no need to feed concentrate mixture.

| <b>Live weight ( kg )</b> | <b>DCP g</b> | <b>TDN kg</b> | <b>ME Mcal</b> | <b>Ca g</b> | <b>P g</b> | <b>Carote ne mg</b> | <b>Vit A 1000 IU</b> |
|---------------------------|--------------|---------------|----------------|-------------|------------|---------------------|----------------------|
| 400                       | 380          | 3.6           | 13.0           | 18          | 13         | 40                  | 16                   |
| 500                       | 450          | 4.5           | 16.2           | 20          | 15         | 53                  | 21                   |
| 600                       | 530          | 5.4           | 19.4           | 22          | 17         | 64                  | 26                   |

- **For a 700 Kg buffalo bull following feeding schedule can be followed:**
- 40 Kg cereal fodder + 0.8 Kg deoiled ground nut cake/deoiled soybean cake
- or
- 10 Kg berseem + 10 Kg straw + 1.2 Kg deoiled ground nut cake/deoiled soybean cake
- or
- 8 Kg straw + 2.0 Kg concentrate mixture + 23 Kg green fodder + 1 Kg deoiled ground nut cake/deoiled soybean cake.

**For every 50 Kg increase or decrease in body weight from 700 Kg:**

- 0.6 Kg straw +100 g deoiled groundnut cake/deoiled soyabean cake
- or
- 3 Kg green berseem
- or
- 3 Kg green cereal fodder should be added/deducted from the ration suggested for 700 Kg body weight.

## Calculation of feeding schedule for growing bull

Daily energy, protein and DM requirements of cattle/ buffalo growing breeding bull (ICAR, 2013)

| Nutrient Requirement | Body weight (kg) |       |       |       |       |       |
|----------------------|------------------|-------|-------|-------|-------|-------|
|                      | 300              |       | 400   |       | 500   |       |
| Daily gain (kg)      | 0.5              | 0.8   | 0.5   | 0.8   | 0.5   | 0.8   |
| TDN (kg)             | 3.79             | 4.44  | 4.63  | 5.39  | 5.42  | 6.29  |
| CP (g)               | 0.617            | 0.784 | 0.680 | 0.823 | 0.762 | 0.896 |
| DMI (kg)             | 6.9              | 7.5   | 8.8   | 9.2   | 10.5  | 11.0  |

## Suggested level of nutrients in the total ration of bulls

| Nutrient          | Level  |
|-------------------|--|
| Dry matter intake | 2.2% of BW 225-250 Kg BW<br>2.5% of BW (500-600 Kg BW) |
| CP                | 12-14%   |
| TDN               | 65-67%   |
| Ca                | 0.55%  |
| P                 | 0.4%   |
| Mg                | 0.2%   |
| Na                | 0.08%  |
| Co                | 0.5 ppm  |
| Cu                | 12 ppm   |
| I                 | 0.75 ppm   |
| Fe                | 100 ppm  |
| Mn                | 40 ppm   |
| Se                | 0.25 ppm   |
| Zn                | 60 ppm   |
| Vit A             | 900 IU / kg  |
| Vit D             | 55 IU / kg   |
| Vit E             | 35 IU / kg   |

## Feed resources used and its nutrient composition

| Feed         | DM (%) | TDN (%) | CP (%) |
|--------------|--------|---------|--------|
| Concentrate* | 90     | 65      | 16     |
| Green fodder | 20     | 55      | 6.5    |
| Straw        | 90     | 44      | 3.0    |

\*Should be prepared by mixing grains/ brans/oil cakes/ salt/ mineral mixture

## Example of feeding schedule per day for a bull of 300 kg body weight, 500 gm gain per day

| Feed         | Quantity     | DM    | TDN    | CP      | Remarks  |
|--------------|--------------|-------|--------|---------|--|
|              | -----kg----- |       |        |         |  |
| Concentrate  | 3            | 2.7   | 1.755  | 0.432   | In the absence of sufficient quantity of green fodder for every 10 kg of green fodder 1.0 kg of concentrate may be included and 1.0 kg of wheat bhoosa can be fed. It is strongly recommended to feed green fodder |
| Green fodder | 10           | 2     | 1.1    | 0.13    |  |
| Straw        | 2.5          | 2.25  | 0.99   | 0.0675  |  |
| Total        |              | 6.95  | 3.845  | 0.6295  |  |
| Balance      |              | +0.05 | +0.055 | +0.0125 |  |

## Calculation of feeding schedule for mature bull

Daily energy, protein and DM requirements of cattle/ buffalo breeding bull (ICAR, 2013)

| Nutrient Requirement | Body weight (kg) |       |       |       |
|----------------------|------------------|-------|-------|-------|
|                      | 600              | 650   | 700   | 750   |
| TDN (kg)             | 5.18             | 5.5   | 5.82  | 6.13  |
| CP (g)               | 0.591            | 0.627 | 0.663 | 0.698 |
| DMI (Kg)             | 11.9             | 13    | 14    | 15.1  |

| Feed         | DM (%) | TDN (%) | CP (%) |
|--------------|--------|---------|--------|
| Concentrate* | 90     | 65      | 16     |
| Green fodder | 20     | 55      | 6.5    |
| Straw        | 90     | 44      | 3.0    |

\*Should be prepared by mixing grains/ brans/oil cakes/ salt/ mineral mixture

## Example of feeding schedule per day for a bull of body weight of 600 kg

| Feed         | Quantity     | DM     | TDN     | CP     | Remarks   |
|--------------|--------------|--------|---------|--------|---|
|              | -----Kg----- |        |         |        |   |
| Concentrate  | 1.5          | 1.35   | 0.8775  | 0.216  | In the absence of sufficient quantity of green fodder for every 10 kg of green fodder 1.0 kg of concentrate may be included and 1.0 kg of wheat bhoosa can be fed. It is strongly recommended to feed green fodder. |
| Green fodder | 15           | 3      | 1.65    | 0.195  |   |
| Straw        | 7            | 6.3    | 2.772   | 0.189  |   |
| Total        |              | 10.65  | 5.2995  | 0.6    |   |
| Balance      |              | -1.25* | +0.1195 | +0.009 |   |

## FEEDING OF WORKING BULLOCKS

- When food supply is adequate, a working animal first draws upon the carbohydrates and fats in the feed. If the supply is inadequate, the body fat is used for the purpose and as a last resort muscles and other protein tissues are used.
- Thus, as long as there is a sufficient supply of carbohydrates in the feed, an ox at work needs no more protein than required for maintenance except probably when the work done is very hard.
- When the animals are not working, they should be fed as per the maintenance requirement.
- For light work, the animal should be fed with 30 kg green maize and 10 kg cowpea.
- For heavy work, 10 kg extra cowpea may be fed to take care of extra protein requirement. When cultivated fodders are available 20 kg berseem/lucerne with 20 kg oats may be fed.

- **In addition 30 g of mineral mixture and 30 g of salt should be fed daily.**
- **When wheat/paddy straw form the basal ration, then a concentrate mixture containing 12% DCP and 75% TDN should be fed at the rate of 1, 1.5, 2 and 2.5 kg respectively to 200, 300, 400 and 500 kg animal along with *ad libitum* bhusa, which will satisfy the requirement for light work**
- **For heavy work 2, 3, 4 and 5 kg of concentrate mixture should be fed along with wheat straw. 2.5 kg green fodder may be fed to satisfy the vitamin A requirement.**



## **Alternative Feeding Schedule for working bullocks**

- **Light work**
- Roughage: Ad libitum straw (6-10 kg)
- Concentrate(12% DCP, 60% TDN): 1-2.5 kg/day
- **Medium work**
- Roughage: Ad libitum straw (6-10 kg)
- Concentrate(12% DCP, 60% TDN): 1.5-4 kg/day
- **Heavy work**
- Roughage: Ad libitum straw (6-10 kg)
- Concentrate(12% DCP, 60% TDN): 2-5 kg/day