

**AVAILABLE COMMERCIAL POULTRY FEEDS IN DHAKA
DIVISION: CRUDE PROTEIN CONTENT OF BROILER FEEDS
AND COMPARE WITH THE PROTEIN VALUE DECLARED
ON BRAND LABELS**

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BREEDING**

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*This is to certify that the thesis entitled “**AVAILABLE COMMERCIAL POULTRY FEEDS IN DHAKA DIVISION: CRUDE PROTEIN CONTENT OF BROILER FEEDS AND COMPARE WITH THE PROTEIN VALUE DECLARED ON BRAND LABELS**” submitted to the Faculty of Animal science & veterinary medicine, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (MS) in ANIMAL NUTRITION**, embodies the results of a piece of bonafide research work carried out by **MD. JAHEDUL ISLAM**, Registration No. 12-04840 under my supervision and guidance. No part of this thesis has been submitted for any other degree or diploma.*

I further certify that such help or source of information as has been availed of during the course of this investigation has duly been acknowledged.

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Dedicated To
My Beloved Parents

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ABSTRACT

The study was performed in different Districts under Dhaka division for the period of 12 months between July 2017 to June 2018 to know the availability of commercial poultry feed and to assess the CP value of commercial poultry feed. The research work reveals the present scenario of feed mills industry in Dhaka division through a survey study. The target group of the survey was retailer or dealer of different feed companies. There were 320 number of respondents interviewed at different levels that covered 10 districts of Dhaka division and the research found that a total 38 active feed mill companies present in different districts of Dhaka division. According to the respondent opinion, United feeds Ltd 18.44%, Nourish poultry & hatchery Ltd. (15.63%), Paragon feed Ltd. (8.75%), CP Bangladesh Ltd. (7.19%), Quality Feeds Ltd.(5.00%), Kazi Farms Ltd. (4.38%), Aftab Feed Products Ltd. (3.75%), SMS Feed Ltd (3.75%), MS Agro Feed Unit Pvt. Ltd (3.44%) and Provita Feed Ltd. (3.13%) are the major contributors in feed market. Those top 10 feed mills contribute more than 73% feed market in different districts of Dhaka division. Feed sample also collected (broiler starter and grower) from top ten feed mill companies among 38 feed mill companies and to find out an exact quantity of CP in broiler feeds manufactured in different districts of Dhaka division. There were no significant differences was $p>0.01$ in case of dry matter of broiler starter feed. Significance difference was $p<0.01$ found in broiler grower feed in nutrient concentrations (Dry matter and crude protein %) among the feeds obtained from the ten different feed mills and also significance difference $p<0.01$ found in CP% in case of broiler starter feed. Broiler feeds were collected from United Feeds Ltd., Nourish Poultry & Hatchery Ltd., Paragon Feed Ltd., SMS Feed and MS Agro Feed Pvt. Ltd. Feed Mills, feed contains somewhat similar or more CP than BSTI standard. So, the feeds produced from these feed mills were deemed to be of acceptable quality. The feeds of remaining feed mills (CP Bangladesh Co. Ltd., Quality Feeds Ltd, Kazi Farms Ltd., Provita Feed Ltd. and Aftab Feed Products Ltd.) appeared to be of comparatively lower in CP value CP%. Feed mills are not maintaining the similar standard or requirement for the similar birds specially in CP content, it should be standardized.

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LIST OF ACRONYMS

BBS	=	Bangladesh Bureau of Statistics
BER	=	Bangladesh Economic Review
BW	=	body weight
DLS	=	Department of Livestock Service
DOC	=	Day Old Chicks
CP	=	Crude Protein
CV%	=	Percentage of coefficient of variance
<i>et al.</i>	=	And others
FAO	=	Food and Agriculture Organization
FIAB	=	Feed Industries Association Bangladesh
Gm	=	Gram
DM		Dry matter
GDP	=	Gross domestic product
FCE	=	feed conversion efficiency
Kg	=	Kilogram
LSD	=	Least significant difference
MT	=	Million Metric Ton
NS	=	Non-significant
WPSA-BB	=	World's Poultry Science Association Bangladesh Branch

CHAPTER I

INTRODUCTION

1.1 General Background

The poultry farming is one of the most profitable business in Bangladesh. Now a days broiler industries have become a rapidly developing enterprise among all other sectors of poultry production and large number of farms are being established in different parts of Dhaka division as well as the whole country. It is an important part of farming system in Bangladesh and it has created opportunity direct or indirect employment including support services for about six million people where about 40% peoples are women (Ansarey, 2012). Poultry contribute 14% of the total value of livestock output and growing rapidly (Raihan and Mahmud, 2008). It was find out that poultry meat alone contributes 37% of the total meat production in Bangladesh and about 22-27% of the total animal protein comes from poultry meat (Prabakaran, 2003).

During 1970-80, the poultry population growth rate was 0.7% which increased to 4% per year during 1990-2005 (Begum, 2008). Since 1995, a significant annual average growth rate of commercial poultry has been achieved 15-20% until 2007 and slow downed after due to avian influenza outbreak (Silva and Rankin, 2014). According to Department of Livestock Service (DLS), there are 8820 registered poultry farms in Bangladesh up to 3 August 2018.

The annual per capita consumption of eggs in the country is 94 against the minimum requirement of 104 eggs (DLS, 2017), at present there are 16 grandparent farms are producing about 60-70 thousand parent stocks per week and 206 parent stock farms are producing 13 million Day Old Chicks (DOC) per week, about 100,000 (registered farms no 80,802) commercial farms produce over 15,000 MT of broiler meat, 2.4 million eggs per week, per capita broiler meat consumption is 3.74 kg that share 54 percent of the total meat consumption (News Today, 2018). Recently, the demand for poultry and livestock products, in general has been increased significantly that leads

most to poultry-related development interventions promoting intensification of traditional poultry systems.

Under these circumstances to meet up the deficiency of meat and egg, the government and private organizations should put efforts together to enhance the present meat and egg production status. The government is getting interested in this sector and is encouraging both urban and rural people to work here and enhance capacity.

Besides government, there are many private enterprises, like United Feeds Ltd. (Meghna Group of Industries), Nourish Poultry & Hatchery Ltd., Paragon Feed Ltd., CP Bangladesh Ltd., Quality Feeds Ltd., Kazi Farms Ltd., Agro Industrial Trust feeds Ltd., City Poultry & Fish Feed Ltd., Provita feed Ltd., Index Feeds Ltd., Aftab Poultry, Aman Poultry, Bangladesh Rural Advancement Committee (BRAC), etc. are working for poultry and poultry products development in the country. Moreover, good management practices should improve for the development of poultry industry.

It is well known to everyone that the performance of poultry can be significantly influenced in ensuring the quality feeds. The availability of feed ingredients are major concerns for the feed millers of Bangladesh. In spite of some problems in the raw materials availability but feed industry has been playing an important role in the supply of commercial feeds to poultry. There are 182 registered commercial feed mills have collectively produced about 3.05 million tons commercial feeds for poultry and dairy against the requirements of 4.0 million tons annually (News today, 2018).

1.2 State of the Problems

Manufactured feeds have to market without examination or test by the authorities. As a result, time to time the poultry industry owners or raisers suffer a serious setback due to feed born problems. In case of poultry farmers, it can say that “Yesterday who was a solvent farmer has become a poor guy today”. The farmers are severely suffering from security of their farms and investment.

Every year many farmers have to count losses due to diseases outbreak in poultry farms, high price poultry feed ingredient and also absorbing losses from market price

fall. The price of poultry raw materials has hiked up sharply in the international market. Very naturally the production costs have also hiked up.

The banks interest rate in this sector is also high. Moreover, lot of hidden charges and costs are associated in this sector to avail the loan from the banking sector. Actually bank interest rate should be low to encourage people to make more poultry farms.

There is a reason to believe that the feed manufactured by different feed mills used to nourish the all poultry farms existing in Dhaka division may or may not meet the standard with respect to quality. It is known that optimum productivity of a farm depends on the quality feed supplied to birds. Feeding is more than just given the birds feeds, they need balanced diets if you want them to do well. Some producers mix complete feeds with cheaper scratch grains, but doing so dilutes the levels of nutrients the chickens are receiving and nutrient deficiency can occurs. Nutrient deficiencies can adversely affect the growth of broiler and the level of production of broiler. The level of feed a bird will eats depend on it sizes, ages and protein contains of the feed and temperature of the environment of the house where broiler are reared.

Quality of meat is affected by the feed they eat, to get the maximum meat production, the level of protein in the feed come in place. The nutritional requirements of the broiler is more than any other domestic animals, it is not surprising that rations are scientifically balanced to assure broiler health along with optimum quality meat at least cost. In short words, feed quality is required in profitable meat birds.

Deficiency of a particular nutrients in the ration may not be overruled which is generally unnoticed by the farm owners causing an undesirable effect on production.

1.3 Justification of the Study

Poultry sector has been playing a significant role in providing protein at a lower cost. Most probably it is the only sector that can grow vertically and produce maximum amount of egg and chicken using the minimum land.

Poultry meat is an important protein source of our food. Its quality is pertinent to the quality of life of poultry birds. If you provide nutrient-rich feed to poultry birds and

keep them healthy by keeping their housing clean and disinfected, you can harvest optimal disease-free meat.

If bad quality feeds are supplied to the birds it may adversely affect the production of the farm. Again higher quality feeds dramatically improve the productivity of the farm. 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.

Rosenberry, (2002) stated that good quality feed has a several advantages over lower quality feed i.e. better feed efficiency, faster growth rate; lower mortality, higher survivability, better meat and egg quality etc. Moreover higher quality feeds also drastically reduce the risk of diseases and environmental damages. A good number of feed mills in Bangladesh are producing commercial poultry feeds. These are purchased by farm-owners according to their need in order to nourish the poultry birds. Farmers do not have enough facilities to evaluate the quality of the prepared or compound feeds.

To get an exact picture of the different poultry feed available in market level as well as to assess the quality of the compound broiler feeds being used in farms located in different areas of Dhaka division.

1.4 Objectives

In view of above situation, the present study was undertaken with the following objectives

1. To find out available poultry feed in different district of Dhaka division;
2. To analyze the crude protein value of most commonly available broiler feeds & compare analyzed protein value with declared value on brand labels;
3. To recognize the necessity of standardize broiler feeds.

CHAPTER II

REVIEW OF LITERATURE

It is very important to review the past research works which are related to the proposed study before conducting any type of survey or experiment. Literature on the present status of poultry farming in Bangladesh, scenario of feed mill industry in Bangladesh, impact of crude protein on poultry production & assessment of nutritive value of commercial broiler specially protein. The literatures reviewed here have been limited to those which are considered pertinent and related to the objectives of the present study.

2.1 Present Status of Poultry Farming in Bangladesh

Bangladesh Economic Review reported that there are about 65,902 poultry farms up to February 1013 in the country (BER, 2013).

Daily Star (2013) reported that in two years since 2011, nearly 25,000 farms were closed mainly due to the outbreak of the diseases.

Raha (2013) are reported that 6 Grand Parent farms which supply 80% of the total demand for parent stock and rest 20% are imported. In the country 82 parent stock farms are operating and of producing 55-60 lakh DOC of broiler and 5 lakh Layer DOC per week.

WPSA-BB (2017) currently reported that 6 grandparent farms producing about (60 - 70) Thousand parent stocks per week and 140 parent stock farms producing 10.1 Million Day Old Chicks (DOC) per week. About 100,000 commercial farms produce over 15,000 MT of broiler meat and 2.4 Million eggs per week.

News today (2018) reported that there are 16 grandparent farms are producing about 60-70 thousand parent stocks per week and 206 parent stock farms are producing 13 million Day Old Chicks (DOC) per week. About 100,000 (registered farms no 80,802) commercial farms produce over 15,000 MT of broiler meat and 2.4 million eggs per week. Annual per capita consumption of eggs in the country is 94 against

the minimum requirement of 104 eggs. Per capita broiler meat consumption is 3.74 kg and the share of broiler meat out of total meat consumption is 54 percent. It is expected that per capita poultry meat consumption to be reached 8.42 kg in 2021 and contribution of poultry meat could increase to 78 percent. Besides commercial poultry, the growth of dairy industry has not been achieved a remarkable stage

DLS (2018) reported that there are 16 grandparent stock, 208 parent stock, 18774 layer farms and 54107 broiler in Bangladesh.

2.2 Scenario of Feed Mill Industry in Bangladesh

According to Rahman *et al.* (2014) commercial feeds available in Bangladesh contained appreciable amount of carbohydrate, protein and minerals and could be useful as feed supplement for poultry.

Ahmed (2015) reported that the major demand driver of the feed industry is the poultry industry and the feed milling industry works as the prime backward linkage industry for these industries. Based on internal estimates, current demand for poultry feed has been estimated to be 5.08 Million MT/year (based on CAGR 10% growth). But supply side has not been able to keep up with the increasing demand. Yearly production of feeds per year is 2795040 MT which is inadequate for meeting demand. As the market size and demand for feed are increasing, the demand for the major raw materials, such as corn, maize, Soy-bean, etc. is also expected to rise. The top industrial producers (CP, Paragon, Aftab, Quality and Kazi) meet 50% of total estimated feed demand of 240,000 MT/month, while the other 50% is met by home mix producers (25%) and low quality local level producers (25%)

Shahinur *et al.* (2017) reported that there are 120 registered feed mills in Bangladesh and they produced 3.05 million tons commercial poultry feed.

According to DLS (2017) reported that there are 182 registered commercial feed mills have collectively produced about 3.05 million tons commercial feeds for poultry and dairy against the requirements of 4.0 million tons annually

WPSA-BB (2017) reported that Present poultry feed production in Bangladesh is 33 Lac MT/year and among 33 Lac MT 95% feed are produced from feed mills, however, the demand of poultry feed will be 60 Lac MT/year in 2021.

Fuad (2017) reported that poultry farms in BD are situated mainly around Dhaka, Chittagong, and Khulna Division which leads to a higher demand for feed in those areas. The demand for poultry feed decreases around 30% during Nov-Feb and increases during Jul-Sep by 50%. The top industrial producers (CP, Paragon, Aftab, Quality and Kazi) meet 50% of total estimated feed demand of 240,000 MT/month, while the other 50% is met by home mix producers (25%) and low quality local level producers (25%).

Home mix producers and local producers do not hire expert supervision or add the necessary additives or vitamins rather than mechanized feed millers and in some instances the raw materials, such as: maize and soy-bean are beyond expiry dates contributing to lower quality.

Fuad (2017) also reported that among the major feed mill companies in Bangladesh, Agro Industrial Trust, Rupsha Poultry Feeds Ltd., BRAC Poultry Feeds Ltd., Paragon Poultry Feeds Ltd., Surma Poultry Feeds Ltd., Kazi Poultry Feeds Ltd., Provita Feeds Ltd., Aftab Bohumuki Farms Ltd., Nourish Poultry Feeds Ltd., Saudi-Bangla Fish Feed Ltd., New Hope Feed Ltd., Aman Feeds Ltd. are the major players, so in a capital-intensive industry such as this, small local players are facing a high entry barrier because achieving economies of scale is very difficult.

Khalakuzzaman (2017) Reported that at present seven foreign companies invest in feed and poultry industry, among these company 5 are Indian, one is China and another company is Thailand based. He also reported that some of the feed manufacturers do not have in-house laboratories for carrying out the proximate analysis and other chemical test for flat toxins, urease activity and toxic residues which has led to production of poorly balanced feed of questionable quality, so all of feed companies should establish in-house laboratories and appoint animal nutritionists to control the quality of feed. In Bangladesh, it is very common that there is no or limited cooperation exists between government, universities, private feed companies.

BBD (2018) reported that there are 61 feed mills in Bangladesh, feed mills including poultry feed, cattle feed, sinking fish feed, floating fish feed and shrimp feed.

Feed Industries Association Bangladesh (FIAB) is a tread organization representing primarily poultry and fish feed industries of the country. As an association of feed mill industries, it deals with all the issues related to its arena. The association is representing the feed mills like poultry, fish, shrimp and cattle. According to FIAB (2018) total member of the FIAB is 77 members are the feed mill owner or their representatives.

DLS (2018) reported that total registered feed mill in Bangladesh is 193, among the 193 feed mills only 62 are renewed in 2018.

Khaleduzzaman (2018) reported that the total registered feed in Bangladesh up to 27 September 2018 is 198 in number

2.3 Impact of Crude Protein on Poultry Production

Temis *et al.* (1999) investigate the effects the ambient temperature, dietary CP and feed intake on finishing period and found that at 32°C a high protein diet increased ($P < 0.05$) weight gain.

Soliman *et al.* (1999) conducted an experiment with the one week old of 240 broiler chickens. The birds were divided into 8 groups, each containing 30 birds of 3 replications. Two levels of CP, 2 levels of ME and 2 supplementation levels of maize oil were used in a 2*2*2 factorial design to alleviate the effect of heat stress (28.1-35.7 degrees C) in broiler. Feeding broiler the diet containing 25% CP, 3100 kcal ME/kg diet and supplemented with 3% maize oil during the growing period of 1-4 weeks and 20%CP, 3200kcal ME/Kg diet and 3% supplemental maize oil during the finishing period of 5-7 weeks significantly improved live body weight and live weight gain.

Kaminsk (2002) conducted an experiment on four groups of Hybro-G broiler chickens in 3 replications of 86 chicks each. They were kept on litter until 45days of age. Two weeks for 2 weeks and two groups for 3 weeks receive a starter diet containing 22%

protein and 13.1 MJ/kg. This was followed by feeding iso-energetic grower diets containing 18 or 20% protein.

Chicken receiving a grower diet with 20% protein from 14 days of age did not differ in body weights from those given a starter diet for 3 weeks. Lower body weights were obtained on day 21 (778 vs. 815gm) by broilers fed a grower diet containing 18% protein from day 14. Body weights of these chickens were also significantly lower at 45 days of age (2457gm).

Temim *et al.* (2000) carried out an experiment that excess dietary protein improve growth performance and carcass characteristics in heat-exposed chickens. Increased dietary protein content clearly improved growth performance at 22 and 32°C. Furthermore, increase of the dietary protein content from 10 to 33% exhibited a less pronounced effect in hot conditions; the increase of daily body weight gain was equal to 13.7 vs 26.8 g/d at 32°C and 22°C, respectively; the reduction of FCR was equal to 1.15 vs 1.36 points.

Silva *et al.* (2001) studied the effect of different levels of metabolize energy (2900, 3100, and 3300 kcal ME) and energy to protein ratio (128, 148 and 188) in male broiler during 22-44 days of age. Increasing the ME:CP ratio resulted in a linear decrease in feed intake, live weight, weight gain, crude protein intake, energy intake, carcass weight, breast meat weight, drumstick weight and a linear increase in abdominal fat presentence. The ME:CP ratio of 148 at a level of 3100 kcal ME met the broilers requirements for optimum growth from, while calorie protein ratio of 188 was inadequate.

Rahman (2001) conducted an experiment with 180 randomly selected 7th day old ISA i757 chicks to compare four dietary treatments containing 23, 21, 19 and age was 1396.03, 1358.01, 1270.26 and 1175.95gm.

Kaminsk (2003) conducted two experiments with broilers to test the effects of using two levels of lysine (1.15 and 1.3%) in starter diet and three levels of lysine (1.10, 1.20 and 1.30%) in grower diet. Increasing the amount of lysine from 1.15% to 1.30% i.e. from 5.2% to 5.8% of dietary protein in the starter diet did not affect the growth of

chickens. In the growing period, no significant differences were observed among body weights of broilers receiving 5.5, 6.0 or 6.5% dietary lysine in relation to crude protein.

Solangi *et al.* (2003) carried out an experiment with two hundred (200) Hubbard broilers to determine the effect of different dietary protein on their performance. The birds were distributed into four groups A, B, C and D (50 chicks each) and given 17, 20, 23 and 26% protein respectively. The sale price the broiler in groups A, B, C and D was Rs 57.76, 67.24, 75.24, and 76.32 against the production cost of Rs. 54.16, 59.77, 67.24 and 69.59 per bird, respectively. The net profit obtained from groups A, B, C and D were Rs. 3.60, 7.47, 8.24 and 6.73, respectively. This shows that group A (17 % CP) or group D (26% CP) were less economical as against 23 and 20% CP levels where net profit earned was fairly higher.

Roy *et al.* (2004) reported that the most important source of variation appeared to be the content of crude protein which was directly related to the final live weight of the birds and the feed conversion.

Rezaei *et al.* (2004) carried out an experiment to investigate that the effects of dietary protein and lysine Levels on broiler performance, carcass characteristics and N excretion. Reducing dietary protein decreased weight gain in starter, grower and total period of the experiment up to 6.0, 4.6 and 4.6% respectively ($P < 0.05$). Lowering dietary protein also decreased feed consumption in starter period ($P < 0.05$), but it had no significant effect on gain to feed ratio in all phases of the experiment.

Ciftci and Ceylan (2004) conducted an experiment to investigate the effects of dietary threonine (Thr) and crude protein (CP) in maize–soybean meal based diets on the growth performance, carcass traits and meat composition of broiler chickens and to determine the dietary threonine requirement for optimum performance (weight gain and feed conversion efficiency (FCE) at 0 to 3 weeks and 3 to 6 weeks of age. A significant interaction between dietary CP and Thr was found for feed intake, body weight (BW) gain and FCE. Increasing Thr supplementation improved feed intake, BW gain and FCE, especially in high CP diets in both feeding periods.

Ibrahim and Osman (2005) carried out an experiment with 200 one day old Ross broiler chicks to evaluate the effect of different levels of crude protein (CP) during three stage of growth, starter (0-3 weeks of age), grower (3 to 6 weeks of age) and finisher (6 to 7) weeks of age) period. Dietary treatments were 1 (control) 2, 3,4 and 5 were fed 23, 20, 18, 23, 18, 20, 20, 23, 18, 18, 23,20, and 20, 20, 20% CP at starting , growing and finishing stage respectively.

A significant increase the total amount of feed intake was observed during the whole experimental period (0-7weeks) in groups three and five 20, 23, 18, and 20, 20, 20% CP at starter (0-3 weeks), grower (3-6weeks) and finisher (6-7 weeks) period when compared with the other groups.

Quentin *et al.* (2005) investigated the effects of dietary crude protein levels (22.5 and 17% CP) and four lysine levels (0.56, 0.66, .076 and 0.86) in a 2*4 factorial design with slow growing broilers (Label) during the finisher period (42-77 days). They reported that during finishing period lysine level of 0.56% induced feather pecking and cannibalism resulting in more severe mortality with high protein (33.9%) than the low protein diet (5.4%).

Tion *et al.* (2005) conducted an experiment with 192 sexed broiler during finisher period in a completely randomized design to test the dietary effects of calorie: protein ratio on the performance and carcass quality of broilers reared to 63 days of age. They reported that calorie: protein ratio had no significant effect on the performance. Carcass traits (final body weight, fat weight and fat percentage) were significantly ($P<.05$) affected by the calorie: protein ratio.

Kolling *et al.* 2005 reported that as nutrient concentrations decreased, BW, BWG and FCR progressively worsened. During this period, birds consumed more feed when fed Low and Regular AA concentrations ($p < 0.05$) were fed, probably in an attempt to supply AA deficiencies. Broiler chickens offered free choice between two diets with different CP and AA levels presented similar performance as the control group (22% CP), by choosing diets with less protein, but rich in essential AA . These results indicate that the birds regulated their feed intake according to their protein requirements.

Pesti (2009) carried out an experiment that the impact of dietary amino acid and crude protein levels in broiler feeds on biological performance, CP is a very highly significant contributor to the variation in BW gain and CP has a negative effect on BW gain (it is toxic). Each unit (percentage) of protein increased daily BW gain (g) by 0.2918 ± 0.0724 . A total of 71.2% of the data sets had positive slopes for BW gain as a function of dietary CP level.

Roy *et al.* (2010) carried out an experiment that the effect of different levels of protein on the performance of synthetic broiler. Three levels of protein i.e. T1 (18% CP), T2 (19% CP) and T3 (20%CP) were considered as the dietary treatments. The initial live weight at 21 day in different dietary treatments; T1, T2 and T3 were 422.33g, 419.67g and 416.67g respectively and the difference was non-significant. At the 28 and 35 days of age, the body weight attained in T2 and T3 was significantly higher than T1. But at 42 days of age, T2 was significantly higher ($P < .01$) than T1 and T3. It indicates that medium level of protein (19%) is good enough for maximum body weight. At 4th week FCR was significantly better in T2 and T3 than T1. This indicated that at 4th week 19-20% CP diet is good enough for optimum FCR. At 5th and 6th week the FCR was significantly better in T2 (19% CP) than T3 (20% CP) and T1 (18% CP). These indicated that for synthetic broiler 19% CP diet was good enough for optimum FCR during growing and finisher period.

Jafarnejad and Sadegh (2011) conducted an experiment on the effects of different Levels of dietary Protein, energy and using fat on the performance of broiler chicks at the end of the third weeks effects of dietary protein levels on BW (1st and 2nd week: $p < 0.001$; 3rd week: $p < 0.05$). The significant difference observed between protein and bodyweight in 1st and 2nd weeks ($p < 0.001$) and 3rd week ($p < 0.05$). The groups that consumed the higher protein, showed the higher bodyweight. They also found that there was no significant difference in feed conversion ratio with higher and lower levels of protein ($p > 0.05$).

Hernandez *et al.* (2013) conducted an experiment the effect of dietary protein level on retention of nutrients, growth performance, litter composition and NH₃ emission

using a multi-phase feeding program in broilers. In case of reduced dietary CP on the productive performance recorded for each feeding phase and for the whole period. No effects of dietary treatments on ADG and ADFI were observed for the whole experimental period (from 1 to 42d). However, a reduction in dietary CP tended to decrease ADG for the starter and grower periods compared with broilers fed the control diet ($p = 0.098$ and $p = 0.061$, respectively). In addition, ADFI (from 1 to 10d) and BW at 21d were higher in birds fed the control diet ($p < 0.05$). In contrast, from 35 to 42d, ADFI in birds fed the low CP diet was higher than that found in birds fed the control diet ($p < 0.01$), but no effect on ADG was observed ($p > 0.05$). As regards feed efficiency, FCR was higher in birds fed the low protein treatment from 22 to 35d ($p < 0.05$), from 35 to 42d ($p < 0.01$), and over the whole experimental period ($p < 0.01$).

Bukar and Saeed (2015) conducted an experiment to study Proximate and heavy metals analysis of selected poultry feeds from Kano Metropolis, Nigeria, four brands (starter, grower, layer and finisher) of four feeds (Animal care, Hybrid, Niger, Sovet, Superb, Top feed and Vital feed coded as A, B, C, D, E, F, G respectively) commercially available in Kano. The result of the experiment revealed that feeds E and F shows the least in crude protein, E layer (2.30%) and F finisher (2.80%). There was no significant difference observed for the entire feeds sample for crude protein $p > 0.05$.

Vakili *et al.* (2015) conducted an experiment to study the Determination of Chemical Composition and Physical Feed Quality with Different Processing Parameters in Broiler Feed Mill Factories. For the determination of the nutritive value of poultry feeds, experiments were carried out by sampling of different broiler feeds the pelleting process based on manufacturing technique from zardaneh feed mill in neishabour city, Iran. Crude protein is one of the most important nutrient to quantify in a prospective feeds due to the fact that is one of the most costly to supply and a deficiency of protein has a drastic effect on growth and production. Various diets are commonly utilized, depending on the bird's production stage. Generally starter rations are high in protein whereas grower and finisher diets usually contain less protein, because older birds need less. In this study crude protein was the second major

constituent and found in the range 23.59-24.21, 19.9- 20.84 and 19.4-19.9 % of for broiler (starter, grower and finisher), respectively. There was significant difference observed in treatments ($p < 0.05$). Since feed processing involves a combination of shear, heat, residence time and water, it may result to partial denaturation of the proteins in the feed (Thomas et al. 1998).

Liu *et al.* (2015) carried out an experiment the effects of dietary crude protein on the growth performance, carcass characteristics and serum biochemical indexes of Lueyang black-boned chickens from seven to twelve weeks of age, that there was no significant difference in initial body weight (42 d) among treatments ($P > .05$). Data on feed intake, weight gain, feed: gain ratio, and relative carcass part weights collected at 84 d of age. It was clear that dietary CP did not have any significant influence on feed intake ($p > 0.05$). The body weight of chickens fed the diet with 180 g kg⁻¹ CP was significantly higher ($p < 0.05$) than those of chickens fed the 120, 140, and 200 g kg⁻¹ CP diets, but was not different from those fed the 160 g kg⁻¹ CP diet. The lower body weights of the low CP-fed (120 and 140 g kg⁻¹ CP) chickens were also associated with significantly lower ($p < 0.05$) relative breast muscle weight.

Faria *et al.* (2017) conducted an experiment that there was an effect ($P < 0.05$) of the crude protein levels on yolk height (mm) in the first (30-33 weeks) and fourth (42-45 weeks) production periods. In these periods, birds fed ration containing 15% crude protein had a higher yolk height, 14.60 and 14.23 mm, respectively.

Egg weight was influenced by breeding systems only in the second production period (34th to 37th week of age) and it was not possible to verify their relation with other quality parameters. In the second production period, there was an effect ($P < 0.01$) of the breeding systems. In the fourth production period, there was a linear effect ($P < 0.01$) of crude protein levels without yolk relative weight, according to equation $Y = 23.09 + 0.19X$. There was an effect ($P < 0.05$) of crude protein levels on albumen height in the third (38-41) production period.

Hossain *et al.* (2017) were conducted an experiment, Effect of high protein supplementation on growth and nutrient digestibility of broiler. The results of gross responses of broilers denote that FI, LW, LWG and FCR fed supplemented diet (T2)

were poorer ($P < .01$) than the responses of broiler fed control diet (T1). The apparent ileal digestibility values of CP and GE were not influenced ($P > .05$) by dietary treatment. The ileal digestibility values of most of the amino acid were influenced significantly ($P < .05$; $P < .01$) by dietary treatment measured in this study. The ileal digestibility values of Gly, Thr, Cys, Val, Ile, Leu and Phe were not influenced ($P > .05$) by dietary treatment. The ileal digestibility values of Asp, His, Arg, Ala, Pro, Ser, Glu, Tyr and Lys were decreased ($P < .05$; $P < .01$) in the supplemented diet (T2) compared to basal diet (T1) except for Met. Only the digestibility of Met was improved ($P < 0.01$) in the birds fed supplemented diet (T2).

CHAPTER III

METHODS AND MATERIALS

The experiment was conducted at different district of Dhaka division to find out the available commercial poultry feed and also assessment of the ten most feed company feed of broiler starter and grower on the basis of crude protein and dry matter contain.

3.1 Description of the Experiment

The commercial poultry feed survey & feed samples were (broiler starter & broiler grower) collected from different part of Dhaka division during the period from July 2017 to December 2017. Lab test of the feed sample were done during the period of January 2018 to June 2018. There are two assessment system were followed during the experimental period. These are

1. To conduct an experiment to find out the most commonly available commercial poultry feed.
2. Assessment of crude protein contents of different broiler feed found in lab test & compared with crude protein value declared on brand level.

3.2 Experimental Location

This study was conducted the different district of Dhaka division (Dhaka ; Faridpur; Gazipur; Kishoreganj; Madaripur; Manikganj; Narayanganj; Narsingdi; Rajbari; and Tangail).

3.3 Sampling Unit

A sampling unit can refers to any single person, animal, plant, product or thing being researched. In this case sampling unit or respondent is a retailer or dealer of different commercial poultry feed. If there is nobody present in shop, refuses to give an interview the next retailer or dealer is considered as sampled retailer or dealer of different district of Dhaka division and the eligible retailer or dealer is considered as sample unit.

The following data were collected from the sample unit:

- a) General information of sampled retailer or dealer.
- b) Nutrient contains in commercial poultry feed and
- c) Data is collected from retailer or dealer which company feed is more sale than other company feed.

3.4 Sample Size

Total sample size was 320. The required sample size was determined based on confidence level and precision rate. The standard formula was used to estimate the required number of sample.

3.5 Distribution of Sample

The distribution of sample size of the study depends on the poultry population at the different district of Dhaka division. Out of 13 districts, 10 districts were selected randomly for the study which is given in below

Table 1: Distribution of sample

Name of District	No. of Response
Dhaka	92
Faridpur	14
Gazipur	46
Kishoreganj	35
Madaripur	16
Manikganj	32
Narayanganj	16
Narsingdi	15
Rajbari	18
Tangail	36
Total	320

3.6. Survey Instrument

This research is a survey based exploratory as well as explanatory. The statistical information is collected via questionnaire survey from retailer or dealer. The total sample is 320 retailer or dealer in the study area.

Questionnaire for Retailer or Dealer

Questionnaire was developed to collect all relative data from the retailer. Questionnaire was pre-tested before starting of survey. Questionnaire was modified and share with supervisor before field survey commencement.

3.7 Chemical Analysis of Ingredient

3.7.1 Sample Collection

A large number of poultry feeds were available in different district of Dhaka division which were produced by commercially or small-scale and on-farm feed mills and industries. The most popular commercial poultry feeds available at different district of Dhaka division were produced by United Feeds Ltd. (Meghna group of industries), Nourish Poultry & Hatchery Ltd., Paragon Feed Ltd, CP Bangladesh Co. Ltd., ACI Godrej Agrovat Pvt. Ltd., R.R.P. Agro Farms City Poultry & Fish Feed Ltd., Aftab Feed Products Ltd., Quality Feeds Ltd., Agro Industrial Trust Feeds Ltd., Provita Feed Ltd., New Hope Feed Mill Bangladesh Ltd., Index Feeds Ltd. etc. All of the feeds used in this study were collected directly from interviewed retailer or dealer by the author himself. Feed sample is collected in plastic bag from retailer or farmers during commercial poultry feed survey with proper labeling. Collected feed samples were preserved in refrigerator until chemical analysis was conducted.

3.7.2 Preparation of the Samples

The samples were taken from the refrigerator and kept in room temperature for few hours. Then the required amount of samples were kept in airtight container for subsequent chemical analysis.

3.7.3 Sample Analysis

The analysis of feed was carried out in the Animal Nutrition Laboratory of the department of Animal Nutrition, Genetics and Breeding in the Faculty of Animal Science and Veterinary Medicine, Sher-e-Bangla Agricultural University (SAU) and HEQEP Lab. at Sher-e-Bangla Agricultural University, Dhaka, 1207. The laboratory had available facilities for the determination of proximate crude protein of the feed sample. Sample test also carried out in DLS Animal nutrition laboratory.

3.7.3.1 Determination of Moisture

Moisture content determined by placing an accurately weighed amount (about 2-3g) ground sample in a pre-weighed porcelain crucible in a hot air oven at 105⁰ C for about 24 hours until a constant weight was obtained. The dried crucible then transferred to desiccators for cooling and weighed using a sensitive electric balance.

The percentage of moisture was calculated using the following equation:

$$\text{Moisture \%} = \frac{\text{Original sample weight(gm)} - \text{Dried sample weight(gm)}}{\text{Original sample weight(gm)}} \times 100$$

3.7.3.2 Dry Matter Analysis

Dry matter was found out from a feed sample to subtract dried sample weight from original sample weight.

3.7.3.3 Crude Protein

Crude protein of the samples was estimated by using Kjeldahl nitrogen determination method. A sample of 1gm and a blank was estimated in the digestion tube. For digestion at high temperature, 15 ml of concentrated sulfuric acid and 8g of kjeldahl catalyst were added in the tube. Then the digestion tubes were set in digestion chamber fixing temperature three step at 150°C for 30 minutes, 300°C for 30 minutes and 400°C for 1 hours and also ensuring water supply, easier gas outlets etc. At the end of the process, the obtained liquid was green in color. After digestion

the tubes were allowed to cool at ambient temperature and 25 ml of distilled water was added each digestion tube. In case of distillation 50ml boric acid solution was added in conical tube and also added mixed indicator. Sodium hydroxide (NaOH) solution was added in each tube. Then the distilled extraction was collected with 50 ml of Boric acid (2%) and titrated with standard hydrochloric acid (0.1N). The nitrogen values obtained was converted into percentage of crude protein by multiplying with a factor of 6.25 assuming that protein contains 16% nitrogen.

$$\text{Nitrogen\%} = \frac{\text{Titation value} \times 0.014 \times \text{normalithy of HCl(0.1N)}}{\text{Sample weight (gm)}} \times 100$$

$$\text{Crude protein\%} = \%N \times 6.25$$

3.8 Statistical Analysis

3.8.1 Data of field survey

A Microsoft Access and Microsoft Excel program was developed for data entry. Different types of statistical tools like number, mean, and percent were used. A singular tabular technique was presented in the study to classify the data into meaningful categories.

3.8.2 Data of crude protein test

Data of crude protein test were analyses by using MSTAT-C computer package program. All recorded were statistically analyzed for analysis of coefficient of variance and least significant difference (LSD).

3.9 Quality Control

In order to ensure the highest level of quality data following measures was adopted

- a) Taking advice from supervisor to get highest quality of information from retailer or dealer

- b) Day to day checking of collected data to ensure proper filling and recording of data
- c) Preserving contact number of the respondents to recheck if necessary at the analytical stage

PICTURE GALLERY



Plate 1: United Feed Ltd. (Fresh)



Plate 2: Nourish Poultry & Hatchery Ltd.



Plate 3: Paragon Feed Ltd.



Plate 4: CP Bangladesh Co.Ltd.



Plate 5: Quality Feed Ltd.



Plate 6: Kazi Farms Ltd.



Plate 9: Provita Feed

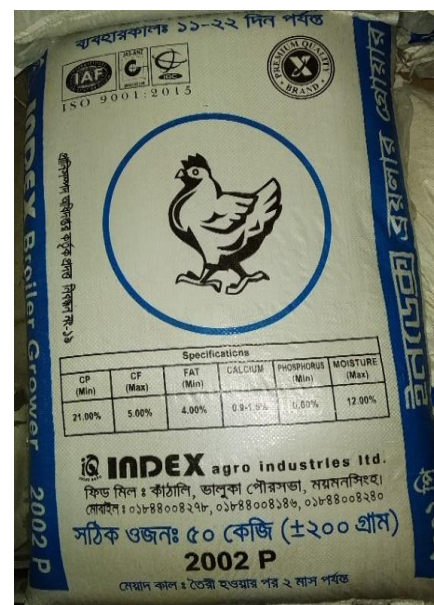
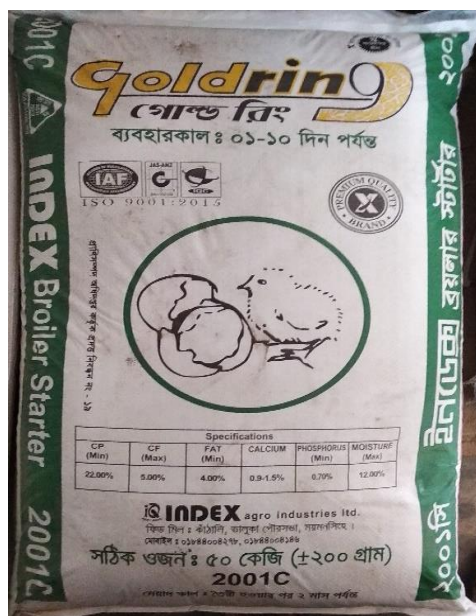


Plate 10: Index Feeds Ltd.



Plate 13: R.R.P Agro



Plate 14: Aftab Feed Products Ltd.



Plate 15: Ag Agro Industries Ltd.



Plate 16: Gram Bangla Poultry & Fish



Plate 17: SMS Feed Ltd.



Plate 18: MS Agro Fisheries Feed Unit

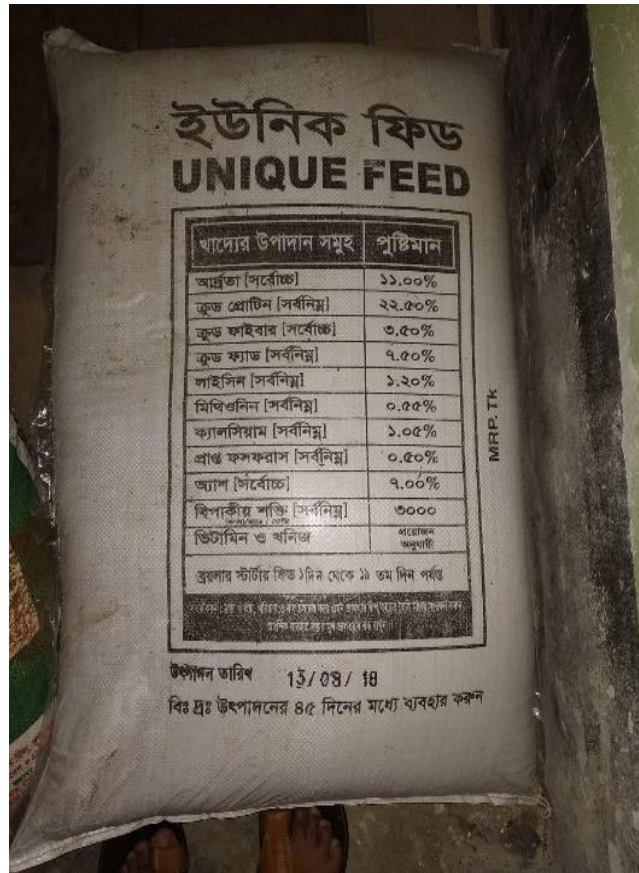


Plate 21: Unique Hatchery & Feed Ltd

CHAPTER IV

RESULTS AND DISCUSSION

The study was conducted in different district of Dhaka division to study available of commercial poultry feed with its crude protein content of broiler feed and compare with the protein value declared on brand labels. The results have been presented and discussed with the help of table and graphs. During the study the following results are obtained

4.1.1 List of Feed Mill in Dhaka Division

The study was conducted in the different district of Dhaka division. In the study, there are 38 active feed mill companies present in different districts of Dhaka division. The research found the following feed mills in Dhaka division

Table 2: List of available feed company in different district of Dhaka division & make a serial of the company base on number of response of sale from retailer or dealer

Sl. No.	Company Name	Brand Name	No. of Response	%
1	United Feeds Ltd.	Fresh	59	18.44
2	Nourish Poultry & Hatchery Ltd.	Nourish	50	15.63
3	Paragon Feed Ltd.	Chamak, Usha	28	8.75
4	Cp Bangladesh Co. Ltd.	CP	23	7.19
5	Quality Feeds Ltd.	Quality feed	16	5.00
6	Kazi Farms Limited	Kazi	14	4.38
7	Aftab Feed Products Limited	Aftab	12	3.75
8	SMS Feed Limited	SMS Poultry Feed	12	3.75
9	MS Agro Fisheries Feed Unit Pvt. Ltd	Planet Poultry Feed	11	3.44
10	Provita Feed Ltd.	Provita	10	3.13

Sl. No.	Company Name	Brand Name	No. of Response	%
11	ACI Godrej Agrovat Pvt. Ltd.	ACI Poultry Feed	10	3.13
12	Aman Feed Ltd.	Classic	9	2.81
13	New Hope Feed Mill Bangladesh Ltd.	New Hope	9	2.81
14	R.R.P. Agro Farms	R.R.P.	9	2.81
15	City Poultry & Fish Feed Ltd.	Teer	7	2.19
16	Ag Agro Industries Ltd.	AG Agro Feed	6	1.88
17	Agata Feeds Mill Ltd	Agata Feed	4	1.25
18	Gram Bangla Poultry & Fish Feed Ltd.	Gram Bangla	4	1.25
19	Agro Indutrial Trust Feeds Ltd.	AIT	3	0.94
20	Index Feeds Ltd.	Index Feed	2	0.63
21	Suguna Food & Feed Bangladesh Privet Ltd.	Suguna	2	0.63
22	Lion Feeds Ltd.	Lion feed	2	0.63
23	Ekushey Feeds Ltd.	Ekushey	2	0.63
24	Mashud Fish Meal Plant & Feed Mills	The best	2	0.63
25	Amrit Global Bangladesh Pvt. Ltd.	Modern Amrit	1	0.31
26	Al-Nur Agro & Farm Product Private Ltd.	Al_Nur Feed	1	0.31
27	SB Poultry & Fish Feed Mills	SB Poultry Feed	1	0.31
28	Paradise Sun Company Ltd.	Paradise Feed	1	0.31
29	Marks Feed Mill Ltd.	Marks Feed	1	0.31
30	Biswas Poultry & Fish Feed Ltd.	Biswas Feed	1	0.31
31	Gazipur Feeds Ltd.	Gazipur Feeds	1	0.31
32	Robi Poultry Feed Mill Ltd.	Robi	1	0.31
33	Power Fish & Poultry Feed Ltd.	Power	1	0.31

Sl. No.	Company Name	Brand Name	No. of Response	%
34	Advanced Poultry & Fish Feed Ltd.	Advanced	1	0.31
35	Cherish Feed & R.B. Agro Ltd.	Cherish Feed	1	0.31
36	Bengal Feed & Fisheries Ltd.	Bengal Feed	1	0.31
37	Unique Hatchery & Feed Ltd.	Unique feed	1	0.31
38	Enam Hatchery & Feeds Ltd.	Enam	1	0.31
Total			320	100

Shahinur *et al.* (2017) reported that there were 120 registered feed mills present in Bangladesh. DLS (2017) also reported that there were 182 registered commercial feed mills present in whole Bangladesh. However, there were no previous data found about feed mills number in division wise.

4.1.2 Categorized Feed Mill Company

There are four types of feed mills according to the responds of retailer or dealer on the basis of poultry feed sale of different feed mill company of different district of Dhaka division. The following results are obtained from table 2

Table 3: Categorized feed mill company.

Sl. No.	Feed Sale	Feed company	No. of Respond	Percentage %
1	Top level*	1-10(10)	235	73.46
2	Higher level	11-18(8)	54	18.13
3	Medium level	19-24(6)	24	4.07
4	Lower level	25-38(14)	14	4.34

*In the Table 3, total 10 number of feed mills were included as top level of feed mills in Dhaka division according to number of respondents. The top 10 feed mills are United Feeds Ltd. (Meghna group of industries), Nourish Poultry & Hatchery Ltd., Paragon Feed Ltd., CP Bangladesh Co. Ltd., Quality Feeds Ltd, Kazi Farms Ltd.,

Provita Feed Ltd., Aftab Feed Products Ltd., SMS Feed Ltd., MS Agro Feed Unit Pvt. Ltd. These feed mills are treated as most commonly available feed company in Dhaka division.

The top industrial producers (CP, Paragon, Aftab, Quality and Kazi) meet 50% of total estimated feed demand of 240,000 MT/month, while the other 50% is met by home mix producers (25%) and low quality local level producers (25%) according to market insight Bangladesh feed industry 2017. As market insight Bangladesh feed industry reported that only four companies (CP, Paragon, Aftab, Quality and Kazi) meet 50% of feed supply. So it may be say that top ten feed company supply feed more than 70%.

4.2 Quality of Feed According to Proximate Contents of Top Ten Feed Mills

The major nutrients value of a poultry feeds that are considered when formulating diets are mainly crude protein, moisture, crude fat and crude fibre. In this study proximate analysis of feed were performed mainly crude protein and dry matter. The results of proximate composition of analyzed feed samples were shown in Table (3 & 4). Rahman *et al.* (2014) also state that Crude protein is one of the most important nutrient to quantify in a prospective feeds due to the fact that is one of the most costly to supply and a deficiency of protein has a drastic effect on growth and production. Various diets are commonly utilized, depending on the bird's production stage. Generally starter rations are high in protein whereas grower diets usually contain less protein, because older birds need less.

4.2.1 Variation of Dry Matter & Crude Protein of Broiler Starter of Top Ten Different Feed Mills

The analytical values of nutrient of the feed samples are shown in table 3. In case of broiler starter rations, the analytical values of dry matter contents of the feed samples differed none significantly $p>0.01$ but crude protein contain of feed sample differed significantly $p<0.01$ among treatment.

Table 4: Nutritional composition of broiler starter feeds of top ten different feed mills

Treatment	Company Name	DM%	CP%
T ₁	United Feeds Ltd(Meghna group of industries)	89.42 ^a	21.83 ^{abc}
T ₂	Nourish Poultry & Hatchery Ltd.	88.74 ^a	22.49 ^{ab}
T ₃	Paragon Feed Ltd.	89.71 ^a	22.68 ^{ab}
T ₄	CP Bangladesh Co. Ltd.	89.04 ^a	19.95 ^{de}
T ₅	Quality Feeds Ltd.	89.00 ^a	20.61 ^{cd}
T ₆	Kazi Farms Ltd.	89.22 ^a	18.38 ^e
T ₇	Provita Feed Ltd.	88.44 ^a	19.27 ^{de}
T ₈	Aftab Feed Products Ltd.	89.72 ^a	19.30 ^d
T ₉	SMS Feed Ltd.	89.16 ^a	21.69 ^{bc}
T ₁₀	MS Agro Fisheries Feed Unit Pvt. Ltd.	89.89 ^a	23.52 ^a
LSD _(0.01)		2.303	1.718
CV%		1.11	3.53

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly by LSD at .01 level of probability.

It is evident from Table 3 that higher DM content was found T₁ (United Feeds Ltd.), T₈ (Aftab Feed Products Ltd.) and T₁₀ (MS Agro Fisheries Feed Unit Pvt. Ltd) groups, in comparison with feeds of other feed mills. High level of dry matter content T₄ (CP Bangladesh Co. Ltd.), T₅ (Quality Feeds Ltd.), T₆ (Kazi Farms Ltd.) and T₉ (SMS Feed Ltd.) groups of feed. Dry matter content (88.44%) of T₇ (Provita Feed Ltd.) group was the lowest of all which was statistically similar to T₂ (Nourish Poultry & Hatchery Ltd.) and T₃ (Paragon Feed Ltd.) groups of feed.

It is also evident from Table 3 that higher crude protein content was found T₂ (Nourish Poultry & Hatchery Ltd.), T₃ (Paragon Feed Ltd.) and T₁₀ (MS Agro Fisheries Feed Unit Pvt. Ltd.) groups, in comparison with feeds of other feed mills. In case of T₁ (United Feeds Ltd.), T₅ (Quality Feeds Ltd) and T₉ (SMS Feed Ltd.) groups of feed content high level of crude protein. Crude protein content (18.38%) of T₆ group was the lowest of all which was statistically similar to T₄ (CP Bangladesh Co. Ltd.), T₇ (Provita Feed Ltd.) and T₈ (Aftab Feed Products Ltd.) group of feed.

In this study, DM were found in United feed (fresh feed), Nourish Poultry feed, Quality Feeds, paragon feed and Aftab feed 89.42%, 88.74%, 89%, 88.71%, 89.72% respectively.

Roy *et al.* (2004) reported that United feed (fresh feed), Nourish Poultry feed, Quality Feeds, paragon feed and Aftab feed contents 88.9%, 90%, 89.8%, 89.2% & 89.7% respectively. Crude protein were found in United feed (fresh feed), Nourish Poultry feed, Quality Feeds, paragon feed and Aftab feed 21.83%, 22.49%, 20.61%, 22.68% and 19.3% respectively but Roy *et al* (2004) were found crude protein in United feed (fresh feed), Nourish Poultry feed, Quality Feeds, paragon feed and Aftab feed 21.6%, 22.9%, 23.5%, 22.2% and 23.9 respectively.

Hossain (2003) reported that dry matter found in United feed (fresh feed), Nourish Poultry feed, Quality Feeds and Aftab feed 88.4%, 90.4%, 89.2% and 89.4% respectively. Crude protein content was found in different broiler starter feed of United feed (fresh feed), Nourish Poultry feed, Quality Feeds and Aftab feed 19.2%, 20.6%, 22.8% and 20.2 respectively.

4.2.2 Variation of Dry Matter & Crude Protein of Broiler Grower Feed of Top Different Feed Mills

The analytical values of nutrient (dry matter & crude protein) of broiler grower ration of different feed mills are shown in table 5. In case of broiler grower rations, nutrient contents (dry matter & crude protein) are shown significance difference among treatment.

Table 5: Nutritional composition of broiler grower feeds of top ten different feed mills

Treatment	Company Name	DM%	CP%
T ₁	United Feeds Ltd.(Meghna group of industries)	89.32 ^{ab}	21.43 ^{bc}
T ₂	Nourish Poultry & Hatchery Ltd.	88.50 ^{bcd}	20.83 ^c
T ₃	Paragon Feed Ltd.	88.96 ^{bc}	23.24 ^a
T ₄	CP Bangladesh Co. Ltd.	87.88 ^{cd}	19.30 ^{de}
T ₅	Quality Feeds Ltd.	90.34 ^a	20.60 ^{cd}
T ₆	Kazi Farms Ltd.	88.42 ^{bcd}	17.93 ^e
T ₇	Provita Feed Ltd.	87.90 ^{cd}	17.91 ^e
T ₈	Aftab Feed Products Ltd.	88.45 ^{bcd}	18.54 ^e
T ₉	SMS Feed Ltd.	88.75 ^{bcd}	22.46 ^{ab}
T ₁₀	MS Agro Fisheries Feed Pvt. Ltd.	87.80 ^d	20.52 ^{cd}
LSD (0.01)		1.112	1.498
CV%		0.54	3.18

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly by LSD at .01 level of probability.

It is proved from Table 5 that the highest dry matter content was found T₁ (United Feeds Ltd.), T₃ (Paragon Feed Ltd.) and T₅ (Quality Feeds Ltd.) groups, in comparison with feeds of other feed mills. High level of dry matter content T₂

(Nourish Poultry & Hatchery Ltd.), T₆ (Kazi Farms Ltd.), T₈ (Aftab Feed Products Ltd.) and T₉ (SMS Feed Ltd.) groups of feed. Dry matter content (87.8%) of T₁₀ (MS Agro Fisheries Feed Pvt. Ltd.) group was the lowest of all which was statistically similar to T₄ (CP Bangladesh Co. Ltd.) and T₇ (Provita Feed Ltd.) groups of feed. It is also evident from Table 4 that higher crude protein content was found T₃ (Paragon Feed Ltd.) and T₉ (SMS Feed Ltd.) groups, in comparison with feeds of other feed mills. In case of T₁ (United Feeds Ltd.), T₂ (Nourish Poultry & Hatchery Ltd.), T₅ (Quality Feeds Ltd.) and T₁₀ (MS Agro Feed Pvt. Ltd.) groups of feed content high level of crude protein. Crude protein content (17.91%) of T₇ (Provita Feed Ltd.) group was the lowest of all which was statistically similar to T₄ (CP Bangladesh Co. Ltd.), T₆ (Kazi Farms Ltd.) and T₈ (Aftab Feed Products Ltd.) group of feed.

In this study, it was found that crude protein range was 18.38 to 23.52 and 17.91 to 23.24 broiler starter and grower respectively.

Rahman (2014) analyzed broiler paragon feed, broiler crumble feed & broiler feed and reported that crude protein contain in broiler feed the range of 17.5-18.2.

Roy *et al.* (2004) reported that dry matter were content in United feed (fresh feed), Nourish Poultry feed, Quality Feeds, paragon feed and Aftab feed 88.7%, 90.4%, 89.5% 89.4%, and 89.4% respectively. They also found crude protein in United feed (fresh feed), Nourish Poultry feed, Quality Feeds, paragon feed and Aftab feed 19.2%, 22.6%, 23.2%, 23.7% and 21% respectively. It was found that the proximate analysis of different company feed content vary lab to lab.

4.2.3 Crude Protein Concentration of Broiler Starter Feed & Compare with Requirement

The analytical values of nutrients content of broiler starter ration of top ten different feed mills along with required level of nutrient according to BSTI are presented in table 6.

Table 6: Comparative study of the nutrient (crude protein) concentration in broiler starter feed of different feed mills and requirement according to BSTI.

Treatment	Feed Company Name	Analytical CP%	Brand Level CP%	BSTI Standard (CP%)
T ₁	United Feeds Ltd.	21.83	21	22
T ₂	Nourish Poultry & Hatchery Ltd.	22.5	20	22
T ₃	Paragon Feed Ltd.	22.68	22.5	22
T ₄	CP Bangladesh Co. Ltd.	19.95	20	22
T ₅	Quality Feeds Ltd.	20.83	23	22
T ₆	Kazi Farms Ltd.	18.38	21	22
T ₇	Provita Feed Ltd.	19.27	*	22
T ₈	Aftab Feed Products Ltd.	19.3	21-23	22
T ₉	SMS Feed Ltd.	21.69	22	22
T ₁₀	MS Agro Feed Pvt. Ltd.	23.52	20	22

*Brand label value absence

In case of united feed broiler starter T₁ (United Feeds Ltd.), the nutrient (CP) concentration obtained by chemical analysis revealed that the CP content was more close to the required level and more than brand label. Nourish broiler starter T₂

(Nourish Poultry & Hatchery Ltd.) feed contain CP 22.5% that is higher than both require level according to the BSTI and brand label.

Similarly, the nutrient (CP) concentration in T₄ (CP Bangladesh Co. Ltd.), T₅ (Quality Feeds Ltd.), T₆ (Kazi Farms Ltd.) and T₈ (Aftab Feed Products Ltd.) groups of broiler starter feed were slightly lower in amounts declared on brand level by feed company or feed mills and also lower CP% contents than BSTI standard level. However T₇ (Provita Feed Ltd.) group of feed company did not declare CP% on brand label and it also contain lower CP than BSTI require level.

In case of T₉ (SMS Feed Ltd.) group of broiler starter feed CP contain all most close to the required level and brand labeling. The nutrient profiles (CP) as obtained by chemical analysis in case of group T₃ (Paragon Feed Ltd.) and T₁₀ (MS Agro Feed Pvt. Ltd.) contains CP more than brand labeling and required level according to the BSTI.

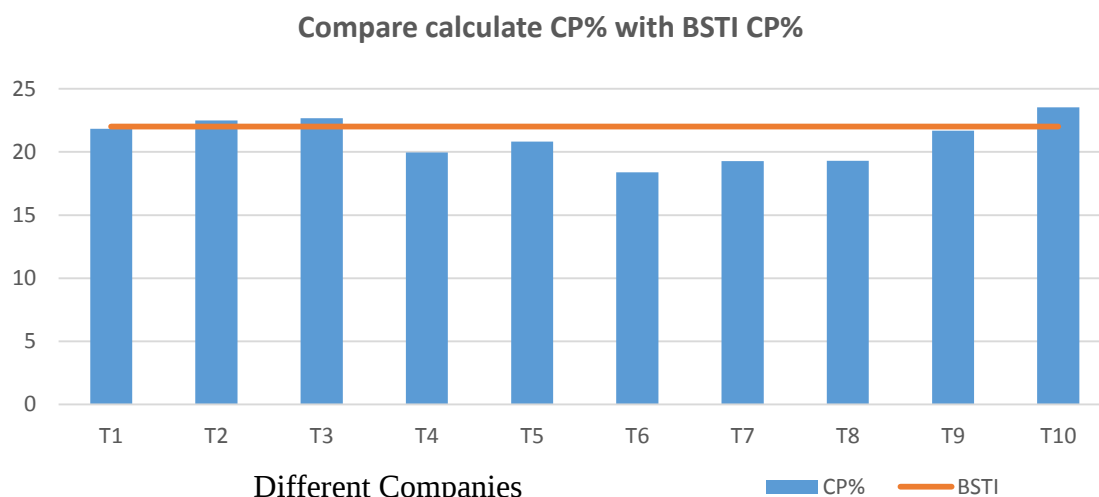


Figure 1: Compare calculated CP with BSTI standard of broiler starter feed of different feed mills

T₁= United Feeds Ltd., T₂= Nourish Poultry & Hatchery Ltd., T₃= Paragon Feed Ltd., T₄= CP Bangladesh Co. Ltd., T₅= Quality Feeds Ltd., T₆= Kazi Farms Ltd., T₇= Provita Feed Ltd., T₈= Aftab Feed Products Ltd., T₉= Sms Feed Ltd., T₁₀= MS Agro Feed Pvt.Ltd.

4.2.4 Crude Protein Concentration of Broiler Grower Feed & Compare with Requirement

The chemical composition of feed sample of grower rations obtained from ten different feed mills along with BSTI standard and feed company specifications are shown in table 6. It was evident from this table that all analytical values obtained from T₄ (CP Bangladesh Co. Ltd.) groups of broiler grower feed contain crude protein more than that declared on brand level but CP% contain less than BSTI standard.

The analytical data of T₁ (United feeds Ltd.), T₂ (Nourish poultry & hatchery Ltd.), T₃ (Paragon feed Ltd.), T₉ (SMS Feed Ltd.) and T₁₀ (MS Agro Feed Pvt. Ltd.) groups of broiler grower feed contains crude protein more than the declared label by the manufacturer company of feeds and also more than BSTI standard.

Table 7: Comparative study of the nutrient (crude protein) concentration in broiler grower feed of different feed mills and requirement according to BSTI.

Treatment	Feed Company Name	Analytical CP%	Brand label CP%	BSTI Standard (CP%)
T ₁	United feeds Ltd.	21.43	21	20
T ₂	Nourish poultry & hatchery Ltd.	20.83	19	20
T ₃	Paragon feed Ltd.	23.24	22±1	20
T ₄	CP Bangladesh Co. Ltd.	19.3	19	20
T ₅	Quality Feeds Ltd.	20.6	21	20
T ₆	Kazi farms Ltd.	17.93	20	20
T ₇	Provita feed Ltd.	17.94	*	20
T ₈	Aftab feed products Ltd.	18.54	20-22	20
T ₉	SMS Feed Ltd.	22.5	22	20
T ₁₀	MS Agro Fisheries Feed Pvt. Ltd	20.52	20	20

*Brand label CP% absence

The nutritive value of T₅ groups of broiler grower feed contain crude protein less than declared label by the feed company but more than BSTI standard. In case of T₆ (Kazi Farms Ltd.), T₇ (Provita Feed Ltd.) and T₈ (Aftab Feed Products Ltd.) groups of broiler grower feed, the nutritive values (CP) contents were slightly lower in amount than specifications of feed manufacturing company and also lower than BSTI standard.

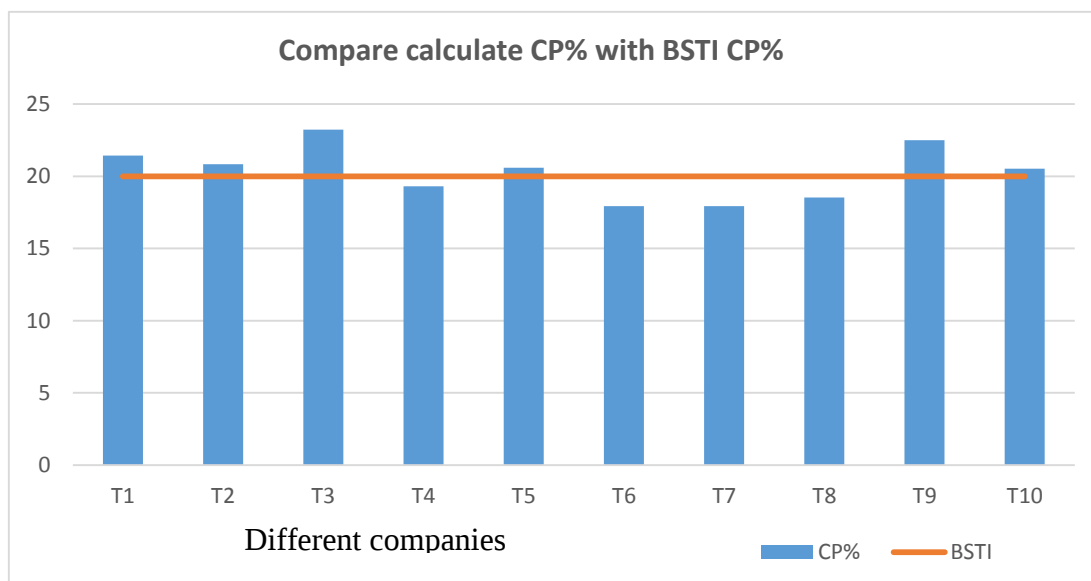


Figure 2: Compare calculated CP with BSTI standard of broiler grower feed of different feed mills.

T₁= United Feeds Ltd., T₂= Nourish Poultry & Hatchery Ltd., T₃= Paragon Feed Ltd., T₄= CP Bangladesh Co. Ltd., T₅= Quality Feeds Ltd., T₆= Kazi Farms Ltd., T₇= Provita Feed Ltd., T₈= Aftab Feed Products Ltd., T₉= Sms Feed Ltd., T₁₀= MS Agro Feed Pvt. Ltd.

4.2.5 Compare CP Value Found in SAU lab with DLS Lab of Broiler Starter Feed

Table 8: Compare CP% of broiler starter feed that found in SAU lab and DLS lab

Sl. No.	Feed Company Name	SAU Lab CP%	DLS Lab CP%
1	United feeds Ltd.	21.83	20.35
2	Nourish poultry & hatchery Ltd.	22.5	21.72
3	Paragon feed Ltd.	22.68	22.78
4	SMS Feed Ltd.	21.69	21.25
5	MS agro feed unit pvt. Ltd	23.52	23.28

From the above table 8, found that crude protein content (found in SAU lab.) in United feeds Ltd. (Meghna group of industries), Nourish poultry & hatchery Ltd., SMS Feed Ltd. and MS agro fisheries feed unit private Ltd. slightly higher value than DLS lab. In case of Paragon broiler starter feed CP% found in SAU lab. which was lower than that found in DLS lab.

4.2.6 Compare CP Value Found in SAU lab with DLS Lab of Broiler Grower Feed

Table 9: Compare CP% of broiler grower feed that found in SAU lab and DLS lab.

Sl. No.	Feed Company Name	SAU Lab CP%	DLS Lab CP%
1	United feeds Ltd(Meghna group of industries)	21.43	21.69
2	Nourish poultry & hatchery Ltd.	20.83	21.48
3	Paragon feed Ltd.	23.24	22.35
4	SMS Feed Limited	22.5	21.73
5	MS agro fisheries feed unit private Ltd.	20.52	20.46

It was found from the table 9 that crude protein content (found in SAU animal nutrition lab.) in United feeds Ltd. and Nourish poultry & hatchery Ltd. were slightly lower than the DLS Lab Value. However, Paragon feed Ltd., SMS Feed Ltd. and MS agro fisheries feed unit private Ltd. were slightly more than the crude protein found in DLS laboratory. From table 8 & 9 it may be say that the laboratory analyses was correct.

CHAPTER V

SUMMARY AND CONCLUSION

Present study was conducted in different districts of Dhaka division to determine the overall feed companies information, at present 38 active feed mill found in Dhaka division. For this study 320 retailers or dealers selected as a sample unit in the different areas of Dhaka division. The study was also comprised of laboratory examination. Feeds were collected from the different parts of Dhaka division. The data were collected during the period from June 2017 to June 2018.

From the study, the best ten feed seller companies were found according to the respond of different districts in Dhaka division. The ten best feed seller companies were United Feeds Ltd. (Meghna Group of Industries), Nourish Poultry & Hatchery Ltd., Paragon Feed Ltd., CP Bangladesh Co. Ltd., Quality Feeds Ltd., Kazi Farms Ltd., Provita Feed Ltd., Aftab Feed Products Ltd., SMS Feed, MS Agro Feed Pvt. Ltd. These ten feed companies contribute in market about 73.46 % and rest 28 companies contribute only 26.54% of feed in Dhaka division.

For laboratory analysis of compound feeds, standard procedures for determination of DM and CP were followed. Having completed the chemical analyses of feeds, statistical analytical method was followed to find out the variations among the nutrient contents of different feed mills. In case of starter no significance difference $p < 0.01$ was found in DM. However in case of grower ration significance difference $p < 0.01$ was found in DM and CP contents and also significance difference $p < 0.01$ was found in CP% of broiler starter feed.

The feed mills T₁ (United Feeds Ltd.), T₂ (Nourish Poultry & Hatchery Ltd.), T₃ (Paragon Feed Ltd.) and T₉ (SMS Feed Ltd.) were found to CP contain of broiler starter 21.82%, 22.50%, 22.68% and 21.69% respectively, which were almost similar as per the actual requirement of birds according to the BSTI (BSTI standard for broiler stater is 22% CP). Little bit variation was found between actual value collect from laboratory test and declared value on brand labels. Declared value of CP on brand label of T₁ (United Feeds Ltd.), T₂ (Nourish Poultry & Hatchery Ltd.), T₃

(Paragon Feed Ltd.) and T₉ (SMS Feed Ltd.) were 21.00%, 20.00%, 22.50% and 22.00% respectively. CP content (23.52%) of T₁₀ (MS Agro Feed Pvt. Ltd.) was higher than the actual requirement of birds 22% according to the BSTI.

However declared value of CP on brand label of T₁₀ was 20.00%, it should be standardized. Feed manufactured by the feed mills T₄ (CP Bangladesh Co. Ltd.), T₅ (Quality Feeds Ltd), T₆ (Kazi Farms Ltd.), T₇ (Provita Feed Ltd.) and T₈ (Aftab Feed Products Ltd.) were found to CP contain of broiler starter 19.95%, 20.83%, 18.38%, 19.27% and 19.30% respectively, which were lower than the BSTI standard but almost similar with their declared value of CP on brand labels. Declared value of CP on brand label of T₄, T₅, T₆ and T₈ were 20.00%, 23.00%, 21.00% and 21 to 23%. In case T₇ (Provita Feed Ltd.) brand label absence.

The feed mills T₁ (United Feeds Ltd.), T₂ (Nourish Poultry & Hatchery Ltd.), T₅ (Quality Feeds Ltd) and T₁₀ (MS Agro feed pvt. Ltd.) were found to CP contain of broiler grower 21.43%, 20.83%, 20.6% and 20.52% respectively, which were almost similar as per the actual requirement of birds according to the BSTI (BSTI standard for broiler grower is 20% CP). Little bit variation was found between actual value collect from laboratory test and declared value on brand labels. Declared value of CP on brand label of T₁ (United Feeds Ltd.), T₂ (Nourish Poultry & Hatchery Ltd.), T₅ (Quality Feeds Ltd) and T₁₀ (MS Agro feed pvt. Ltd.) were 21.00%, 22±1%, 21% and 20% respectively. CP content of T₃ (Paragon Feed Ltd.) and T₉ (SMS Feed Ltd.) were 23.24% and 22.5% that was higher than the actual requirement of birds 20% according to the BSTI.

Feed manufactured by the feed mills T₄ (CP Bangladesh Co. Ltd.), T₆ (Kazi Farms Ltd.), T₇ (Provita Feed Ltd.) and T₈ (Aftab Feed Products Ltd.) were found to CP contain of broiler grower 19.3%, 17.93%, 17.94% and 18.54% respectively, which were lower than the BSTI standard and also lower CP contents than declared value of CP on brand labels except T₄ (CP Bangladesh Co. Ltd.). Declared value of CP on brand label of T₄ (CP Bangladesh Co. Ltd.), T₆ (Kazi Farms Ltd.), and T₈ (Aftab Feed Products Ltd.) were 19%, 20%, 20 to 22%. In case T₇ (Provita Feed Ltd.) brand label CP value was absence.

The quality of broiler feeds obtained from feeds mills T₁ (United feeds Ltd.), T₂ (Nourish Poultry & Hatchery Ltd.), T₃ (Paragon Feed Ltd.), T₉ (SMS Feed) and T₁₀ (MS Agro Feed Pvt. Ltd.) was quite acceptable with regard to their nutrients content (DM & CP%). While T₃ and T₁₀ groups of feed contain higher CP of both broiler starter and grower.

From the standing point of nutritive value (DM & CP%), the quality of the compound feeds collected from the feed mills T₁ (United feeds Ltd.), T₂ (Nourish Poultry & Hatchery Ltd.), T₃ (Paragon Feed Ltd.), T₉ (SMS Feed) and T₁₀ (MS Agro Feed Pvt. Ltd.) appeared to be comparatively better than the feeds produced from the feed mills T₄ (CP Bangladesh Co. Ltd.), T₅ (Quality Feeds Ltd), T₆ (Kazi Farms Ltd.), T₇ (Provita Feed Ltd.) and T₈ (Aftab Feed Products Ltd.).

The following conclusions were drawn from the results of the present study

- 1) Most commonly available feed companies in Dhaka division were United feeds Ltd. (Meghna group of industries), Nourish poultry & hatchery Ltd., Paragon Feed Ltd., CP Bangladesh Co. Ltd., Quality Feeds Ltd., Kazi farms Ltd., Provita Feed Ltd., Aftab Feed Products Ltd., SMS Feed, MS Agro Feed Pvt. Ltd
- 2) Broiler feeds were collected from T₁ (United feeds Ltd.), T₂ (Nourish Poultry & Hatchery Ltd.), T₃ (Paragon Feed Ltd.), T₉ (SMS Feed) and T₁₀ (MS Agro Feed Pvt. Ltd.) feed mills. Feed contains somewhat similar or more CP than BSTI standard. So, the feeds produced from these feed mills were deemed to be of acceptable quality.
- 3) The feeds of remaining feed mills (T₄ (CP Bangladesh Co. Ltd.), T₅ (Quality Feeds Ltd), T₆ (Kazi Farms Ltd.), T₇ (Provita Feed Ltd.) and T₈ (Aftab Feed Products Ltd.)) appeared to be of comparatively lower in nutritive value CP%
- 4) Feed mills are not maintaining the similar standard or requirement for the similar birds specially in CP content, it should be standardized.

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APPENDICES

Appendix I. Experimental area of Bangladesh (Dhaka Division)



Appendix II. Analysis of variance of the data on dry matter of broiler starter and grower, crude protein of broiler starter and grower of different commercial feed companies of Dhaka Division.

Source of variation	Df	Mean square of value of			
		Dry matter of broiler starter	Dry matter of broiler grower	Crude protein of broiler starter	Crude protein of broiler grower
Treatment	9	0.64 ^{NS}	1.80**	8.85**	10.14**
Error	20	0.98	0.23	0.55	0.42

**Significant at 1% level of significance

^{NS} Non significant

Appendix III. Crude protein contain commonly used broiler starter feed companies in

Dhaka Division

Treatment	R1	R2	R3	Mean CP%	Brand Level CP%	BSTI CP%
T ₁ (United Feeds Ltd.)	21.78	21.875	21.83	21.83	22	22
T ₂ (Nourish Poultry & Hatchery Ltd)	22.06	21.875	23.52	22.5	23	22
T ₃ (Paragon Feed Ltd)	23.1	22.52	22.42	22.68	22.5	22
T ₄ (CP Bangladesh Co. Ltd)	19.266	20.64	19.94	19.95	20	22
T ₅ (Quality Feeds Ltd)	19.94	22.15	19.73	20.83	21	22
T ₆ (Kazi Farms Ltd)	18.375	18.63	18.12	18.38	19.03	22
T ₇ (Provita Feed Ltd)	18.375	19	20.43	19.27	19.5	22
T ₈ (Aftab Feed Products Ltd)	19.35	19.25	19.3	19.3	19	22
T ₉ (Sms Feed Ltd)	22.15	22.3	20.61	21.69	22	22
T ₁₀ (MS Agro Feed Pvt. Ltd.)	24	23.1	23.46	23.52	20	22

Appendix IV. Crude protein contain commonly used broiler grower feed companies in

Dhaka division

Treatment	R1	R2	R3	Mean CP%	Brand label CP%	BSTI
T ₁ (United Feeds Ltd.)	21	21.875	21.4	21.43	21	20
T ₂ (Nourish Poultry & Hatchery Ltd)	20.61	22.15	19.73	20.83	19	20
T ₃ (Paragon Feed Ltd)	23.1	23.46	23.16	23.24	22	20
T ₄ (CP Bangladesh Co. Ltd)	19.35	19.25	19.3	19.3	19	20
T ₅ (Quality Feeds Ltd)	21	20.19	20.61	20.6	21	20
T ₆ (Kazi Farms Ltd)	17.5	18.375	17.91	17.93	18	20
T ₇ (Provita Feed Ltd)	18.375	17.12	18.23	17.94	18	20
T ₈ (Aftab Feed Products Ltd)	18.375	18.23	19	18.54	18	20
T ₉ (Sms Feed Ltd)	21.785	23.52	22.06	22.5	22	20
T ₁₀ (MS Agro Feed Pvt. Ltd.)	20.61	19.73	21.22	20.52	20	20

Appendix V. Dry matter contents in top ten different broiler starter feed that are commonly used in Dhaka division.

Treatment	R1	R2	R3	Mean DM%
T ₁ (United Feeds Ltd.)	88.67	87.65	91.94	89.42
T ₂ (Nourish Poultry & Hatchery Ltd)	88.72	88.65	88.85	88.74
T ₃ (Paragon Feed Ltd)	89	90.25	89.88	89.71
T ₄ (CP Bangladesh Co. Ltd)	89.26	88.85	89.01	89.04
T ₅ (Quality Feeds Ltd)	88.35	89.15	89.5	89
T ₆ (Kazi Farms Ltd)	88.5	89.15	90.01	89.22
T ₇ (Provita Feed Ltd)	88.64	87.75	88.93	88.44
T ₈ (Aftab Feed Products Ltd)	90.15	88.45	90.56	89.72
T ₉ (Sms Feed Ltd)	89.46	89.06	88.96	89.16
T ₁₀ (MS Agro Feed Pvt. Ltd.)	90	91.15	88.53	89.56

Appendix VI. Dry matter contents in top ten broiler starter feed that are commonly used.

Treatment	R1	R2	R3	Mean DM%
T ₁ (United Feeds Ltd.)	89	89.4	89.56	89.32
T ₂ (Nourish Poultry & Hatchery Ltd)	88.25	88.46	88.8	88.5
T ₃ (Paragon Feed Ltd)	88.87	88.97	89.04	88.96
T ₄ (CP Bangladesh Co. Ltd)	87	87.68	88.96	87.88
T ₅ (Quality Feeds Ltd)	89.68	90.35	91	90.35
T ₆ (Kazi Farms Ltd)	88.35	89	87.91	88.42
T ₇ (Provita Feed Ltd)	88	87.56	88.14	87.9
T ₈ (Aftab Feed Products Ltd)	88.24	88.65	88.46	88.45
T ₉ (Sms Feed Ltd)	89.2	88.56	88.49	88.75
T ₁₀ (MS Agro Feed Pvt. Ltd.)	88.15	87.75	87.5	87.8



SHER-E-BANGLA AGRICULTURAL UNIVERSITY

SHER-E-BANGLA NAGOR, DHAKA-1207

DEPARTMENT OF ANIMAL NUTRITION, GENETICS AND BREEDING

QUESTIONNAIRE:

Questionnaire No.: _____

Date of Interview: ____/____/____

ID of Interviewer: _____

Target group: Retailer/dealer of animal feed

1. General Information:

- a) Retailer's/ Dealer Name:
- b) Mobile No.
- c) Shop name:
- d) Market Name:
- e) Upazila name:
- f) District name:

2. Where do you collect your Feed?

- a) Feed mill/ feed industry
- b) Dealer
- c) Supplier
- d) Others.....(please specify)

3. Which animal s feed is available in your shop

- a) Chicken
- b) Duck
- c) Pigeon
- d) Cattle
- e) Others (.....please specify)

4. What Type of feed available in shop?

- a) Pellet
- b) Mash
- c) Crumble
- d) cube
- e) Others

5. Name of the company feed available in your shop (like paragon , Narish, Fresh, kazi, Aftab , Sundorban, pocha feed, Ait, New hope, Provita etc)

- a)
- b)
- c)
- d)
- e)
- f)
- g)

6. Chemical composition/proximate component available in sack :

- a. Name of feed:

Moisture..... % CP.....% CF.....% NFE..... % EE..... % Ash..... %
phosphorous.....% Ca.....% Energy.....kcal.

b. Name of feed:

Moisture..... % CP.....% CF.....% NFE..... % EE..... % Ash..... %
phosphorous.....% Ca.....% Energy.....kcal.

c. Name of feed:

Moisture..... % CP.....% CF.....% NFE..... % EE..... % Ash..... %
phosphorous.....% Ca.....% Energy.....kcal.

d. Name of feed:

Moisture..... % CP.....% CF.....% NFE..... % EE..... % Ash..... %
phosphorous.....% Ca.....% Energy.....kcal.

e. Name of feed:

Moisture..... % CP.....% CF.....% NFE..... % EE..... % Ash..... %
phosphorous.....% Ca.....% Energy.....kcal.

7. Price of feed per sack(50kg/25kg):

- a)
- b)
- c)
- d)
- e)
- f)

8. How much feeds are sale per day(kg)

9. Monthly income from feed sale:

10. Which companies feed are best sale?

11. Which feed are best according to the opinion of Farmer?

- a)
- b)
- c)
- d)
- e)
- f)

Collection of 100gm feed of each type in different plastic pack from shopkeeper/farmers adjacent to the shop

Signature of interviewer

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