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BRIEF OVERVIEW ON ROLE OF FEED FORMULATION SOFTWARE IN MANAGEMENT OF FEED PRICES

Hrishitva Patel[1], Abdul Samad[2]
[1] SUNY Binghamton, USA
[2] Faculty of Veterinary and Animal Science MNS University of Agriculture, 25000, Multan Pakistan
Email: hpatel51@binghamton.edu

Abstract

Feeding chickens is currently less expensive than feeding other livestock. It was discovered that the price of chicken feeds might be decreased by using unusual (cheap) local ingredients to create the least expensive feed composition with the use of computer software. When using these feed materials in the composition of feed, extra nutrients must be included, like, toxin binders, amino acids, micronutrients and some others. The majority of broiler and layer enterprises were found to be using amino acids over the levels recommended, with minimal influence on output and detrimental consequences on profitability. Although there are anti-nutritional elements and a reduced level of digestibility in typical feed components, there is little utilization of unconventional feed ingredients. This study looks at the use of low-cost feed ingredients to reduce feed costs while raising feed quality and output, and it also highlights the function of computer software in feed formulation

Keywords: Least cost feed formulation, Software, Management of Feed prices

INTRODUCTION

To lower the cost of feed, it is necessary to advance scientific understanding of the use of inexpensive locally available agro-industrial byproducts and also have knowledge regarding feed formulation software [1]. Any effort to lower the cost of feed could result in a considerable decrease in the total cost of production since feed accounts for 60 to 70 percent of all production costs [2]. Due to their mono-gastric nature, chickens lack the enzymes necessary to break down complex carbohydrates including cellulose, hemicellulose, and lignin [3]. Since complex carbohydrates make up a large portion of fibrous by products, it is important to identify strategies to better utilize these materials so that they can be added to poultry feed without having a negative impact on the health and productivity of the birds [4]. Broilers, backyard poultry, and Japanese quails can all be produced economically using locally accessible materials. Therefore, it was thought that these byproducts should be evaluated for economical poultry feeding to produce more meat and eggs at a lower cost in Pakistan or whole world [5]. Low cost poultry breeding is a windfall for

marginal farmers because of the anticipated increase in demand for eggs and meat. The demand for traditional feed ingredients to feed chickens is always rising. The cost of production has significantly increased due to the inclusion of these feed components in chicken feed [6]. By using computer software like excel for feed formulation and utilizing inexpensive by-products that are readily available locally may help the end users by lowering the cost of feed, which can therefore lower the overall cost of producing meat and eggs and make them more readily available at lower prices in rural areas of Pakistan [7]

Meat Fish meal, and groundnut cake, bone meal, , soybean meal and other old-fashioned resources of proteins and vitamins used in feed of Poultry are getting more expensive in developing nations [8]. Due to the rising cost of raw resources and the intense competition with humans for the same foods, there is not an enough supply of these ingredients for feed [9]. Therefore, in order to lower the cost of feed, the quest for alternative feed sources has become necessary [10]

Now a days in Pakistan the rate of feed is so high just because of availability of soya bean so we should replace soya bean keeping in a view the anti-nutritional factor which are elaborated by the NRC [11].

Present condition of Poultry sector in Pakistan

Pakistan is currently the eighth-largest producer of chicken in the world because to significant upgrading of the industry. Poultry production in Pakistan accounts for 1.4% of Pakistan's GDP and 32.7% of all meat consumed in the nation (Economic Survey, 2017-18). Developing least cost feed formulations methods to minimize the feed cost is main focus for researchers of Pakistan. Our objective is to create solutions for least cost feed formulation by using feed formulation software and replacing high cost ingredients with low cost. In this review we will find out the ways of minimizing feed cost which may help farmers for good production and cost effectives will provide longevity to their businesses [12].

Feed consumption in Pakistan

In Pakistan, there is currently an estimated 6.4 million tons of demand for chicken feed (PPA Pakistan) [13]. When compared to 2017–2022, the consumption of poultry feed increased from 40% to 50%. The rise of the feed business in Pakistan has been credited to the boiler industry, which benefited greatly from the presence of integrators (who made up 70% of the whole industry) and a compressed production cycle. As a result, the sector has become more reasonable and efficient using feed. Compound feed is used in the broiler industry 90% of the time. The usage of compound feed, which ranges from 5% to 25% in the egg layer industry, is significantly underutilized. Although there are already 23 million tons of eggs consumed, the overall feed need is estimated to be 2 million tons. Future expansion of the feed industry has a bright outlook thanks to the egg-laying sector[14]. The overall feed demand is predicted to be between five and six percent when taking into account the egg business. There are large prospects for compound feed demand in the foreseeable future in the egg sector. Egg layer farming will be integrated backward into feed millings when farms combine and expand in size over time [15].

Reason behind the rates of Feed in Pakistan

Feed is a big input, and the cost of feed is a major limitation, but it also provides a vital tool for controlling production costs and turning a business profitable [16]. The poultry diet contains a substantial amount of cereals and edible oil seed meals, which directly compete with human consumption. Because there is nearly no more

room for agriculture, the availability of feed resources could be one of the biggest obstacles to increasing poultry production in the future. Therefore, more cautious methods should be used to maintain the poultry business in the cutthroat market, including lowering production costs, creating safe and high-quality goods to suit consumer demand, and ensuring the welfare of the birds[17]. Again, there are many factors that affect feed production, including recurrent monsoon failure, low productivity, insects, weeds, environmental concerns, cost effectiveness, sustainability, and dwindling agricultural land. Farmers are additionally encouraged to switch to producing cash and commodity crops. These elements contribute to the declining trend in chicken feed ingredient output over the past few years and the rise in demand, which drives up the price of feed ingredients The cost of feed materials (such as corn and soy meal) has recently increased significantly, reaching record highs, and the feed business has been suffering due to an overstock of products in the market. For instance, the typical commercial broiler farm's average production costs, which were in the range of Rs. 55–60/kg in 2013, grew to more than Rs. 65–70/kg in 2015 [18].

Available replacement of Feed Ingredient

All three poultry production systems have access to a large variety of alternate feedstuffs. Traditional family poultry systems (scavenging and backyard) and the semi-commercial system have the best chance of effectively utilizing these feedstuffs. The semi-commercial technique allows for the mixing or diluting of purchased feeds with locally accessible, alternative feedstuffs because only a portion of the feed demand is acquired from commercial compounders. Alternative feedstuffs can be used in local, low-input family poultry systems to complement the scavenge feed base [19-22].

Sources of Energy

The country's main energy source, maize, has been getting more readily available, albeit at a slower rate than the expansion of the livestock and poultry industries. In order to fulfil the need, mixtures of corn with other ingredients, particularly sorghum, finger millet, and pearl millet, could be tried. The development of the poultry sector is supported when these cereals are combined at a level of 25 to 33 percent. The use of various oilseed and cereals filtrate has been shown to be beneficial. Additionally, these grain can be utilize safely as a component or the sole diluent of the concentrate of protein and mineral used in feed of broiler during the end of flock. Morever, there are alternatives to maize such as, rice polish, broken rice, de-oiled rice bran, maize germ maize grit, meal, undersized wheat, maize germ cake dried distillery, grain ghee residue, etc. The use of edible oils and fats significantly contributes to the replacement of maize as a source of energy. Recently developed energy sources, such as the variety of bio fortified maize currently on the market, may meet the limited amino acid requirements of real maize grain [23-25].

Sources of Protein

Due to its high protein content and easy digestion, soya bean meal is the primary source of protein for chicken feed in Pakistan. Utilizing other protein sources could lower the price of the protein supply [26]. Soya bean meal was replaced with rapeseed meal and sunflower seed meal, each at a 10 percent level, to support broilers' optimal growth and profit margin. The 75:25 ratio of ground nut meal to Niger meal was shown to be suitable for producing eggs profitably. Nevertheless, there are certain restrictions on employing mustered cake (glucosinolates, tannins, erucic acid,

colour, etc.), sunflower cake (high fibre), safflower cake (high fibre, low availability), niger cake (export and cost competitiveness), and ground nut cake (aflatoxin, fibre and cost). Guar meal, cotton seed meal, sesame meal, rice gluten meal, and other potential byproducts could all be employed in the production of chicken [27,28]. Due to the high cost and lack of good grade fish meal, the usage of fish meal has been restricted. The additional animal protein feed ingredients are also available for chicken feed and include meat cum bone meal (42 to 55% protein and 3 to 7% P), meat meal (65 to 75% protein), and blood meal (78 to 82%). Even poultry slaughterhouse waste meal can be substituted for soya bean meal in diets safely up to 5%. [29,30]

Constrained and Opportunity in Poultry industry of Pakistan

In addition to exact nutrient supply and maximizing nutrient utilization from those accessible feed resources, the cost of feed depends on the availability of feed stuffs in the needed quantity and their prudent use. In general, the price of chicken feed is determined by the availability and cost of maize and soy. In India, it is necessary to use locally accessible feed ingredients of one or more in least expensive feed mixing due to the paucity of both maize and soys bean meal at reasonable prices. However, due to a lack of valid information on their nutritional quality, feeding value, and safe or effective levels of inclusion in different types of chicken feed, only a smaller number of raw materials are employed in the formulation of poultry feed. To meet customer demand, the feed industry needs a steady supply of any novel feed resource with consistent quality. A significant amount of precision and dependability has been assessed in the basic data base for maize, soy bean meal, ground nut extraction, and fish meal, but there is less information available for other feed items. Only research institutes have access to the nutritional value, toxicants, amino acid value, safe inclusion level, and metabolizable energy of numerous substitutes for maize and soya bean meal either alone or in combinations, not poultry nutritionists and farmers (FAO, 2004). Regarding non-starch polysaccharides and anti-nutritional elements, cereal byproducts and oilseed residues are likewise not an exception. Along with delayed production of eggs and meat, the diet's low and fluctuating concentration of metabolizable energy, high levels of fiber, and anti-nutritional substances may cause poor conversion efficiency. A higher volume of undigested nutrients excreted through excreta might occasionally result in a high level of indoor ammonia generation along with other environmental issues. Therefore, greater attention should be paid to improving nutritional availability and digestion in the gut of poultry [30-33].

Least cost feed formulation by using feed formulation software

When F.V. Waugh published a paper titled "The Minimum-Cost Dairy Feed" in 1951, it marked the first time a computer was used to formulate feed. The first book on computer-based formulation was "Linear Programming and Animal Nutrition," written by Dent & Casey in 1967. When computers became accessible to major enterprises, the feed industry began using them in the 1970s for practical feed formulation. Later, when personal computers were made commercially available in the 1980s, the use of computers for feed formulation grew. Nowadays, it is quite uncommon to formulate feed without using computers [34, 35]. Based on specified inputs, this research compares six distinct feed formulation software programmers. The calculation time for formulating feeds can be reduced as computer power increases. There are numerous traditional and unconventional feed formulation

techniques. The traditional approaches include the square method, the two by two matrix method, the trial-and-error approach, and the simultaneous equation approach. Following this, new techniques like goal programming, least-cost formulation, stochastic programming, and non-linear programming were introduced. The best way to use depends on the goal that feed was designed to achieve, such as optimizing egg production or minimizing costs.

Different feed standard tables should be taken into consideration for different breeds of Poultry when formulating feed. The amount of nutrients needed varies depending on the bird's category, age, and weight. Dealing with restrictions is one of the main challenges while developing any mathematical model or linear model

RESULT AND DISCUSSION

The cost of the feedstock is significantly affected by even the smallest change in the limitation. Finding the proper values for limits is therefore crucial, and employing software designed to calculate nutrient requirements makes this task simple [35-37].
The below formulation is done by a software

Feed Ingredient	Ratio in kg
Whole maize	10
Maize germ	16.7
Wheat pollard	13.3
Wheat bran	10
Cotton seed cake	6
Sunflower cake	4.7
Soya meal	3.4
Lime	2
Fishmeal	3
Bone meal	0.04
Grower PMX	0.001
Salt	0.005
Coccidiostat	0.005
Zincbacitrach	0.005

Figure 1
Formulation done by use of software

Figure 2
Software winfeed

Purpose of Feed formulation

The goal of feed formulation is to create a balanced diet that will give the bird the right amounts of nutrients that are biologically available to it. Formulations include supplements to supply minerals, vitamins, and particular amino acids in addition to energy and protein. All diets need to include these supplements since they offer the vital elements required for health and performance. Additionally, a wide variety of non-nutritive ingredients that may not be necessary but have a significant impact on performance and health are included in contemporary feed formulas. The necessity of their participation is frequently obvious: Their effectiveness must be taken into account as a key element when choosing these additions. Only a little amount of feed supplements and additives are utilized, therefore it's crucial that they're thoroughly combined with the other ingredients to ensure an even distribution [37-40].

Nutritional Need of Bird

Nutrient requirements are difficult to define since they are always changing and influenced by a variety of circumstances [41,42]. There are two primary categories of factors that affect nutrient needs: those that are specific to the bird, such genetics, sex, and the kind and stage of production; and those that are external, including the thermal environment, stress, and husbandry circumstances. Accuracy in both domains is required for precision in specifying criteria. The increased homogeneity of genotypes, housing, and husbandry procedures across the poultry business has enabled significant advancements in the characterization of nutrient requirements for different classes of fowl. Accepting the idea of an ideal protein has made defining requirements for the 10 necessary amino acids simpler. The requirements for amino acids are similar to those for other nutrients. Influenced by a number of variables, such as heredity, sex, physiological state, environment, and state of health. The relative proportion of the various amino acids does not, however, typically alter as the amino acid requirements do. This allows for the expression of actual changes in amino acid requirements in relation to a balanced protein or ideal protein. Lysine serves as the reference amino acid in the concept of an ideal protein, and the amounts of other required amino acids are specified as percentages (or ratios) of the lysine requirement. The benefit of this technique is that it allows for the calculation of the requirements for the other essential amino acids after the lysine requirements for various situations have been established. Setting the amino acid

requirements for feed formulations in the poultry sector has now become standard procedure [43,44]

Balanced Protein with economic price

Lowering the level of balanced protein generally lowers the cost of feed per tonne while simultaneously lowering productivity and profitability [45,46]. In order to provide broilers with the proper minimum levels of necessary and non-essential amino acids, the balancing protein concept is a practical application of the Ideal Amino Acid profile. The Ideal Amino Acid Profile creates a precise profile by applying minimum and maximum values to each individual amino acid, which is not always possible in actual commercial broiler feed formulations. The Ideal Protein principle is put to use in Balanced Protein [47,48].

Future Demands

Given the demand for key ingredients in chicken feed, such as soya bean meal and maize, as well as the growing rate of the poultry industry in our nation, more effort should be put into finding alternative feed sources that are both high-quality and readily accessible. It should be done methodically and made available to all nutritionists and the farming community to assess data bases on feeding values, including nutritional value, availability of nutrients, and safe degree of incorporation of alternative and newer feed resources. For the efficient use of the more recent feed resources, identification of incriminating variables and their detoxification processes should be done at all levels of study. The main issue, however, is the current dearth of processing, transport, cold chain, and storage facilities. High feed costs can translate into greater production expenses, which raise pricing. Another issue is the absence of quality standards, which makes people more susceptible to illness epidemics.

CONCLUSION

The ability to influence feed costs and broiler realizations is limited, so poultry integrators continue to concentrate on increasing productivity by experimenting with feed mixtures, use of Feed formulation software, reducing mortality rates through improved farm management and medication, and making constant improvements to other operational parameters like hatchability, average daily weight gain, and minimizing selection gaps. These procedures may be necessary, but they result in quality being compromised. To increase production, improve quality, and increase outputs, specialized systems, upgrades, and existing facilities are required. Unconventional feed sources are inexpensive and readily available locally, allowing for maximum inclusion without endangering the health of the birds. When the demand for conventional feed ingredients increases, we can switch to formulating feed by using unconventional feed ingredients with a high level of safety inclusion to boost production profits. The most affordable feed formulation with a balanced protein content also aids in proper nutrient absorption and produces good results and this kind of formulation can be done by use of software as it gives positive results.

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