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Current scenario about protein sources of poultry diets in Tamilnadu

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Abstract

Protein sources play a vital role in successful production in broiler as well as layer chicken. Feed sources are classified in to both conventional and unconventional sources. In Tamilnadu, during this current COVID 19 situation, the cost of raw materials has been increased, especially Soybean meal (SBM). This makes the entry of various unconventional protein sources. Protein nutrition has a high economic preference, since it is an expensive material rather than other raw materials. The optimum inclusion of protein should be needed in the poultry rationing to achieve maximum performance. Fortunately, access to these protease enzymes and synthetic amino acids has become available with the recent advancement of biotechnology.

Keywords: current scenario, protein sources, poultry diets

1. Introduction

In Tamilnadu, Namakkal and Palladam is considered to be the layer and broiler markets respectively. Feed contributes about 60 – 70% of cost in rearing poultry (TNAU, 2015) [13]. Protein sources play a vital role in successful production in broiler as well as layer chicken. Feed sources are classified in to both conventional and unconventional sources. Conventional sources are having more digestibility compared to unconventional sources. Unconventional sources are locally available feed sources which will be used during the scarcity of conventional materials and some of them are having poor digestibility and also minimally used in the poultry rations. It has various anti-nutritional factors, which affects the growth of chicken. It can be overcome by the supplementation of non-starch polysaccharide (NSP) enzymes in the poultry rations.

2. Protein sources for Poultry

Soybean meal (SBM) is the preferred and desired protein source used in poultry feed production. Its CP content is about 40 - 48% (S.S.M. Beski *et al.*, 2015) [1]. In Tamilnadu, during this current COVID 19 situation, the cost of raw materials has been increased, especially Soybean meal (SBM). This makes the entry of various unconventional protein sources like DDGS, Till cake, Rapeseed meal, coconut meal, Palm kernel meal, Canola meal, Lupin seed meal, Cottonseed meal, Guar meal in the poultry feed ration. It also assists in the synthesis of body tissue, for that renovation and growth of the body. The usefulness of a protein sources depends on its ability to deliver a sufficient amount of the essential amino acids (EAA) that the bird needs, as well as the protein digestibility and the level of toxic substances associated with it (Scanes *et al.*, 2004) [11].

2.1 Soybean meal

Soybean meal (SBM) contains about 40 – 48% of crude protein, which is considered to be the safest and having high inclusion rate among other protein sources. SBM is a trypsin inhibitor, which also having other anti-nutritional factors like hemagglutinins or lectins, which contribute to growth depression (Ham *et al.*, 1945 [5]; Chernick *et al.*, 1948 [2]; Coates *et al.*, 1970 [3]; Liener, 1980) [7]. The trypsin inhibitor is inactivated by heat treatment of soybean meal. The heat treatment must be carefully controlled because overheating can result in deterioration of protein quality. High inclusion level of soybean meal in poultry diets has been associated to the incidence of foot pad dermatitis (Jensen *et al.*, 1970) [6]. The exact cause of this is not known. Soybean meal contains relatively high levels of potassium, which may increase litter moisture and thus result in sticky litter (NRC, 1994) [9].

Due to the increase of rate, the nutritional value of crude protein in the poultry feed ration is compensated by other protein sources and protease enzymes. The lysine content in the overall feed ration can be reimbursed by synthetic lysine to reduce the feed cost, respectively.

2.2 Rapeseed meal

Rapeseed meal (RSM) contains about 35% of crude protein and also rich in crude fibre. The anti-nutritional factors are goitrogenic, or progoitrogenic compounds which are known to be glucosinolates. The high inclusion rate leads to the reduction of growth rate in broilers and egg production in layer chickens (NRC, 1994) [9]. The average inclusion rate will be 3 – 4% in the layer chicken diets.

2.3 Sunflower cake/pellet

Sunflower cake contains about 25 – 29% of crude protein, whereas the pellet has 36% of crude protein. The cellulose and lignin in sunflower cake is a non-starch polysaccharide (NSP) which is not digested by the non-ruminants. The endogenous enzyme complex in non-ruminants cannot be able to digest the NSP. The NSP enzymes are supplemented in the poultry diets can be able to degrade this cellulose and lignin. Compared to soybean-meal it is richer in methionine and arginine but poor in lysine. It is an excellent source of pantothenic acid and niacin (TNAU, 2015) [14].

2.4 Guar meal

Guar meal (GM) contains about 45 – 50% of crude protein, whereas the raw guar meal has the lower level of protein and toasted guar meal has the elevated level of crude protein. Galactomannan is the deleterious factor present in the GM, which causes viscosity of ingested materials in the intestines leads to depression of growth and improper absorption of nutrients. The optimal inclusion level is 2 – 4% (M. Siva *et al.*, 2018) [8]. The application of β -mannanase enzyme in the diet removes the deleterious effects caused by galactomannans and reduces the viscosity in the intestine.

2.5 Cottonseed meal

Cottonseed meal (CSM) has approximately 40% of crude protein. Gossypol is the anti-nutritional factor present in the CSM. Free gossypol forms complexes with iron in the feed, intestinal tract, blood, and egg yolk, leading to possible iron deficiency or to discoloration of the yolk. Under extreme heat during processing, the gossypol may also form complexes with lysine, severely reducing the digestibility. Hens consuming gossypol may lay eggs with olive-discolored yolks, with the incidence related to the amount of free gossypol consumed. The discoloration may be obvious in the newly laid egg, but it becomes invisible after storage. Supplementation of soluble iron salts to tie up with the free gossypol may allow the use of cottonseed meals, where this is economically achievable (Waldroup, 1981) [16]. The presence of cyclopropanoid fatty acids and gossypol in cottonseed meals and oil may also cause a pinkish color in the egg whites. (NRC, 1994) [9].

2.6 Groundnut oil cake

Groundnut oil cake (GN) contains about 40 – 47% of crude protein, which is very rich in arginine and deficient in cysteine, tryptophan, methionine and lysine, but good source of Vitamin B12 and calcium.

The common adulterant includes castor husk and Mahua oil

cake. The toxin binder and liver tonics must be supplemented during the higher inclusion levels of GN in the diet due to the presence of Aflatoxin. There are four Aflatoxins, B1, G1, B2 and G2 out of which B1 is most toxic. Inclusion level of GN can be used upto 2-5% in the grower and layer rations (Vikaspedia, 2021) [15].

2.7 Dried Distillers Grain with Soluble (DDGS)

Dried Distillers Grain with Soluble (DDGS), an ethanol byproduct contains about 28 – 35% of crude protein, which is rich in xanthophyll pigment. It enhances the color of the egg yolk. The moisture content leads to the mycotoxin infection, this itself limits the inclusion level in the diet. The optimal inclusion level will be 2-4% in the poultry ration. (Swiatkiewicz *et al.*, 2008) [12].

2.8 Fish meal

Fish meal consists of fish or fish by-products, which have been dried and ground into a meal, contains about 40 – 60% of crude protein. It has a digestibility between 93 and 95 per cent. Fishmeal protein has a high content of lysine, methionine, and tryptophan. It has about 20 percent mineral content which is high in calcium (8%) and phosphorus (3.5%). They are a good source of vitamins of the B complex, particularly choline, B12 and riboflavin. For pigs and poultry, fishmeal has become a standard ingredient and is added to about 10% of the ration to make up for deficiencies of essential amino acids. The fish meal is having some bacterial content also, especially clostridium sp. The higher concentration rate will result in necrotic enteritis in poultry (NRC, 1994) [9].

2.9 Meat meal

Meat meal is rich in crude protein (50-55%) and ash (21%) with high calcium about 8% and 4% phosphorus – but low in methionine and tryptophan (NRC, 1994) [9]. Good sources of vitamins of B complex, especially riboflavin, choline nicotinamide and B12 (S. Senthilkumar *et al.*, 2015) [10].

3. Economy of protein in poultry feed

Protein nutrition has a high economic preference, since it is an expensive material rather than other raw materials. The optimum inclusion of protein should be needed in the poultry rationing to achieve maximum performance. For example, the cost of protein sources are keep on climbing up, instead of adding the raw material (soybean meal) to achieve the optimum protein level, we should add the synthetic lysine and methionine as well as the protease enzymes which will give the same nutritional advantage and also the essential amino acids (EAA). Still the better way to explain this will be, approximately 25kg of SBM (45% CP) is needed for 1.0% ($25/1050 \times 45 = 1.07$) of CP in the feed formulation but adding up of 500g Protease enzyme per ton of feed will give the same benefit. Here the cost of SBM is Rs. 71/kg (unit price may differ from place to place or time to time) ($25 \times 71 = 1775$) where else the cost of Protease enzyme will be around Rs. 500/kg ($0.5 \times 500 = 250$). But there will some limitations also in using the enzymes. Out of 25kg we have to add 0.5kg of enzyme and the rest 24.5kg will be the inclusion of filler materials like DORB, which will be having around 13 – 15% of Crude protein per kg.

4. Conclusion

Fortunately, access to these protease enzymes and synthetic

amino acids has become available with the recent advancement of biotechnology, which makes the economic benefits of such an approach quite achievable.

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