A COMPARATIVE STUDY AMONG THE DIFFERENT STRAINS OF BROILER UNDER FARM CONDITION

A Thesis
By

BISHOJIT GHOSH
Registration No. 1205104

Semester: July-December, 2013

Session: 2012-2013

MASTER OF SCIENCE (M.S.)

IN

POULTRY SCIENCE

DEPARTMENT OF DAIRY AND POULTRY SCIENCE

HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY
DINAJPUR

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Submitted to

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DINAJPUR

DECEMBER, 2014

DEDICATED
TO MY
BELOVED PARENTS

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The author

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ABSTRACT

The study was conducted in poultry shed, under the Department of Dairy and Poultry Science, HSTU. The experimental period was 28th August 2013 to 5th October 2013. The experiment is carried our to select the best strain in the suitable environment in the Dinajpur district. One hundred twenty commercial broiler chicks of different strains (Lohmann, First feather, Hubbard classic and Cobb 500) were randomly divided into four dietary treatment each having three (3) replicates. The number of birds in each treatment was 30 while in each replicate 10. The birds were reared from day 1 to 35 days of age with similar housing, feeding and environmental management condition. The body weight of Lohmann (T_1) was significant as compare to fast feather (T_2) and the body weight of Hubbard Classic and Cobb 500 were not significant as compare to Lohmann through out the experimental period. After five weeks of rearing body weight were T_1 (1948.83g), T_2 (1836.25g), T_3 (1876.08g) and T_4 (1851.65g) respectively. In that case of feed intake there was more or less similer. But T_2 (First Feather) intake more (3123.33g) than others. Feed intake after 35 days, T_1 (3100gm), T_2 (3123.33g), T_3 (3056.67g) and T_4 (3080gm) respectively. Feed convertion ratio was superior in FCR of Lohmann as compare to fast feather (T_2) and Hubbard Classic (T_3) and Cobb 500 were not significant as compare to Lohmann (T_1). The feed conversion ratio was followed by 1.59 (T_1), 1.70 (T_2), 1.62 (T_3) and 1.66 (T_4) respectivly. The variation in survibility among the strains was non significant ($P>0.05$). Non significant differences were found in dressing percentage among the strains. Abdominal fat, breast muscle is higher in Lohmann than another three strains. It may be concluded that Lohmann broiler performs the best in Bangladesh especially in hot weather than First feather and the perfomance of Hubbard classic and Cobb 500 were more or less similer to Lohmann . The later three strains may also be recommended but priority may be given to Lohmann broiler.

Key words: Broiler Performance, Different Strains, Feed Conversion Ration.

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LIST OF ABBREVIATION AND SYMBOLS

AM	=Ante meridian
Av.	= Available
HSTU	= Hajee Mohammod Danesh Scince and Technology University
Ca	= Calcium
CF	= Crude fiber
Cm	= Centimeter
Cm^2	= Square Centimeter
Contd.	=Continued
CP	= Crude protein
DM	=Dry matter
Dr.	=Doctor
et al.	= Associates
Fig.	= Figure
FCR	= Feed Conversion Ration
G	= Gram
i.e.	= That is
kcal	= kilo-calorie
Ltd.	= Limited
Lys.	= Lysine
ME	=Metabolizable energy
Met.	= Methionine
No.	= Number
°C	= Degree Celsius
P	= Probability
Total P	= Total Phosphorus
PM	=Post Meridian
Pp	= Page
Prof.	= Professor
SD	= Standard Deviation of Means
Tk.	= Taka
UFFDA	= Users Friendly Feed Formulation Done Again
USFDA	= United States Food and Drug Administration

WHO	= World Health Organization
%	= Per cent
&	= And
@	= At the rate of
+	= Plus/and
/	= Per/or
>	=Greater than
<	= Less than
±	= Plus-minus

CHAPTER I

INTRODUCTION

CHAPTER I

INTRODUCTION

The world population will reach 7.5 billion by 2020, with 6.3 billion living in developing countries (FAO, 2000). The increase in populations and urbanization are critical issues in terms of food availability and nutritional well being. More people require more food, more services and employment. It is reported that 30% children of the world under five years of age are underweight, 199 million children suffer from protein-energy malnutrition and 1.3 billon people live below poverty line (UNDP, 2000). According to BBS (1998), about 90% people of your country are suffering from malnutrition, especially for imbalanced animal protein in the diet.

According to BBS (1995), the consumption of animal protein in Bangladesh is only 9.56 g/day person as against the standard requirement of 30.0 g/day/person (Ahmed and Islam, 1990). The picture is more severe in rural areas and also among the poor rickshaw pullers and day labors. In order to build up a nation with good mental and physical health, supply of huge amount of animal protein is needed. The animal protein is superior to vegetable protein because of higher protein, high digestibility, higher biological value (BV), less fiber content and well balanced essential amino acids (Scott *et al*, 1982). Hoffman and Gwin (1964) observed that chicken meat is an excellent source of essential amino acids for human being. Synder *et al.* (1962) reported that poultry meat and egg contain the right kind of fat which is necessary for good health. The food selected for human consumption should be of high protein level with low calories content and thus chicken meat is highly acceptable in this respect.

Broiler meat can efficiently and rapidly fulfill the shortage of protein requirement, since it can be produced at least possible time as compared together meat producing animals. Poultry contributes approximately 37% of total animal protein supplied in Bangladesh (Ahmed and Islam, 1990). Bangladesh has a great

prospect for raising broilers. Broiler production reveals the fact of minimum expense with maximum return. It can be mentioned that small area of available land can be well utilized for commercial broiler farming in a thickly populated country like Bangladesh. So, there is a wide scope for raising broilers adaptable to Bangladesh condition.

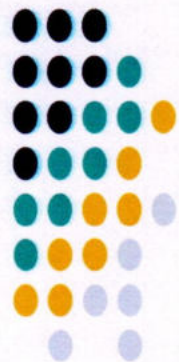
The suitable genetic make-up of the broilers to perform under a given environment is one of the most important pre-requisite profitable poultry productions. Production characteristics and performance of the broilers depend on the adaptability to the climatic environment. Baghel and pradham (1989) noted great influence of environment and reported that body weight gains and feed intake of the broilers were maximum in cold followed by those of hot-humid and hot season. Lack of authentic information on the performance of broiler strains is a major limitation for the speedy growth of broiler industry in Bangladesh.

The prices of poultry meat are beyond the purchasing capacity of the majority people due to extreme shortage of supply. The growing demand of broiler meat can be meat up quickly by rearing broilers. A number of modern boiler strains are available in Bangladesh at present. A few studies had been under taken in the past to compare the performances of different broiler strains under Bangladesh condition. Performance of Lohmann, First Feather, Hubbard Classic and Cobb 500 were not studied yet. Therefore, it is worth whole to know the strain most suitable for commercial production in Dinajpur. With this idea, an experiment was conducted using Lohmann, First Feather, Hubbard Classic and Cobb 500 at Poultry Shed, Department of Dairy and Poultry Science, HSTU, Dinajpur, with the following objectives:

1. To know the production performance of four different broiler strains in Dinajpur district.
2. To know the suitable strain for commercial purpose in hot humid season.

CHAPTER II

REVIEW OF LITERATURE



CHAPTER II

REVIEW OF LITERATURE

Various factors have been reported in literature to influence the growth performance and meat yield of broilers. The most important factors are genetics, age, sex, nutrition, environment and disease (Perreault and Leeson, 1987). In the past, the performance of different commercial strains of broiler was reported without considering the inherited nature of growth of the birds. Moreover, information with regard to performance and adaptability of broilers under the climatic condition of Bangladesh are scanty. Comparative study among the Lohman, First feather, Hubbard classic and Cobb 500 strains of broiler are not research yet. But worked with three fast growing broilers (Hubbard Classic, Cobb 500 and MPK) and also research with another four strains that are vencobb-100, Kasila, Arbor Acres plus and Ross in Bangladesh Agriculture University, Mymensingh, Bangladesh. Some of the literatures relevant to the present study are reviewed in this chapter.

2.1 Live weight and weight gain

Iqbal *et al.* (2012) reported that an experiment with four different strains (Hubbard, Arbor Acres, Ross 308 and Hybro PN), they observed that birds of Hubbard, Arbor Acres, Ross 308 gained significantly more than Hybro PN. Hossain *et al.* (2011) conducted an experiment with three different commercial strains (Hubbard classic, Cobb 500 and MPK). They found that live weight and body weight gain were highest in Cobb 500 and followed by Hubbard classic and MPK. Souza *et al.* (1996) conducted an experiment with 3600 Arbor Acres, Cobb, Hubbard and Ross broilers. They found that, the weight gains of strains from hatching to 49 days were average 2.38, 2.42, 2.49 and 2.5 kg for males vs. 1.99, 2.13, 2.04 and 1.99 kg for females respectively. Zollitsch *et al.* (1989) stated that the live weight gain of Hubbard, Arbor Acres, ISA-Vedette and Hybro Strains were 1620,1561,1522 and 1521g respectively at 42 days of age.

Pavlovski *et al.* (1988) compared the data of Jata, Preluxbro, Hybro, Lohamann and Hubbard broilers, They found highest body weight in Hubbard broiler than others. The male broilers from Jata's and females from Preluxbro's were the lightest in respect of weight gain up to 47 days of rearing. Lambio *et al.* (1987) studied the growth performance and carcass yield of 5 commercial broiler strains; Arbor acres, Hubbard classic, Hybro, Lohmann and Pilch. They stated that the body weight did not differ ($P>0.05$) significantly among the strains at & weeks of age. Branovic *et al.* (1985) reported that there were no significant differences between Hybro and Lohmann concerning final weight but Lohmann chicks were heavier at the end of fattening.

2.2 Feed consumption

Iqbal *et al.* (2012) reported that, an experiment with four different strains (Hubbard, Arbor, Ross 308 and Hybro PN). They seen that the birds of Hybro PN consumed significantly less feed intake followed by Hubbard Classic, Arbor Acres and Ross 308. Hossain *et al.* (2011) stated an experiment with three different commercial strains (Hubbard classic, Cobb 500 and MPK) they found that Hubbard classic and Cobb strain group consumed higher feeds, while the birds of MPK had the lowest feed intake. It has been proved that when broiler chicks are fed with a wide range of energy concentrations a similar growth rate is observed and birds adjust their feed intake as far as their energy requirements (Leeson and summers, 2001). France *et al.* (2008) reported that feeding highly energy concentrated diets result in remarkable changes in body composition of the birds, while feed efficiency can be estimated when different energy concentrations are applied. Souza *et al.* (1996) conducted an experiment with 3600 Arbor Acres, Cobb, Hubbard and Ross broilers. They reported that the amount of feed consumed per kg weight gain were 1.82, 1.92, 1.84 and 1.85 for males vs. 1.78, 1.93, 1.87 and 1.86 kg for females respectively. Lambio *et al.* (1987) studied the growth performance and carcass yield of 5 commercial broiler strains: Arbor Acres, Hubbard Classic, Hybro, Lohmann and Pilch. They stated that feed

308 and were non-significant among the remaining treatment. Souza *et al.* (1996) conducted an experiment with 3600 broilers from Arbor Acres, Cobb, Hubbard and Ross strains. They reported that the average carcass yields were 69.77, 69.93, 71.86 and 71.22% respectively. The respective percentages of breast meat were 14.12, 14.61, 14.69 and 15.26% respectively. The Ross and Arbor acres broilers were most suitable for the production of breast and leg meat respectively. Avila *et al.* (1993) reported that carcass weight and meat yield was depending on strains. Pilch broilers had the best overall performance in comparison with those of Arbor Acres, Cobb and Hubbard. Lambio *et al.* (1987) studied the growth performance and carcass yield of 5 commercial broiler strains; Arbor Acres, Hubbard classic, Hybro, Lohmann and Pilch. They stated that strains and sex showed no influence on eviscerated carcass, breast, thighs, wings, back and neck as percent of live weight.

2.5 Effect of environment on broiler production

It has been observed that environment influenced the growth, feed intake, feed conversion efficiency and meat yield of broilers. Decuypere *et al.* (1994) observed that the decreased growth of a heavy broiler strain in a hot- humid zone was associated with decreased feed intake. Feed conversion was poorer under tropical conditions as a result of longer growth period to reach 1.9-2.0kg weight. Bertechini *et al.* (1991) conducted an experiment on the effect of environmental temperature on broiler performance. From 28 days old, 144 Hubbard Chickens were kept at an environmental temperature of 17.1, 22.2 and 27.9°C. They showed that increasing environmental temperature resulted in a liner decrease ($P<0.05$) in weight gain and feed intake. Feed conversion was best at 22.2°C ($P<0.05$). There was no significant difference in feed conversion between 17.1 and 27.9°C. Sonaiya *et al.* (1990) conducted an experiment from 14 to 54 days old, 2000 commercial broilers. They kept the birds in environmentally controlled house at constant 21°C (low temperature) or diurnally cycling at 21°C to 30°C (high temperature). They reported that cycling high temperature resulted in higher breast and lower proportions than at constant low temperature. Baghel and

Pradhan (1989) observed-that feed intake of the boilers was maximum in cold followed by those of hot-humid and hot environment. Body weight was highest mainly due to maximum amount of intake during winter season regulated by the ambient temperature (Scott *et al.*, 1982).

Yousuf and Singh (1989) reported that body weight gain of broiler was maximum in cold followed by in hot-humid and hot-dry seasons. Performance index during cold season was higher than those of other seasons. Mortality was higher during hot-dry season. Sundarasu and Prabaharah (1989) studied the effect of strain and season on commercial broiler production with two strains viz. Cobb and Samrat under four seasons viz., Southwest monsoon, Northeast monsoon. Cold-dry winter and hot-dry summer. They showed that the strain and season had significant ($P<0.01$) influence on gross income from commercial broiler production and that hot-lid dry summer disfavored for broiler production from economic view point. Prasad *et al.* (1989) studied that the performance of a commercial broiler in different climatic conditions. The weight gain and feed consumption to 10 weeks was lower for broiler raised in September-November and highest in April-June. Howlider and Rose (1989) carried out an experiment with Ross- 1 broiler chicks. They placed the birds in 4 environmental controlled rooms and kept at one of two constant rearing temperatures (21°C compared with 31°C). They showed that weight gain (01) was reduced by 16% ($P<0.05$) at 31°C (high environmental temperature) compared to that of at 21°C.

Howlider and Rose (1987) also showed a marked reduction of growth rate in broilers at high environmental temperatures. Antomarchi and Lopez (1988) compared three hybrid broiler strains: S_{47}. ES_{36} and E_{24} in winter. They found significant differences among the strains. The performance of broiler ES_{36} strain was significantly best than those of the other two strains. Bray (1983) observed that growth reduction of broilers kept at high temperatures increased with age. He also observed that the effect of temperature was greater in males than females. High temperature could also b involved in reducing the proportion of breast meat in broiler. He observed little variations in the proportion of dark meat and total

was 5.68%. Sarker *et al.* (2001) conducted that many people are now being encouraged in the enterprise, as maximum return can be achieved shortly by investing minimum capital in broiler production.

2.7 Effect of temperature and humidity on meat yield

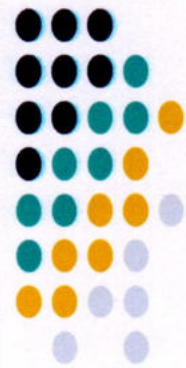
A suitable environmental condition is very essential for better production poultry meat. Environment, especially, high temperature and high humidity hinders the broilers meat yield. Bray (1983) observed that, the growth reduction of broilers kept at high temperature increased with age. He also observed that the effect of temperature was greater in males than females. High temperature could also be involved in reducing the proportion of breast meat in broilers. He observed little variations in the proportion of dark meat and total meat at 20-27°C temperature. Felton and Hoffman (1969) reported that the percentage of carcass fat was lowest for the broilers finished at lowest (12.78°C) temperature; 10.03, 10.59 and 12.70 respectively at 12.78°C, 18.33°C and 23.88°C respectively. The assumption was that the broilers on the temperature used energy to maintain body temperature in the cooler environment. As a result, with the increase of temperature the fat percentage increases.

2.8 Justification of the present study

Poultry production has increased tremendously during the last one decade in Dinajpur district. Especially small farmers are mostly interested in broiler farming because of quick return. A number of modern broiler strains are available in Bangladesh at present time. A few studies had been under taken in the past to compare the performances of different broiler strains under Bangladesh condition. Performances of Lohmann, First Feather, Hubbard classic and Cobb 500 were not studied yet in Dinajpur district to select the best strain in the suitable environment. To compare the performance of different broiler strains would be helpful for the farmers. So, the present study was under taken to compare the performance of Lohmann, First feather, Hubbard Classic and Cobb 500 under farming condition in Dinajpur district.

CHAPTER III

MATERIALS AND METHODS



CHAPTER III

METARIALS AND METHODS

3.1 Statement of the research work

To investigate the effect of same diet of different strains, a 35-day feeding trial with 120 day-old Lohmann, First Feather, Hubbard Classic and Cobb 500 broilers was conducted at Poultry shed, Dairy and Poultery Lab., Hajee Mohammod Danesh Science and Technology University. The trial period continued from 28th August to 5th October 2013

3.2 Preparation of the experimental house and equipment

An open shed house was used for rearing the experimental birds. Each experimental was partitioned into 03 separate pens of equal size by using wire net and bamboo materials with 04 pens on each side of a service area running along the middle of each room. The experimental rooms (ceiling, wall, floor and wire net) were properly brushed with broom and then washed and cleaned by forced water using a hosepipe. After, washing with clean water, the rooms were disinfected by bleaching powder solution. Then the rooms were left vacant for 15 days. Later, the rooms were again disinfected and kept free to dry up properly. At the same time, all feeders, waterers and other necessary equipment were also properly cleaned, washed and disinfected with bleaching powder solution, subsequently dried and left them empty for one week before the arrival of chicks. Ceiling, walls and wire net were also thoroughly disinfected.

3.3 Collection of the experimental birds

A total 120 broilers was used in this experiment. Lohmann, First Feather, Hubbard classic and Cobb 500 broiler chicks were purchased respectively from Nilsagor farms Ltd, Aftab Bahumukhi Farms Ltd, Paragon and CP Bangladesh Ltd.

3.4 Layout of the experiment

The day-old chicks of four strains were divided into four different treatments having three replications. The chicks were randomly picked up from chick boxes and allocated to respective replicate pens. There were 10 chicks in each replication. The layout of the experiment is shown in Table 3.1.

Table 3.1 Layout showing the distribution of experimental birds

Treatments	Number of birds in each replication			Total
	R_1	R_2	R_3	
T_1	10	10	10	30
T_2	10	10	10	30
T_3	10	10	10	30
T_4	10	10	10	30
Total no. of birds	40	40	40	120

Where T_1= Lohmann, T_2= First Feather, T_3= Hubbard Classic and T_4= Cobb 500

3.5 Procurement of feed ingredients

Required feed ingredients for making experimental diets were purchased from the local market of Dinajpur town. During procurement, ingredients were evaluated carefully for their freshness by observing its color with naked eye and smell with nose.

3.6 Preparation of the experimental diets

The ration was formulated with least-cost principles by using computer software named UFFDA (1992). Nutrient composition of each ingredient was considered from the report of Chowdhury (2003) and the amount was calculated in such a way that nutrient composition per unit feed could fulfill the breeder's recommendation. The experimental diets were divided into two phases (broiler-

starter and broiler-finisher). Broiler starter diet was provided between 0 to 14 days, broiler-grower phase consists of 15 to 35 days.

The experimental diets were formulated with locally available feed ingredients. The ground ingredients were mixed thoroughly and properly. Then rice polish, micronutrients (vitamin-mineral-premix, lysine & methionine) and common salt were mixed thoroughly in a separate place. The required amounts of mixed rice polish were again weighed according to respective treatments. After proper mixing, it was then thoroughly mixed with maize, soybean meal etc. properly. At last required amount of soybean oil was sprayed on the mixed feed ingredients and finally, it was mixed properly and thoroughly. Mixing was done manually and no coccidiostat or any other feed additives were added to the diets.

Table 3.2 Ingredient composition of experimental diets

Feed ingredients	Amount (kg/100 kg feed)	
	Starter (0-14 days)	Finisher (15-35 days)
Maize	53.50	57.00
Rice polish (Auto)	10.00	10.00
Soybean meal (44)	23.00	18.00
Protein Concentrate	10.00	10.00
Oyester Shell	1.00	0.75
Soybean oil	1.50	3.00
DCP	0.50	0.75
***Vitamin-mineral Premix	0.25	0.25
Common salt	0.25	0.25
Chemical composition		
ME (kcal/kg)	2912	3074
CP (%)	21.25	19.41
CF (%)	5.00	5.00
Ca (%)	1.00	0.95
Available P (%)	0.74	0.75
Lysine (%)	1.02	0.89
Methionine (%)	0.35	0.35
Ash (%)	6.00	6.00

*** Vitamin Mineral Premix provided following per kg diet: Vit. A 5000 IU, D_3 1000 IU, K 1.6 mg, B1 1mg, B2 2mg, B3 16mb, B6 1.6mg, B9 320µg, B12 4.8 µg, H 40mg, Cu 4mg, Mn 40mg, Zn 20mg, Fe 2.4mg, I 160 µg.

3.7 Routine management

The birds were exposed to similar care and management in all treatment groups throughout the experimental period. The following management practices were followed during whole the experimental period.

3.7.1 Litter management

Fresh and dried rice husk was used as litter at a depth of about 3cm. After 3rd week of age the old litter was totally removed and new litter was provided. Again it was practiced after 4th week of age. The litter was stirred three times a week from 14 days and onwards to prevent accumulation of harmful gases.

3.7.2 Floor space

Each pen was 274.32 cm × 101.50 cm (27843.48 cm^2) allocated for 10 birds. Therefore, each bird was provided with a floor space of 1031.24 cm^2.

3.7.3 Brooding

Since experiment was done in summer season (28th August to 5th October), the environmental temperature was sometimes lower and sometimes higher than the requirements. In that time some days rain was occur. In the first week of the experimental period, the environmental temperature was lower than brooding temperature for all treatment groups, therefore, additional heat was provided to chicks during this time. Brooding of chicks was done by using two (2) electric bulbs in the respective pens. The bulbs were hanged just above the birds' level at the center of each pen. Brooding temperature was kept 34°C at the beginning of the first week of age and decreased gradually as shown in Table 3.4.

Table 3.3 Brooding temperature for experimental birds

Age of birds (days)	Brooding temperature (°C)
0-3	34
4-6	33
7-9	32
10-12	30
13-15	29
16-28	28

3.7.4 Lighting

The birds were exposed to 23.30 hours of lighting and a dark period of 0.30 hour per day throughout the experimental period. The dark period provision was practiced to make broilers familiar with the possible darkness due to electricity failure. Two- three (2-3) 100-watt electric bulbs were satisfactory for lighting.

Photo 3.1 Brooding condition of chick

Photo 3.2 Housing condition of chick

3.7.5 Feeder and waterer management

For the first 7 days, feeds were given on paper and water was supplied in round waterer. After 7 days of age, one round feeder and one round waterer were provided for each replication (10 birds). One additional round feeder was provided to each replication after 18 days of age. Required feeding and drinking space were provided according to the number and age of the birds in each replication. The feeders and waterers were fixed in such a way that the birds were able to eat and drink conveniently. Feeders were cleaned at the end of each week and waterers were washed twice a day.

3.7.6 Feeding and drinking

Immediately after allocating the chicks in their respective pen, 5% glucose solution was provided to the chicks for 3 hours. Then fresh, clean and cool drinking water was supplied to the chicks. For the first seven days, feeds were given to the birds at two-three (2-3) hours interval and water was provided three times a day. From the second week, feeds were supplied to the experimental birds three (3) times every day; once in the morning, in the afternoon and again at night. Fresh cool drinking water was also provided three (3) times a day; once in the morning, in the noon, and again at night. Feeders and waters were not kept empty.

3.7.7 Immunization

The experimental birds were vaccinated to prevent Newcastle Disease and Infectious Bursal Disease (Gumboro). The vaccination schedule followed during the experimental period is given in Table 3.5.

Table 3.4 Vaccination schedule of birds

Age(days)	Disease	Name of vaccine*
4	Newcastle Disease	BCRDV Bangla
11	Gumboro	Gumboro vac Bangla
18	Gumboro	Gumboro vac Bangla

* Vaccine prepared by FNF pharmaceuticals were applied as per recommendation of the manufacturer (one drop in each eye and Gumboro vaccine in both eye drop and with water)

3.7.8 Medication

During the course of experiment medication of any nature was not practiced.

3.7.9 Sanitation

Proper hygienic measures and strict sanitation programs were followed during the experimental period. The entrance point and Corridor were kept clean and solution of PPM. In addition, the service area of the experimental rooms, outside wall of the experimental house and the feed room were kept clean throughout the experimental period.

3.7.10 Biosecurity

To prevent the outbreak of diseases, biosecurity was maintained during the experimental period. The following measures were taken to maintain biosecurity-

- Visitors were not allowed to enter into the house. This was done by hanging billboard with "RESTRICTED AREA - NO ENTRANCE WITHOUT PERMISSION" at the entrance gate of the experimental shed.
- A footbath containing disinfectant solution (potassium permanganate or bleaching powder) was provided at the entrance point.
- All equipment of the experimental house was kept clean.
- Dead and sick birds were removed promptly.
- Dead birds were buried far away from the experimental house.
- The entrance of cats, dogs and wild flying birds was prevented inside the experimental house.

3.7.11 Postmortem examination of birds

Dead birds were diagnosed promptly at the Pathology Department under Veterinary Faculty, Hajee Mohammod Danesh Science and Technology University, Dinajpur. After posstmortem examination, the results were collected and necessary measures were taken to remove the problem without applying medicines.

3.8 Processing of broilers

The processing of broilers was done according to the procedure of Jones (1982). At the end of trial the weight of the birds was taken and average body weight was calculated. At 36 day of age, two birds weighing average from each replication were randomly selected for determining meat yield. To facilitate slaughter, all birds from each treatment group were kept without feed for 12 hours prior to killing, but water was supplied ad libitum. The birds were slaughtered and allowed to bleed for 2 minutes. After complete bleeding, birds were weighed individually. Then they were immersed in hot water (51 to 55°C) for 120 seconds for proper de-feathering of carcass. The feathers were removed manually (by hand) and the birds were again individually weighed. Finally, processing was performed by removing head, shank, viscera, oil gland, kidney and giblets. As soon as these were removed, the gall bladder was cut off from the liver and pericardial sac and arteries were cut from the heart. After removal of gizzard from the intestine, it was split open with knife and the fecal materials were removed. Then it was washed with clean water and the lining was removed by hand.

3.9 Record keeping

Body weight of chicks was recorded initially and weekly replication-wise for each treatment. Feed intake was also recorded weekly replication-wise for each treatment. Mortality was recorded daily if death occurred. During the whole experimental period, the temperature of the experimental house was recorded with the help of an automatic digital thermometer. The relative humidity was also

recorded by using an automatic digital hygrometer. The different meat yield parameters like dressing weight, blood weight, feather weight, liver weight, gizzard weight, heart weight, shank weight, breast meat weight, thigh weight, drumstick weight, wing weight and dark meat weight for individual bird were recorded after slaughtering.

3.10 Calculation

On the basis of data collected, the required variables were calculated. The weight gain of each broiler was calculated by deducting initial body weight from the final body weight of the birds. Feed intake was also calculated as the total feed consumption in a replication divided by number of birds in a replication. Necessary adjustments were made for mortality. The feed conversion ratio (FCR) was calculated as the total consumption of feed divided by live weight gain. Performance index was calculated by dividing the live weight (kg) by the feed conversion ratio and it was multiplied by 100. Survivability was calculated as the total number of birds survived divided by the total number of birds in each replication and multiplied by 100. The survived birds were calculated by deducting the number of dead birds from the total number of birds. The efficiency of performance was evaluated in terms of production number (PN) as follows (Euribrid, 1994):

$$\text{Production number (PN)} = \frac{\text{abw.} \times \% \text{ live}}{(\text{Days} \times \text{FCR})} \times 10$$

Here, abw = average live weight in gram, % liv = percent livability, days = duration of fattening in days, FCR = Feed Conversion Ratio

3.11 Statistical analysis

Statistical analyses were conducted with the Statistical Package for Social Science (SPSS for Windows Version 20) to determine if variables differed between treatment groups. Results are expressed as mean ± SD. The body weight, feed intake and feed conversation were compared among the groups by 1-way ANOVA and subsequent Duncan's Multiple Range Tests (DMRT).

CHAPTER IV

RESULTS AND DISCUSSION

CHAPTER IV

RESULTS AND DISCUSSION

4.1 Performance of broiler

The performances in terms of live weight gain weekly feed intake or feed consumption, feed conversion, survivability of Lohmann (T_1), First feather (T_2), Hubbard classic (T_3) and Cobb 500 (T_4) of birds are presented and discussed in the following subheadings.

4.1.1 Body weight gain

The weekly live weights of different strains are presented in Table.4.1. The body weight at first week, Lohmann, First feather, Hubbard classic and Cobb 500 gained 217.20 g, 196.00g, 181.33g and 182.23g respectively. It is evident (Table 4.1) that Lohmann (T_1) had highest body weight (1948.83 g) followed by Hubbard classic (1876.08g), Cobb 500 (1851.65g) and first feather (1836.25g) respectively. Final body weight differed significantly ($P<0.01$) among the strains. The results of present experiment agree with the results of Rahman (1990). He stated that the live weight was persistantly highest in Minibro, intermediate in Ross and lowest in Tropicbro at different ages. This findings also consist with the reports of several other previous researchers (Gonzales *et al.*, 1998; Sarker *et al.*, 2001 & 2002; Abdullah *et al.*, 2010), who found similar variations in case of body weight of different strains under experimental conditions.

These results contradict with the results of Zullitch *et al.* (1989). They stated that the live weight gain of Hubbard, Arbor, ISA Vedette and Hybro strains at 42 days of age were 1620, 1561, 1522 and 1521g respectively. The results of present experiment also contradict with the result of Islam (2005). He stated that the live weight gained of Vencobb 100, Kasila, Arbor Acres plus and Ross were 2127.50, 1726.25, 1915.00 and 2025.00 g respectively at 6 weeks of age.

The differences of the live weight and weight gain of the broiler strains may be explained by different factors, for example, genotype, feed, sex, strains, environmental conditions, climatic effects and so on. Gonzales *et al.* (1998) found strain effects among several strains of birds in live weight. Korver *et al.* (2004) reported that genotype may affect the body weight of different broiler strains. The body weight of Lohmann (T_1) was significant as compare to fast feather (T_2) and the body weight of Hubbard Classic and Cobb 500 were not significant as compare to Lohmann through out the experimental period, in hot-humid climates Lohmann strain is the best than other strains.

Table 4.1 Effect of same diet of broilers in different strains in different weeks and shows body weight gain (gram)

Age	T_1 (Lohmann)	T_2 (First feather)	T_3 (Hubbard classic)	T_4 (Cobb 500)	LSD	Level of significance
1st week	$217.20^{a}\pm8.05$	$196.00^{b}\pm8.24$	$181.33^{c}\pm4.50$	$182.23^{c}\pm6.10$	7.50	**
2nd week	$413.97^{a}\pm9.36$	$381.00^{b}\pm25.20$	$345.73^{c}\pm11.72$	$348.27^{c}\pm15.61$	18.06	**
3rd week	$831.50^{a}\pm44.43$	$745.67^{b}\pm12.32$	$751.93^{b}\pm5.46$	$758.47^{b}\pm24.21$	28.46	**
4th week	$1385.17^{a}\pm79.18$	$1259.27^{b}\pm29.10$	$1288.33^{ab}\pm37.53$	$1242.00^{b}\pm86.63$	68.81	**
5th week	$1948.83^{a}\pm51.76$	$1836.25^{b}\pm51.74$	$1876.08^{ab}\pm46.69$	$1851.65^{ab}\pm58.60$	56.93	**

Mean values having uncommon superscripts differ significantly. SD=Standard Deviation of mean, * = Significant at 5% level of probability, ** = Significant at 1% level of probability, NS = Not significant. LSD = Least Significant Difference

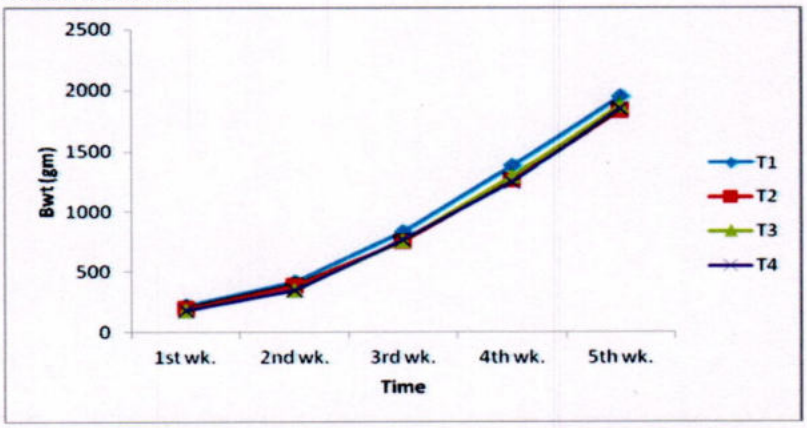


Fig. 1 Graph showing weekly body weight (g/broiler)

4.1.2 Feed intake

The cumulative feed intake at different weeks of age is shown in Table 4.2. Feed consumption among the strains was non-significant ($P>0.05$) at first week, second week and third weeks respectively. During fourth and fifth week the variation in feed consumption among the strains differed significantly ($P<0.05$). The overall (1-5 week) feed consumption was highest in First feather (3123.33g) followed by Lohmann (3100g), Cobb 500 (3080g) and Hubbard classic (3056.67g) respectively. The results are partially supported by Sarker *et al.* (1999) and Horniakova (1985), who found significant difference in feed consumption among the three different types of broilers from first week to sixth weeks of age.

The ingestion of the optimal level of dietary nutrients whether for birds involved in egg or meat production is very much dependent on the level of feed intake. The complexities of the factors which determine nutrient intakes and causative reasons and hypotheses for under or over consumption have been reviewed extensively by many former researchers (Forbes, 1995; Van der Heide *et al.,* 1999; Forbes, 2006). Smith *et al.* (1998) reported that strain and sex can affect feed intake and feed conversion ratio. Goliomytis *et al.* (2003) reported that feed intake was comparable between Cobb-500 and shaver Starbro strains through 154 days of age. They reported that feed intake of broilers increased until 84 days of age and then declined until 112 days of age. Our findings are in agreement with their results, as our experiment was ended at 35 days and there was also a continuous increase in feed intake.

This results contradict with the report of Baghel and Pradhan (1989) and Islam (2000). They reported that feed intake and body weight was lower under hot humid and dry seasons than the cold climatic condition. Because in my study all the strains got good results in hot humid climate. Among them Lohmann strain was the best.

Table 4.2 Effect of same diet of broilers in different strains in different weeks and shows feed intake (gram)

Age	T_1 (Lohmann)	T_2 (First feather)	T_3 (Hubbard classic)	T_4 (Cobb 500)	LSD	Level of significance
1st week	228.33±10.41	218.33±10.41	211.33±9.87	203.67±12.66	11.84	NS
2nd week	470.00±72.11	430.00±10.00	453.33±41.63	446.67±35.12	49.42	NS
3rd week	1110.00±65.57	1156.67±40.41	1166.67±35.12	1090.00±17.32	46.97	NS
4th week	2076.67^{a}±106.93	1993.33^{ab}±11.55	1916.67^{b}±28.87	1950.00^{b}±60.00	68.75	**
5th week	3100.00^{a}±111.36	3123.33^{a}±8.05	3056.67^{b}±60.28	3080.00^{ab}±10.00	44.06	**

Mean values having uncommon superscripts differ significantly. SD=Standard Deviation of mean, * = Significant at 5% level of probability, ** = Significant at 1% level of probability, NS = Not significant. LSD= Least Significant Difference

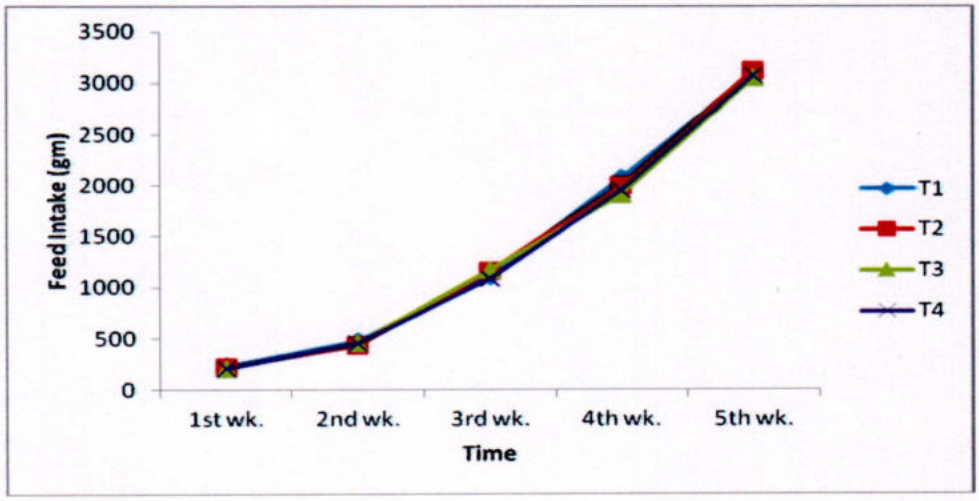


Fig. 2 Graph showing weekly Feed intake (g/broiler)

4.1.3 Feed conversion

The feed conversion in same dietary treatments were much close with each other in first week and fourth week. But in second week, third week and fifth week not so similer. The feed conversion ratios of different stages of growth are shown in Table 4.3. It appears that the FCR was the best all the ages in T_1 (Lohmann) followed by T_3 (Hubbard classic), T_4 (Cobb 500) and T_4 (First feather) respectively, and the differences were significant ($P<0.05$). The feed conversion was followed by 1.59, 1.70, 1.62 and 1.66. In accordance with the general principle in case of Lohmann is that the heavier broiler strains consume more feed and consequently gained more weight.

The results contradict with the findings of Sarker *et al.* (1999), Rahmann (1990) and Lambio *et al.* (1987) who found no significant difference in feed conversion among the different broiler strains. The findings not consists with the report of Abdullah *et al.* (2010), who found that FCR of Cobb 500 is better than Hubbard classic. But in my study Hubbard classic showed better than Cobb 500.

The results are in agreement of Gonzales *et al.* (1998), also reported that the FCR value may be differed due to the interaction of genotype amongst the strains and found the highest FCR values in several strains including Hubbard classic strain of broilers. FCR values of this study indicated that improved feed efficiency showed by Lohmann (T_1) broiler strain, inferior trend of FCR values was followed by Hubbard classic (T_3), Cobb 500 (T_4) and First feather (T_2) strains subsequently at 35^{th} days of age. Feed conversion ratio (FCR) of the Cobb-500 broiler strain was found to be superior to other strains in this study. This performance might be partly due to the capacity of this strain (Cobb-500) to consume greater quantities of feed, resulting in higher intakes and hence greater live weight, weight gain and improved FCR than in other broiler strains. The improved FCR of Cobb-500 birds indicates that this strain is more efficient in converting feed to meat more rapidly than in other strains. Our findings are in agreement with the report of Abdullah *et al.* (2010) who found similar FCR value

in Hubbard classic strain of broiler during the rearing period from 7-42 days of age. Gonzales *et al.* (1998) also reported that FCR value may be differed due to the interaction of genotype amongst the strains, and found the highest FCR values in several strains including Hubbard classic strain of broilers. FCR values of this study indicated that improved feed efficiency showed by Cobb-500 broiler strains, then inferior trend of FCR values was followed by Hubbard classic and MPK strains subsequently at 35th days of age.

Table 4.3 Effect of same diet of broilers in different strains in different weeks and shows feed conversion (FCR)

Age	T_1 (Lohmann)	T_2 (First feather)	T_3 (Hubbard classic)	T_4 (Cobb 500)	LSD	Level of significance
1st week	$1.05^{c}\pm0.01$	$1.11^{b}\pm0.01$	$1.17^{a}\pm0.02$	$1.12^{b}\pm0.04$	0.03	*
2nd week	1.13±0.16	1.12±0.04	1.31±0.12	1.28±0.04	0.11	NS
3rd week	$1.34^{b}\pm0.11$	$1.55^{a}\pm0.04$	$1.55^{a}\pm0.06$	$1.43^{ab}\pm0.06$	0.08	**
4th week	$1.49^{b}\pm0.02$	$1.58^{a}\pm0.03$	$1.49^{b}\pm0.05$	$1.57^{ab}\pm0.07$	0.05	**
5th week	$1.59^{b}\pm0.02$	$1.70^{a}\pm0.03$	$1.62^{ab}\pm0.07$	$1.66^{ab}\pm0.05$	0.05	*

Mean values having uncommon superscripts differ significantly. SD=Standard Deviation of mean, * = Significant at 5% level of probability, ** = Significant at 1% level of probability, NS = Not significant. LSD=Least Significance Difference

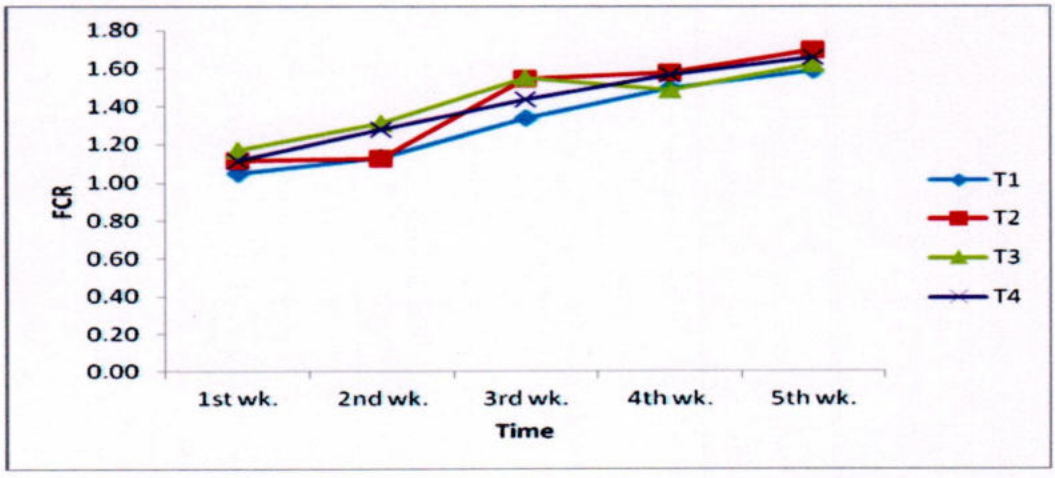


Fig.3 Graph showing weekly Feed conversation in different treatment group

4.1.4 Survivability

Survivability of broilers fed on same dietary treatments was very much acceptable during the study period. The survivability did not vary significantly (P >0.05) among different treatment groups during the whole experimental period. Survivability is an economic trait and mostly influenced by genetic and environmental factors.The current findings are in agreement with that of Sarker *et al.* (2001 & 2002) who demonstrated that strains had no adverse effect on livability or survivality of the birds.

4.1.5 Performance index

The index of the broiler strains werw presented in table 4.4. At the end of the feeding trail,the difference in performance index varies significantly (P<0.05) between different feed intake.The performance index is highest in T_1 group and is FCR is 1.59.

4.2 Meat yield parameters

The meat yield parameters such as breast weight, live weight weight, head weight, abdominal weight, and gizzard weight thigh weight are shown in Table 4.3.

The meat yield parameters such as live weight, breast weight, head weight, abdominal fat weight gizzard weight, thigh weight, dressing percentage of four different strains of broiler are shown in Table 4.3.

Abdominal fats weight was significantly (P<0.05) my findings. This results are agreed with Mendes *et al.* (1994), who found higher percentage of abdominal fat in females than males.

These results are also agreed with Islam (2005), who found females had more abdominal fat than males in all the strains.

Shank weight and head weight of four different strains of broiler showed significant differences ($P < 0.01$). The finding of the present study contradict with the findings of Islam (200) and Akter (1996), who found non-significant difference between the two different broiler strains (ISA Vedette and ISA-i757).

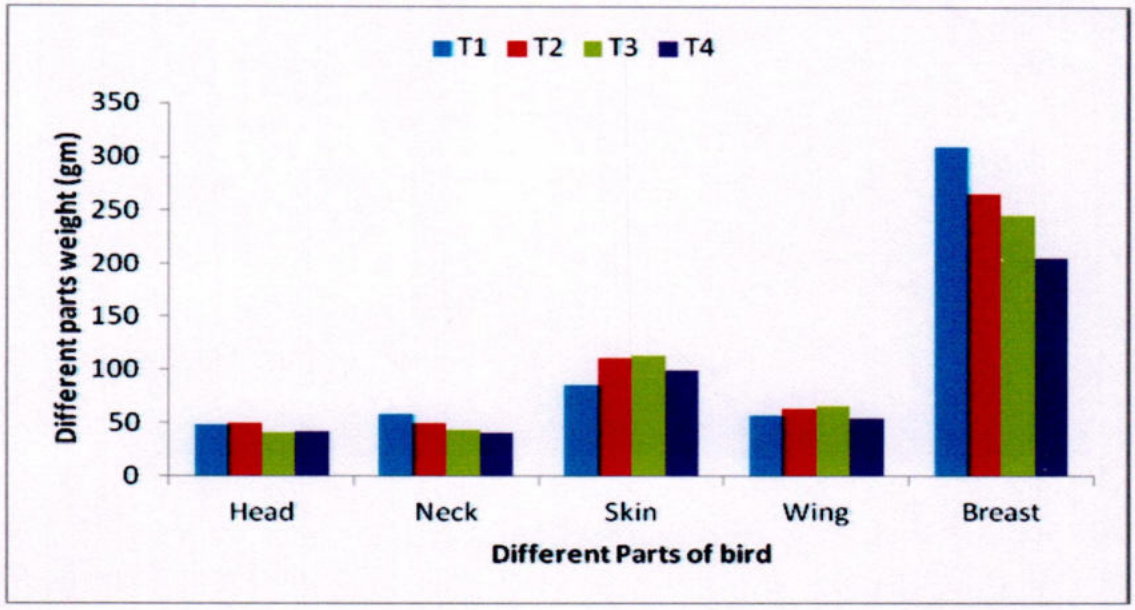
Dressing percentage of four different strains of broiler were non-significant ($P > 0.05$). The results are agreed with Rahman (1990) who did not find any significant variation of dressing percentage among the three different broiler hybrids. This result is also agreed with Islam (2005). He did not find significant difference between four different broiler strains.

But the results of my study contradict with Mendes *et al.* (1994) Avila *et al.* (1993), Pandey *et al.* (1985) and Orr *et al.* (1985), who found significant differences among the different broiler strains for carcass yields.

Table 4.4 Different body parts weight of different treatment groups (gram)

Body parts	Treatments				LSD	Level of sig.
	T_1	T_2	T_3	T_4		
Live Weight	1896.5±51.76	1797.5±51.74	1849±46.69	1884.25±58.60	2.18	NS
Dress Weight	1533.33±46.23	1445±66.84	1490.2±30.18	1495.44±30.55	0.88	NS
Carcass Weight	1167±2402	11078.3±46.23	1122.2±20.44	1120.67±42.55	2.45	NS
Head	48.00^{a}±2.65	49.33^{a}±1.15	41.00^{b}±1.00	41.67_{b}±2.89	2.28	**
Neck	58.00^{a}±6.24	49.67^{ab}±5.51	43.00^{b}±4.58	40.67^{b}±1.15	5.20	**
Skin	85.33±19.40	110.67±25.42	113.33±23.18	100.00±17.44	23.47	NS
Wing	56.67±1.53	62.67±4.04	66.00±7.81	54.67±11.15	7.76	NS
Breast	310.33^{a}±66.86	265.00^{ab}±54.03	245.67^{ab}±22.68	206.00^{b}±21.93	49.77	**
Shank	71.67^{a}±2.52	72.33^{a}±3.21	50.00^{b}±1.00	58.00_{b}±10.44	6.12	**
Shank length	5.17±0.29	5.17±0.29	5.33±0.29	5.17±0.29	0.31	NS
Thigh	153.00^{a}±13.89	159.33^{a}±4.16	100.00^{b}±2.00	93.67^{b}±7.57	8.96	**
Drumstick	162.00^{a}±6.08	167.33^{a}±1.53	125.67^{b}±18.50	104.00^{b}±21.00	15.59	*
Gizzard	58.33±8.96	57.67±5.51	53.67±2.31	49.33±5.51	6.57	NS
Liver	51.00^{a}±6.24	50.33^{a}±3.51	45.67^{ab}±4.16	39.00^{b}±3.00	4.79	**
Heart	9.00±1.00	8.33±0.58	8.67±0.58	8.00±1.00	0.89	NS
Fat	53.67^{a}±5.51	30.33b±4.16	35.67^{b}±5.51	38.33_{b}±0.58	4.81	*
Dressing percentage	76.1	74.6	75.3	74.9	0.87	NS

Mean values having uncommon superscripts differ significantly. SD=Standard Deviation of mean, * = Significant at 5% level of probability, ** = Significant at 1% level of probability, NS = Not significant. LSD= Least Significant Difference



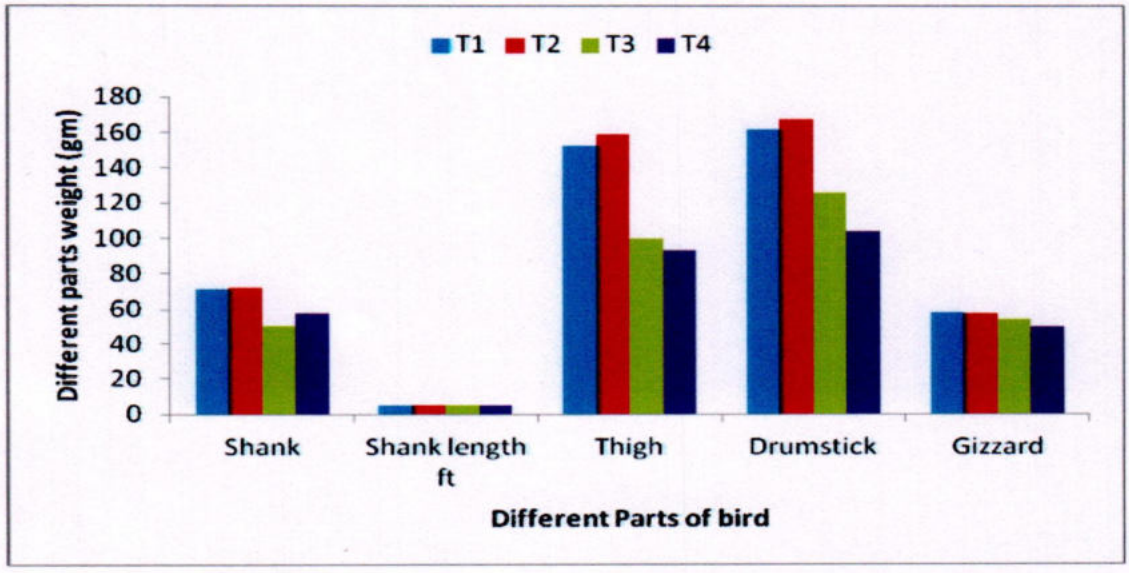


Fig. 4 Bar graph showing weight of body parts (g/broiler)

CHAPTER V

SUMMARY AND CONCLUSION

CHAPTER V

SUMMARY AND CONCLUSION

An experiment was conducted with 120 day old broiler chicks of four different commercial strains of Hajee Mohammad Danesh Science and Technology University poultry shed, Dinajpur to compare the growth, feed consumption, feed conversion, livability and dressing percentage. The experiment continued 1-35 days of age, on 28th August to 5th October, 2013. The chicks of four different strains were divided into four different treatments having 3 replications for each treatment with 10 chicks each according to treatments and replications. Birds were fed standard commercial broiler rations and reared under identical care and management period. At the end of experiment total 8 birds (each treatment has two) were slaughtered at 35 days of age to determine their dressing yield.

It was observed that the body weight in Lohmann strain was highest (1948.83g) followed by Hubbard Classic (1876.08g), Cobb 500 (1851.65g) and First Feather (1836.25g.) respectively at 5th weeks of age and different were significant ($P<0.01$). Feed consumption during the experimental period was highest in First feather (3123.33g) followed by Lohmann (3100g), Cobb 500 (3080g) and Hubbard Classic (3056.67g) respectively and the different were non-significant ($P>0.05$). Feed conversion ratio (1-5th weeks) was the best (1.59) in Lohmann followed by Hubbard Classic (1.62), Cobb 500 (1.66) and First Feather (1.70) respectively. The diference were significant ($P<0.01$). The highest performance index at 5th week value was observed in Lohmann followed by another three strains.Liabilities during 5th week of experimental period in all broiler strains were satisfactory and the differences werenon-significant ($P>0.05$). Dressing percentage was found superior in Lohmann. However, the differences among the strains were non-significant.

It may be concluded from the study that Lohmann strain was very good as compare to the fast feather and results of Hubbard classic and Cobb 500 showed more or less similar to Lohmann. At last Lohmann strain was comparatively good from other strains but further investigation are needed to confirm the results of the study.

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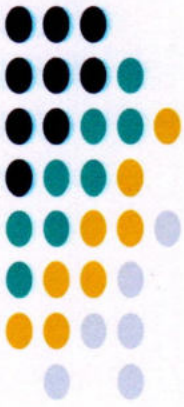

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