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Author

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SYMBOLS/ABBREVIATIONS	FULL MEANING
%	Percent
/	Per
<	Less than
gm	Gram
Kcal/Kg	Kilo-calorie per kilogram
CP	Crude protein
CF	Crude fibre
DM	Dry matter
EE	Ether Extracts
NFE	Nitrogen Free Extracts
ME	Metabolizable Energy
DLS	Department of Livestock Services
HCl	Hydrochloric acid
H_2SO_4	Sulphuric acid
KOH	Potassium hydroxide
NaOH	Sodium hydroxide
&	And

Plagiarism certificate……

This report is a significant new work/knowledge. No sentence, equation, diagram, table, paragraph or section has been copied verbatim from previous work unless it is placed under quotation marks and duly referenced. The work presented is original and own work of the author (i.e. there is no plagiarism). No ideas, processes, results or words of others have been presented as Author own work. There is no fabrication of data or results which have been compiled/analyzed. There is no falsification by manipulating research materials, equipment or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.

The Author

ABSTRACT

Feed represents the major cost of poultry production, constituting up to 70 percent of the total cost. Of total feed cost, about 95 percent is used to meet energy and protein requirements, about 3 to 4 percent for major mineral, trace mineral and vitamin requirements, and 1 to 2 percent for various feed additives. Poultry diets are formulated from a mixture of ingredients, including cereal grains, cereal by-products, fats, plant protein sources, animal byproducts, vitamin and mineral supplements, crystalline amino acids and feed additives. These are assembled on a least-cost basis, taking into consideration their nutrient contents as well as their unit prices. As the quality of feed is one of the main determinant factors in successful poultry farming; an attempt was made to compare the quality of commercial layer feeds to identify the different proximate component. For this two feed samples were collected from two specific places. CP feed sample was collected from a nearby shop of Chittagong metropolitan area and the other feed sample was collected from Animal Feed Analytical and Quality assurance Laboratory (AFAQAL) of VC&RI, Namakkal, Tamilnadu, India. The CP feed are commercially available in Bangladesh. Proximate analysis was done to see the nutritive values. Those values were then compared with the standard value. Finally both data of proximate analysis & economic one were compiled by using Microsoft Excel 2007 (Chi-square test by using SPSS 16.0). The proximate analysis of two feeds are showed the following ranges of nutrient compositions DM (88-90)%, Moisture (10.5-11.5)%, CP (16-18)%, CF (5-6)%, EE (3-4)%, Ash (6-6.6)%, NFE (53.2-55.05)%, ME (2666-2685) Kcal/kg. From this experiment, it was observed that the nutritive value of AFAQAL feed is comparatively better than CP feed as the nutritive values are very close to the specified values.

Key Words: Feed, layer layer, proximate analysis, DM, ME, CP, CF, EE, Ash, NFE.

Chapter-I

INTRODUCTION

The poultry sub-sector is crucially important in the context of agricultural growth and the improvement of diets of people in Bangladesh. The sector is particularly important in that it is a significant source for the supply of protein and nutrition in a household's nutritional intake. It is an attractive economic activity as well, especially for women and poor population. Bangladesh is an agro-based developing country in the world. Livestock is one of the most important sectors of agriculture which plays a vital role to promote national economy and human health. The estimated contribution to GDP during FY 2012-13 from this subsector was 3.49% (DLS, 2012-2013).Though the share of this sub sector in GDP is small; it has immense contribution to meet the daily protein needs. Among this, poultry constitutes 30% of animal protein and which will be increased to 40% before 2015 (IFPRI, 2000). As an important sub sector of livestock, the poultry industry plays a vital role in economy and simultaneously creates numerous employment opportunities. In Bangladesh, small and large scale poultry farms are expanding rapidly, providing meat, eggs and employment. According to DLS, the production of poultry (projected) rose to 293.235 million in 2012-13. There are 246.6 million chickens (DLS, 2012-13) and about 50,000 poultry farms (FFYP, 2003) available in Bangladesh presently. However from another census it was found that 12.89% poultry birds came from nonfarm source, 51.95% from small farms, 27.43% from medium farms and 7.73% from large farms (BBS, 2003). The poultry industry, as a fundamental part of animal production, is committed to supply the nation which is a cheap source of good quality nutritious animal protein in terms of meat and eggs (Akter and Uddin, 2009). Person from low income group may also start the business on a small scale. Poultry farming offers opportunities for fulltime or part-time employment for rural women, children or elderly person on the farm operation. Poultry is basically a source of economical, palatable and healthy food protein. Poultry meat and eggs contribute approximately 33% of total animal protein supplied in the country (Ahmed and Islam, 1990). According to

DLS, total production of meat was 25.32 million ton and egg was 51347 million in numbers in FY 2012-13. Hossain, 1999 stated that farm produced broilers, spent hens, cockerels constitute about 55% of the total chicken meat while farm produced eggs are 82% of the total eggs marketed in Dhaka. The per capita availability of meat was 20 gm/day and 40 eggs/ year in the year 2007-08. Total production in the years 2002-2008 was meat-0.91-1.04 million ton at a growth rate of 114.3% and eggs-4770-5653 million numbers at a growth rate of 118.5% (DLS, 2007). The demand was 15174 million numbers (104/head/year) and supply was 5653 (38.74/head/year) in the year of 2008 (BBS, 2009). The demand of egg and meat is higher in our country than the supply. The egg production of deshi hen is about 30-70 eggs per year where as the exotic strains produce 300 eggs per year (Haque *et al*., 1993). This data clearly indicate that the abundance of poultry meat and egg is still very much lower in Bangladesh in spite of the significant development in the commercial poultry sector during last 10 years. Poultry production is an important part of animal agriculture. By increasing the productivity of poultry meat and eggs, the existing gap between supply and demand of animal protein can be bridged. Poultry meat and eggs are quality food in respect amino acid ingredients and therefore, can improve considerably an unbalanced diet. It also provides cash income and creates employment opportunity for small and landless farmers. Though presently only 15% of the total poultry products are coming from commercial farms, poultry industry has established its position as the fastest growing segment in the agricultural sector. Bangladesh Government has also come forward for the improvement of this sector and offering training and financial assistance to marginal entrepreneurs. Profitable poultry farming is a highly specialized job in which a lot of factors may be responsible to offset the profit amount. Among these, quality of chicks and feeds are most important. Feed alone accounts for approximately 65-70% of the total cost of production of poultry meat and eggs. As nutrition is one of the most important factors for successful poultry farming, a booming poultry feed business is appearing all over the country. Different feed ingredients are being important to prepare low cost but nutritionally balanced poultry ration. A number of feed mills are producing poultry feed,

which is purchased by farm owners according to their need. Farmers do not have enough facility to analyze and monitor the quality of the feed. Often they formulate the ration for their own birds from ingredients on the basis of the information about the feed components mentioned elsewhere. In view of the availability and source of different feed ingredients, the level of nutrients in the prepared ration may vary from what is actually desired. Deficiency of a particular nutrient in the ration may not be over ruled which is generally unnoticed by the farm owners causing a devastating effect on production. To get an exact picture of the feeding practices as well as to assess the quality of the poultry feeds being used in farms located in different areas of Bangladesh, round the year, biochemical analysis (nutritional quality) of the feed seems to be worthwhile. The present study was therefore, undertaken to observe the source of feed and feeding practices followed by the farm and to assess the nutritive value of feeds collected from the poultry farms, round the year. One of the major problems of the development of the poultry sub-sector in Bangladesh relates to the lack of sufficient and appropriate feeds (Mitchell 1997; Alam 1997). Relevant research suggests that a high priority is given to the improvement of the feed supply in the sector, which is expected to help in developing resistance to diseases and production of quality products. Poultry farms in Bangladesh are growing fast in recent times. Following a high population growth, urbanization and demand elasticity, the demand for poultry products is expected to increase in the future. Hence, poultry farms are also expected to further increase over time. Wheat and maize together constitute over half of total poultry feeds, of which over four-fifths is maize and less than one-fifth is wheat. Although the use of wheat and maize for livestock and poultry feed is growing rapidly in developing countries in general (Sarma 1997), this has not yet reached a significant proportion in Bangladesh. Maize in Bangladesh is still a minor crop in terms of acreage, accounting for only 3 percent of wheat and 0.2 percent of rice. Although it is possible to produce maize throughout the year, maize is currently produced in the country largely in winter season. The demand for both livestock and poultry feeds, comprised largely of wheat and maize ingredients, appears to be currently met from only imports, and at seemingly relatively

higher costs. In view of this, the domestic production of maize and wheat has an important role to play in the development of poultry vis-à-vis the agricultural sector in Bangladesh.

Considering all the above mentioned points, the present study was designed with the following aims and objectives:

- To explore the quality of both hand mixed and commercial layer layer feeds on basis of proximate analysis in laboratory.
- To ascertain the nutrient status of commercial layer layer feeds produced in two different feed producing mills.
- To compare between the companies standard value and observed value of nutrients in layer layer ration in different companies.
- To suggest which one (layer feed) is the best on the basis of quality and profitability on the farm level.
- To solve the problems faced by different poultry farms.
- For the development of poultry sector in Bangladesh by increasing the product quality in compare to India.

Chapter-II

METHODOLOGY

2.1. Study Area

Two feed samples were collected from two different places. One of the samples was collected from VC&RI, Namakkal, India and another sample was collected from a nearby shop of Chittagong metropolitan area. The Layer layer feed samples were collected which were in the form of mash.

2.2. Collection of Sample

Samples were collected by using simple random sampling technique. Several physical characteristics were seen during collection. The feed samples were brownish color with good flavor, free from foreign particles (soil, dust, weeds, iron, nails etc.) and no offensive odor was present. Samples were wrapped up by polythene bags and preserved in the laboratory for proximate analysis.

2.3. Preparation of Sample

The feed samples were grinded by using micro grinder to make it homogenous powder. Later on, it was mixed properly and exposed to cool down for sampling.

2.4. Estimation of Nutrients Content of feed Sample

2.4.1. Proximate Analysis:

Proximate Analysis of collected samples were carried for Dry Matter (DM), Moisture, Total Ash (TA), Crude Protein (CP), crude fibre (CF), Ether Extract (EE), Nitrogen Free Extract (NFE) in animal nutrition laboratory, Chittagong Veterinary and Animal Sciences University, Chittagong, Bangladesh.

Figure 1: Collected Sample for Proximate Analysis

Figure 2: Estimation of DM by Using Hot air oven & Desiccators

Figure 3: Estimation of Crude Fibre (CF)

Figure 4: Weighting of Feed Sample

Figure 5: Estimation of Ether Extract (EE)

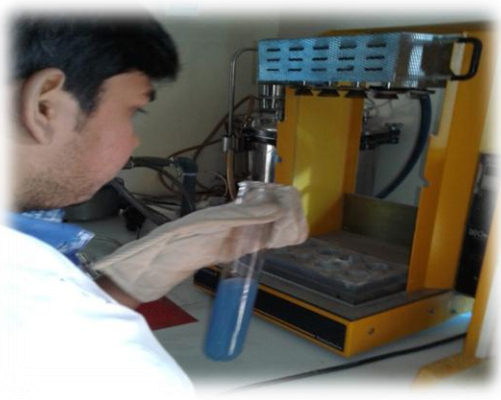


Figure 6: Estimation of Crude Protein (CP)

Figure 7: Estimation of Ash

2.4.2. Estimation of DM and Moisture:

The enamel disc or crucible was dried in an oven regulated at 105°C which was cooled in desiccators and weighted. 5 gm of feed sample was weighted into the enamel disc and kept into the oven for 24 hours. The enamel disc was removed from the oven with metal tong. After that it was cooled in desiccators and the final weight was taken after getting constant weight **(AOAC, 1990).**

$$\%DM = \frac{Weight\ of\ crucible\ with\ dry\ sample - Weight\ of\ empty\ crucible}{Weight\ of\ feed\ sample} \times 100$$

%Moisture = 100 - %DM

2.4.3. Estimation of Ash:

The crucible was cleaned and dried in hot air oven. Then it was cooled in desiccators and weight of empty crucible was taken. 5gm of feed sample was placed there and the sample was burned up to no smoke in heater. The crucible with sample was cooled and transferred to the muffle furnace. Then the sample was ignited at 550-600°C for 6-8 hours until white ash. The furnace was cooled at 150°C and the sample was transferred to desiccators and weighted **(AOAC, 1990)**.

$$\%Ash = \frac{Weight\ of\ crucible\ and\ ash - Weight\ of\ crucible}{Weight\ of\ feed\ sample} \times 100$$

2.4.4. Estimation of Crude Fibre (CF):

2 gm of feed sample was weighted and taken into a beaker. 125 ml of 1.25% H_2SO_4 was added into the beaker. Then it was fitted in condenser and placed on heater. It was boiled for 30 minutes. After that it was cooled and filtered through filtering cloth. The sample was washed with tap water until it was free from acid. Residue of sample was transferred into same beaker. 125 ml of 1.25% NaOH was added there and again fitted in

condenser and placed on heater. It was boiled for 30 minutes and removed from heater which was cooled and filtered through filtering cloth. The sample was washed until it was free from alkali. The residue of sample was transferred in a previously weighted crucible. The crucible was into the muffle furnace and ignited at 600^0C temperature for 5 hours. Then it was weighted after cooling.

$$\%CF = \frac{Weight\ of\ CF}{Weight\ of\ feed\ sample} \times 100$$

$$= \frac{Weight\ of\ crucible\ with\ dry\ sample - Weight\ of\ crucible\ with\ ash}{Weight\ of\ feed\ sample} \times 100$$

2.4.5. Estimation of Crude Protein (CP):

0.5 gm sample was weighted and taken into digestion tube. One spoonful of catalyzer mixer (KOH, NaOH, Se) was added there. 10 ml concentrated H_2SO_4 was added and the digestion flask was placed in Kzeldhal Digestion Set. After that heat was increased gradually and continued up to clear residue (45 min to 1 hr). The flask was removed and cooled. 10 ml 2% boric acid solution, 2 drops mixed indicator were taken in a conical flask. The conical flask was fitted in the collection arm of distillation set. 50 ml distilled H_2O was added in the digestion tube and fitted in the distillation flask. 40 ml of 40% NaOH was added there and the distillation was continued up to 100ml of distillate. The distillate was titrated against 0.1 N HCl solution. Titration was continued until the color changed into pink. Then the titration volume was calculated **(AOAC, 1990)**.

$$\%\ CP = \frac{(Titre - Blank) \times Normality\ of\ HCl \times 14.007 \times 6.25}{Weight\ of\ sample} \times 100$$

2.4.6. Estimation of Ether Extracts (EE):

One gram dry sample was taken in an extraction thimble having porosity and then placed in the Soxhlet flask. The cork of thimble was above the siphon tube. A receiving

flask was weighted and fitted with Soxlet apparatus and was placed in water bath at (50 to 60)^{0}C. Ether extract was poured down in to the soxlet flask. The flask was filled up to ¾th portion with ether and it was sure that water was running through the condenser. When extraction was over, the thimble with sample was removed and heated in the water bath to remove all the ether from receiving flask. The receiving flask was placed into the oven at 105^{0}C to eliminate left of the ether and water. After drying, the flask was taken out and weighted **(AOAC, 1990)**.

$$\%EE = \frac{Initial\ weight - Weight\ after\ extraction}{Sample\ weight} \times 100$$

2.4.7. Calculation of Nitrogen Free Extracts (NFE):

The NFE content was calculated by deducing the sum of the values for moisture, crude protein, crude fibre, ether extracts, total mineral matter in 100 **(Raghuramulu *et al.*, 1983).**

%NFE = 100 – (%Moisture +%CF + %CP + %EE + %Ash)

2.4.8. Calculation of Metabolizable Energy (ME):

The ME was calculated by using following formula **(Lodhi *et al.*, 1976)**.

ME (Kcal/kg) = 32.959 {%CP + (%EE × 2.25) + %NFE} – 29.20

Chapter-III

RESULTS

The results of chemical analysis and also of statistical analysis of data are given below in tabulated form**:**

Table 3.1: Proximate components of two feeds with company standard

Parameters	CP		AFAQAL	
	Observed values	Company values	Observed values	Company values
Moisture %	11.3	12	10.85	11
ME(Kcal/kg)	2685	2800	2666	2700
Ash%	6	5.8	6.6	6.5
CP%	16.9	17.5	17.65	18
CF%	5.2	6	5.65	6
EE%	3.3	4	3.9	4
NFE%	53.2	55.5	55.05	55.5

Source of company report: Specification attached with the collected feed bag.

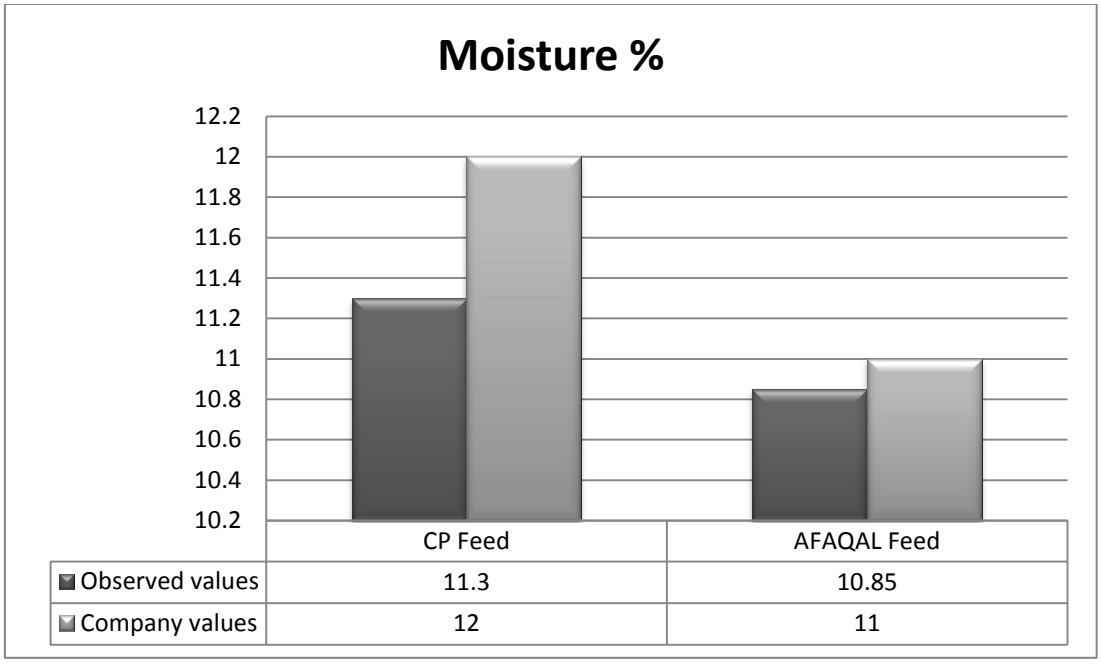
Table 3.2: Standard values for nutrients of layer layer diet recommended by different researchers

References	ME (Kcal/Kg)	CP (%)	CF (%)	EE (%)	Moisture (%)
Larbier, M. and Leclerc, B. (1992)	2750-2900	17-18	4	3.5-4.0	12
Banerjee, G.C.(1995)	2700	18	8	-	10
Verma D.N. (2006)	2700	18	-	-	-

Chapter-IV

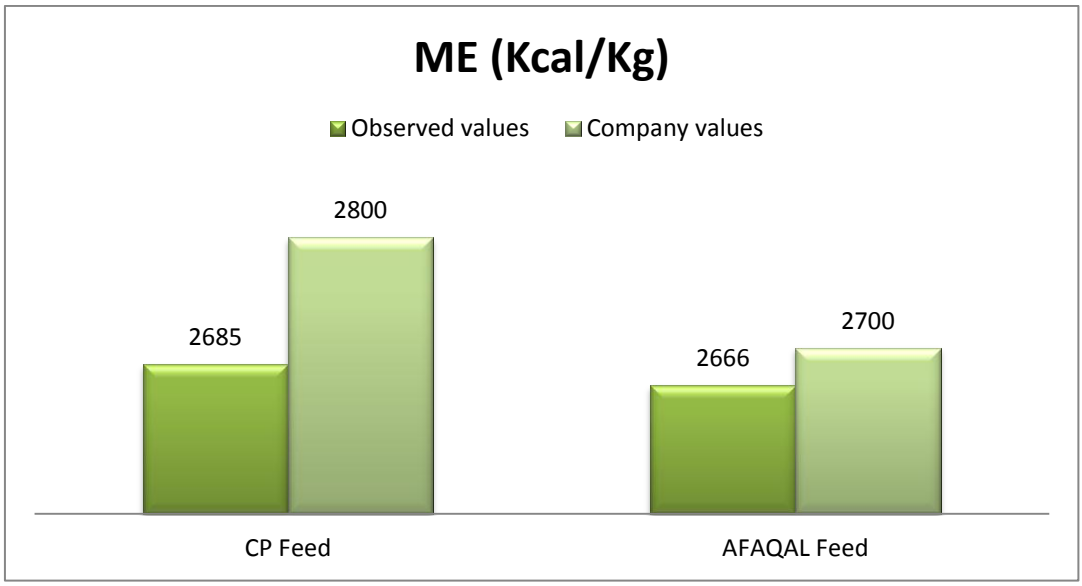
DISCUSSION

From above observation (Table 3.1), it can be said that there are no significant difference is written for statistical analysis among the nutrient compositions of layer layer diet with different types of feeds. Apparently, there were a few differences between the observed and specified nutrient compositions of layer layer feed collected from CP an AFAQAL (table 3.1).



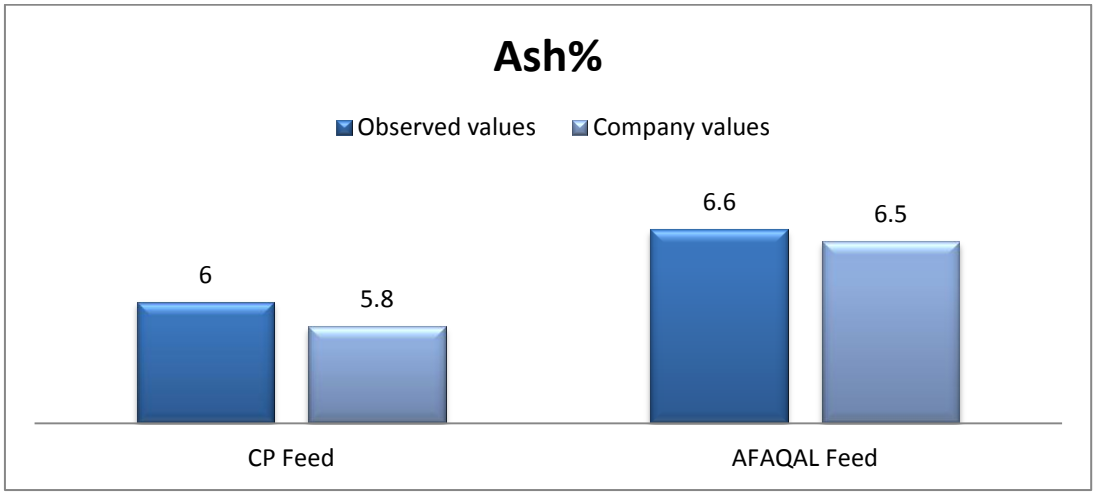
4.1: Graphical presentation of Moisture% of layer layer diet with different types of feeds.

The moisture percentage was found to be higher in CP feed (11.3%) and lower in AFAQAL feed (10.85%) observed in laboratory. The company value of CP and AFAQAL feed are 12 and 11 respectively (Graph 4.1).



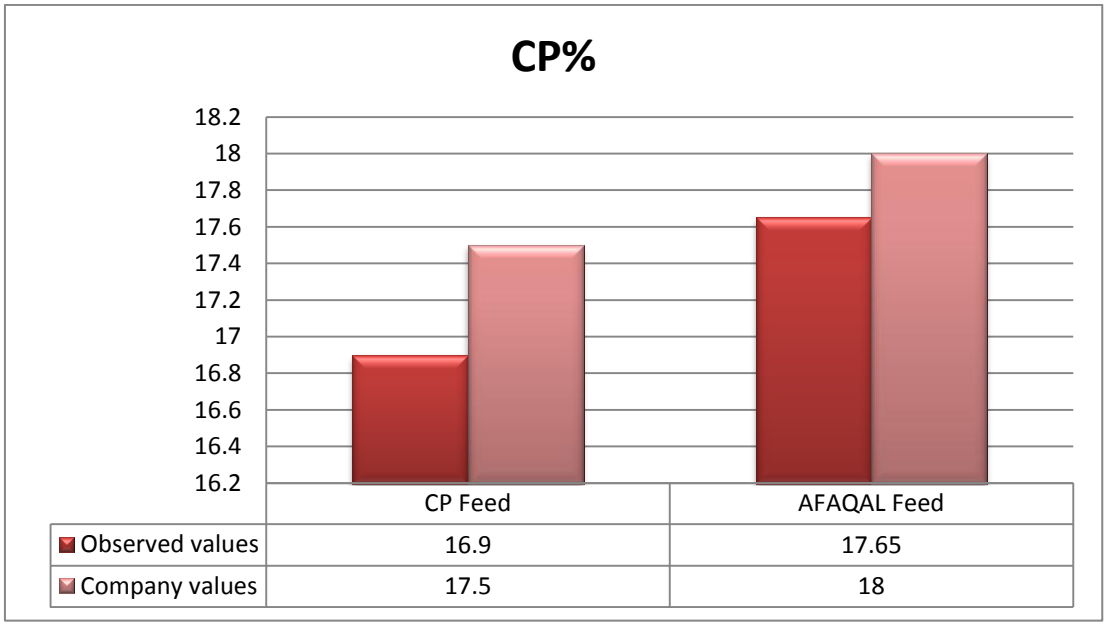
4.2: Graphical presentation of Metabolizable Energy (ME Kcal/Kg) of layer layer diet with different types of feeds.

The metabolizable energy (ME) was found to be higher in CP Feed (2685 Kcal/Kg) and lowers in AFAQAL feed (2666 Kcal/Kg) observed in laboratory. The company value of CP and AFAQAL feed are 2800 and 2700 Kcal/Kg respectively (Graph 4.2).



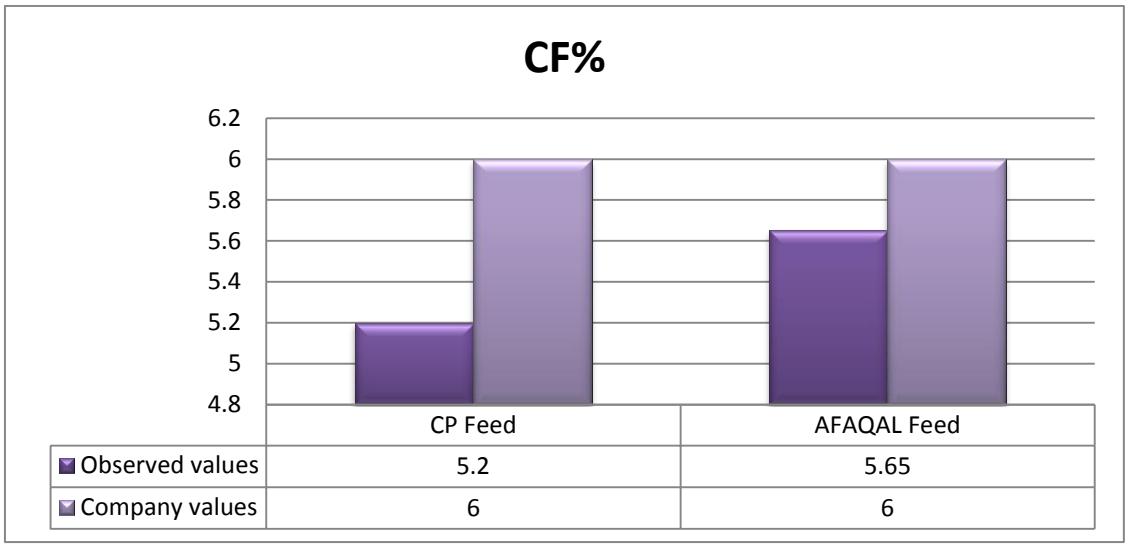
4.3: Graphical presentation of Ash% of layer layer diet with different types of feeds.

The Ash percentage was found to be higher in AFAQAL feed (6.6%) and lower in CP Feed (6%) observed in laboratory. The company value of AFAQAL and CP Feed are (6.5%) and (5.8%) respectively (Graph 4.3).



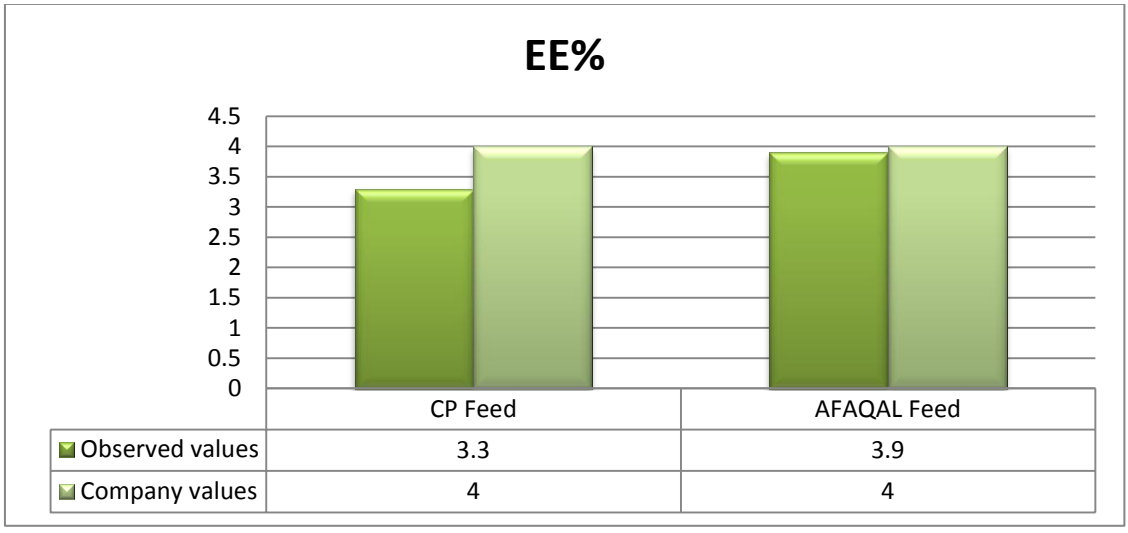
4.4: Graphical presentation of Crude Protein (CP%) of layer layer diet with different types of feeds.

The Crude Protein (CP%) Percentage was found to be higher in AFAQAL feed (17.65%) and lower in CP feed (16.9%) observed in laboratory. The company value of CP and AFAQAL feed are 17.5% and 18% respectively (Graph 4.4).



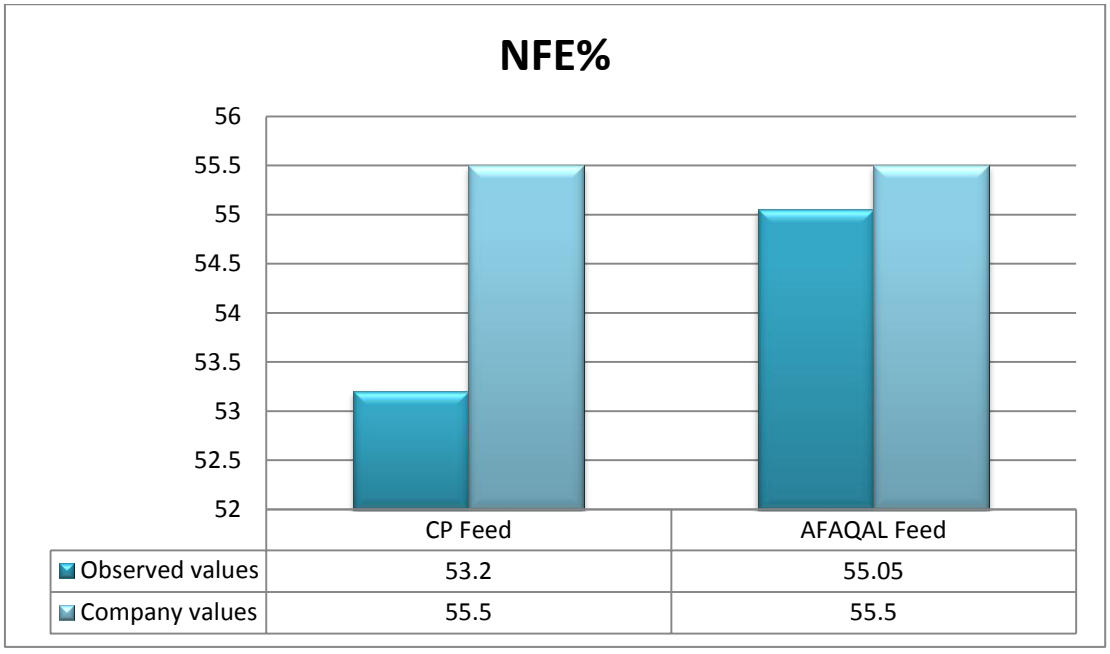
4.5: Graphical presentation of Crude Fiber (CF%) of layer layer diet with different types of feeds .

The Crude Fiber (CF %) Percentage was found to be higher in AFAQAL feed (5.65%) and lower in CP feed (5.2%) observed in laboratory. The company value of CP and AFAQAL feed both are 6% (Graph 4.5).



4.6: Graphical presentation of Ether Extract (EE%) of layer layer diet with different types of feeds .

The Ether extract (EE%) Percentage was found to be higher in AFAQAL feed (3.9%) and lower in CP feed (3.3%) observed in laboratory. The company value of CP and AFAQAL feed both are 4% (Graph 4.6).



4.7: Graphical presentation of Nitrogen-Free Extract *(*NFE%*)* of layer layer diet with different types of feeds .

The Nitrogen-free extract *(*NFE%*)* percentage was found to be higher in AFAQAL feed (55.05%) and lower in CP feed (53.2%) observed in laboratory. The company value of AFAQAL and CP feed both are 55.5% (Graph 4.7).

Chapter-V

CONCLUSION

As a developing country our agricultural and livestock sector should be developed. As a part of livestock the poultry occupy a great part. So development of poultry sector is dependent on availability of day old chick, low cost feed, and infrastructure. In this study we have tried to find out the comparative nutrient value of different feed samples. After ending the study we saw the nutritive value of AFAQAL feed is comparatively better than CP feed. But both the feeds seemed to be good if the farmer can maintain a good management on his farm. The existing information about the composition and nutritive value of the layer feed permits the layer farmers to select the best one for the better growth and health of the poultry on the basis of cost and profitability.

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