

Feeding of poultry

Principles of feeding poultry:

1. Birds have no lips or teeth. So, they cannot chew their feed. Hence, the ration is chiefly consisting of concentrates.
2. They have simple stomach. Their nutrient requirements are more precise and specific.
3. They have higher rate of metabolism.
4. Birds are fed in groups.
5. Feeds must be appetizing and free from
6. must contain not more than 6-7%.
7. Feed must contain all the nutrients in balanced form.
8. Always provide fresh, clean, cool water all the time.

Feed ingredients for poultry

Cereal grains and their by-products:

1. **Dry matter:** Dry matter of cereal grains should be 90%.
2. **Proteins:** Crude protein content of grains range from 8-12%. Cereal proteins are deficient in certain indispensable amino acids particularly **lysine and methionine**.
3. **Lipids:** Wheat, barley, rye, rice contain 1-3% lipids. Lipid content is highest in oat (4-6%) and lowest in wheat (1-2%). Cereal oils are **unsaturated fatty acids** main acids being linoleic and oleic.
4. **Crude fibre:** Highest amount of crude fibre is present in oats and rice which contain a husk or hull. Crude fibre is lowest in naked grains, wheat and maize.
5. **Starch:** Cereal starch occurs in the endosperm of the grain in the form of granules. Cereal starches consist of 25% amylose and 75% amylopectine,
6. **Minerals:** All grains are deficient in Ca (0.1% or less) and P (0.3-0.5%) but part of this is present as phytic acid which is concentrated in the aleurone layer. Cereal phytates bind with Ca and probably Mg, thus preventing their absorption.
7. **Vitamins:** Cereal grains are deficient in vitamin A. With exception of yellow maize having good amount of vitamin A as carotene, Grains are good source of vitamin E and vitamin B1, but low content of vitamin B2.

Ingredients	ME Kcal/kg	CP	CF	EE	Ca	P	Lysine	Methionine
Yellow maize	3340	9	2.2	3.8	0.02	0.28	0.22	0.18
Sorghum white	3200	10	2.3	2.8	0.03	0.28	0.21	0.16
Bajra	2850	11.5	3.5	4.3	0.06	0.33	0.43	0.23
Broken rice	2900	8.5	10.6	1.9	0.08	0.39	0.24	0.16
Wheat	3000	10	2.4	1.8	0.05	0.31	0.30	0.16
DORB	2200	13.5	14	0.6	0.07	1.5	0.6	0.25
Rice polish	3300	12	8	15.1	0.08	1.3	0.5	0.22
Wheat bran	1300	15.7	11	3	0.14	1.15	0.59	0.23

Plant origin oil cakes:

Cakes have higher protein and fat content while meals have higher protein content but have very less amount of fat.

Proteins: In general oilseed proteins have a low cystine and methionine content and variable but usually low cystine content. The high temperature and pressure of the expeller process may denature the protein and reduce its digestibility, with a consequent lowering of its nutritive value.

Fat: Digestive disturbances may result from uncontrolled use of cakes rich in oil and, if the oil is unsaturated, body fat may be soft and carcass quality lowered.

Minerals and vitamins: The oil seed meals have a high P content, which tends to aggravate their generally low Ca content. They may provide B-complex vitamins but they are poor source of carotene and vitamin A.

Groundnut cake:

Groundnut seed contains 35-60% oil and 25-30% crude protein. GNC is most widely used, high protein feed. In expeller variety CP content is 45% and 10% fat. GNC is an excellent source of arginine but deficient in lysine, methionine and cystine. First limiting amino acid is lysine. GNC is poor in Ca and P. Toxic factor present in the GNC is '**Aflatoxin**' a metabolite of the fungus *Aspergillus flavus*, particularly in warm rainy season. The cake tends to become rancid especially in warm moist climate. It should not be stored more than 6 weeks in summer or 3-4 months in winter. Ducklings are highly susceptible.

Soybean meal (SBM):

Normally solvent extracted oil content is 1%. Most of the SBM are deoiled type. It is one of the best source proteins available for animals. The protein contains all the essential amino acids but concentration of cystine and methionine are sub-optimal. It is an excellent source for lysine but methionine is the first limiting amino acid. Two grades of SBM: 44% CP and 49% CP. The cake is used for all kinds and poultry

Mustard oil cake:

Oil content is high 14.1%. Crude protein content is 35%. Ca and P content are very much higher: 0.29% and 0.39%, respectively. The protein is deficient in lysine Deoiled type can be used for poultry up to 10% of the ration In the case of poultry it is not a good source of protein. It contains a **goitrogenic** substance which reduces the growth rate in poultry. About 10-15% of this cake can be incorporated in poultry ration.

Cotton seed cake:

Excellent high quality protein feed (about 40%) but low in cystine, methionine and lysine. First limiting amino acid is lysine. The cake can be used in poultry rations if the free gossypol does not exceed 0.03%. The cakes are available in two forms 1. Whole pressed cotton seed cake (undecorticated) and 2. Dehulled (decorticated), containing less of fibre and more of proteins than the whole pressed type.

Animal origin protein sources:

Fish meal:

Fish meal is produced by cooking fish and pressing the cooked mass to remove most of the oil and water. Protein digestibility of fish meal is 93-95%. Protein content of various fish meal varies over a range of about 50-75% but the composition of the protein is relatively constant. It is rich in all essential amino acids, particularly lysine, cystine, methionine and tryptophan. It contains a high proportion of Ca and phosphorus and a number of desirable trace minerals including Mn, Fe and Iodine. They are good source of vitamin A, D and B-complex vitamins, particularly choline, pantothenic acid, B12 and riboflavin. Fishmeal is the richest source of Vit B12.

Ingredients	ME Kcal/kg	CP	CF	EE	Ca	P	Lysine	Methionine
Sunflower cake	1900	27	28	1.1	0.37	1	1.13	0.58
SBM	2300	45	6.6	0.8	0.29	0.65	2.7	0.65
GNC-SE	2400	42	13	1	0.2	0.63	1.6	0.45
GNC-EXP	2600	40	13	7.3	0.16	0.56	1.5	0.42
Rapeseed cake	2300	35	11	1.4	0.72	1.12	1.7	0.65
Fish meal	2400	42	1	5	3.73	2.43	3.2	1.1
Meat meal	2400	45	8.7	7.1	8.27	4.1	2.5	0.65

Unconventional poultry feeds

Sunflower meal:

Good quality sunflower meal contains 40-44% high grade protein especially rich in methionine (in decorticated variety). The first limiting amino acid is lysine. In undecorticated variety has only 20% protein.

Rubber seed cake:

Good quality rubber seed cake contains 30% crude protein, 9-10% ether extract and 5% crude fibre in decorticated variety. Inclusion level is 10% in poultry ration.

Neem cake:

Neem cake contains 34% crude protein while processed cake shows 48% crude protein. Fibre content is only 4.4%. Amino acid lysine and methionine is comparable to GNC. The cake is as such unpalatable. Therefore, it should be mixed with other well liked feed stuffs.

Kkaranja cake:

seeds are available in Mysore, A.P, M.S, M.P, Bihar, W.B and Assam. It is less palatable, contains some polyphenolic compounds which have deleterious effect on growth and production. The deoiled variety of this cake contains 30% crude protein. It is having 60% NFE and only 6.66% crude fibre. The cake is moderately rich in all essential amino acids such as lysine and methionine.

Meat meal:

meal is obtained from mammal tissue exclusive of hair, hoof, horn, stomach content and hides trimmings by proper drying and grinding. It is rich in crude protein (50-55%) and ash (21%) with high calcium (8%) and phosphorus (4%). Low in tryptophan and methionine. Meat meal is a good source of vitamin B-complex, specially riboflavin, choline, niacin and cyanocobalamine.

Blood meal:

This is a major slaughterhouse by product. The product is obtained by drying the blood of slaughtered warm blooded animals. It has 80% crude protein, small amount of ash and oil and 10% moisture. It is poor in Ca and P which make it **unpalatable** to the animals. This meal is one of the **richest sources of lysine** and rich source of arginine, methionine, cystine and glycine

Tapioca chips:

Tapioca chips or flour is a rich source of carbohydrate but low in protein and fat. Tapioca can be used as a partial cereal grain replacer, provided the protein deficiency is rectified. Tapioca chips or tapioca flour has 10% moisture and 90% dry matter. It has got a good nutritive value with 77% NFE, 3.9% crude protein, 11% crude fiber, 0.7% ether extract, 5.6% ash, 0.58% calcium and 0.18% phosphorus

Level of inclusion of common poultry feed ingredients

Feed ingredients	%
Maize	60
Sorghum	30-40
Bajra	10-20
Wheat	50
Rice	40
Rice bran	10-20
Deoiled rice bran	10-20
Rice polish	10-30
Wheat bran	10-15
Tapioca meal	5-15
Molasses	0-5
Maize gluten	0-10
GNC	10-30
Sunflower cake	10-20
Safflower cake	5-15
Mustard cake	0-5
Soybean meal	40
CSC (decorticated)	0-10
Coconut cake	5-10
Fish meal	5-10
Meat meal	5-10
Blood meal	3
Silkworm-pupae meal	6

Feed supplement and additives in poultry

Supplement

Supplements are nutritional substances which are added in the feeds to supply those nutrients which are deficient in ration. The items used in the ration for supply of energy and protein are generally called as feed ingredients. These ingredients may be deficient in some minerals, vitamins and amino acids. Mineral supplements are added in synthetic forms as organic complex, such as chelated minerals, Vitamin supplements are provided in synthetic forms. Amino acids particularly the limiting amino acids are also commercially available and supplemented in synthetic forms, e.g. DL-methionine, L-lysine, etc.

Additive

Additives are non-nutritive substances added in the feed to improve feed intake, digestion, absorption and utilization of nutrients for better growth and production performances of birds. There are various types of feed additives which are used for poultry. Following are the important feed additives:

1. Antibiotic
2. Probiotic

3. Prebiotic
4. Acidifier
5. Enzyme
6. Emulsifier
7. Toxin binder
8. Antioxidant
9. Herbal growth promoter
10. Colouring pigment

Antibiotic as feed additives

The optimum performance of animal depends upon healthy and disease free condition if the atmosphere of animal shed is not free from pathogenic organism these organisms are present in body are in sub clinical disease condition. The organisms present in GI tract consume the nutrients and produce toxin causes inflammatory reaction in intestine resulting in to thickening of intestinal mucous membrane. All these effect result in to lowered nutrient availability to the animal which is responsible for poor health growth and production of the animal. Under such condition if antibiotics are given in smaller amount for a periods the multiplication of these organism stop and nutrients availability for host increase and harmful effect of toxin is reduced and intestinal mucus membrane become thin, and all these effect leads to better nutrient availability and improved health, growth and production of animal. Due to this reason the antibiotics are used as a feed additive in the ration of poultry and swine.

The use of antibiotics as feed additive has a drawback also and because of that reason now days the use of antibiotics as a feed additive has been banned in USA and other country, in our country so many antibiotics is banned and only few antibiotics are allowed to use.

The problem is that when the antibiotics are given at subclinical dose for a long period the micro organism develop resistance against these antibiotics and when disease occur these antibiotics cannot effected. The antibiotics which are generally used antibiotics as a feed additive are tetracycline, oxy- tetracycline auriomycins.

Hormones as feed additives

In the animal body the endocrine glands secrete hormones many of then are responsible for improved growth and better feed utilization these hormones are STH or GH estrogens and testosterone and thyroxin. About 50 year back these hormones when tried as feed additive to improve the growth of poultry birds.

Impact of its beneficial effect of these hormones, they have some harmful effect also in the form of its residual effect. The hormones were generally used in meat animal for better growth. The residues of these hormones are found in meat of these animals, when such meat are

consumed by human population harmful effect were seen in human population, so these hormone are now a days are banded.

Probiotics as feed additives

The resistance problem in antibiotics the use is banned as feed additives and probiotics are now been used for improvement of animal health and production. As name indicate probiotics means towards life or in favour of life or with life.

The idea of probiotics was initiated with the observed that the people consuming yoghurt which is type of curd regularly consumed by the people in Bulgaria and they have very long life span. Yoghurt contain live microorganism of lactobacillus species and sacharomyces cerevise is the yeast have beneficial effect so they are called perfectly feed organism.

Mode of action of probiotics- these live organisms are non pathogenic organism and are not harmful in any way for the host animal, when given in large number these organisms blocked the attachment side of pathogenic organism, so pathogens cannot multiply so the animal remain healthy. Secondly the probiotics organisms also produce certain growth producing substances which help the animal for better growth and production.

Prebiotics

Prebiotics are not organism, these are the substance which required by the probiotics organism or in other words these are the substance which promote the growth of probiotic organism for example FOS (fructan oligosaccharide) MOS (mannan oligosaccharide) these are carbohydrate in nature and used as energy source by probiotic organism.

Acidifiers

These are organic acid which are added in the poultry diet for some beneficial effect such as microcidal and microstatic compound because at low ph many bacteria cannot grow or they are killed. in the early age of chicken when HCL production is not sufficient for protein digestion acidifiers are help to improve protein digestion. Example- lactic acid, propionic acid and acetic acid are normaly used organic acid in poultry diet.

Toxin binders

In poultry feed toxin is the major problem it reduce the growth and feed conversion efficiency these toxins are generally fungus toxin, the most important fungal toxin is aflatoxin produced by aspergillus flavus, when feed are stored at humid and hot condition. The maize and groundnut cake are most affected. The aflatoxin has growth depressing effect and causes tumour in liver.

To protect birds from such toxin certain compound is used which have the properties to adsorbed these toxin, charcoal is very good effect on adsorption of aflatoxin.

Colouring agent

These are particularly used in poultry. Yolk colour is parameter of egg quality and colouring agent is used to make yolk bright in colour which increases the price of egg. The example of colouring agent is yolk -O-gold