A COMPARATIVE STUDY ON THE PERFORMANCE OF COBB 500 AND HUBBARD CLASSIC BROILER STRAINS UNDER FARM CONDITION

A THESIS

BY

MD. RAYHANUL ISLAM
Semester: March- August, 2010
Examination Roll No: 37
Registration No: 1005037
Session: 2009-2010

MASTER OF SCIENCE (M.S.)
IN
POULTRY SCIENCE

DEPARTMENT OF DAIRY AND POULTRY SCIENCE
HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY DINAJPUR- 5200

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Submitted to the Department of Dairy and Poultry Science
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DEPARTMENT OF DAIRY AND POULTRY SCIENCE
HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY DINAJPUR- 5200

August 2012

Dedicated To
My
Beloved Parents

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The author ***August 2012***

Abstract

The performance and profitability of two commercial broiler strains reared under farming system were investigated in this study. Day-old broiler chicks (n=60) of two different commercial strains (Hubbard classic and Cobb 500) were assigned into two treatment groups. The birds were reared from day one in 35 days of age with similar housing, feeding and managemental condition. Regarding to all parameters collected, live weight and body weight gain were significantly ($p<0.01$) higher in Cobb 500 than that of Hubbard Classic. Feed intake and FCR was higher ($p<0.01$) in Cobb 500 than Hubbard classic group, livability also higher in Hubbard classic strain than that of Cobb 500 broiler strain. Higher net profit and lower production cost observed in Cobb 500 group than that of Hubbard classic strain, although the differences between the treatment groups were not statistically significant ($P>0.05$). In conclusion, Cobb 500 broiler strain is appeared to be the most economic to rear between the two broiler strains investigated here in response to their performance records.

Keywords: Broiler Performances, Broiler Strains, Cost Benefit Ratio.

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LIST OF ABBREVIATION

ANOVA =Analysis of Variance

BCRDV=Baby Chick Ranikhat Disease Virus

^{0}C = Celsius

Ca = Calcium

CF = Crude Fiber

CP = Crude Protein

CRD = Completely Randomized Design

EE = Ether Extract

e.g. = Example

et *al*., = Associated

etc= Etcetera

FCR =Feed Conversion Ratio

Fig. = Figure

gm = Gram

Ibs = Pounds

INSP = International Nutrient Standard for Poultry

Kg. = Kilogram

mg = Milligram

Min = Minute

ME = Metabolizable Energy

No. = Number

NS = Non Significance

WPSA = World Poultry Science Association

Chapter 1

INTRODUCTION

CHAPTER 1

INTRODUCTION

There is lack of sufficient animal protein in developing countries like Bangladesh due to population explosion. Poor people can hardly manage the standard daily requirement of protein. To fulfill this shortage commercial broiler can play an important role. Still broiler is the cheapest meat source in Bangladesh and it contributes 30% to the total animal protein for human consumption (Huque, 1996).

There is every reason to believe that the broiler industry will continue to grow at a rapid rate compared with other form of meat production industry. The sources of meat for human consumption are mainly cattle, goat, sheep, pork and chicken (Broiler), but the common source is chicken which can be produced commercially within the shortest possible time. Broiler rising will augment the supply of meat at least to a certain level. Broiler meat is an excellent source of animal protein. Diets containing animal protein are superior to vegetable proteins.

The price of poultry meat is beyond the buying capacity of the majority people of Bangladesh due to extreme shortage of supply. This growing demand can be met up quickly by rearing different strains of broiler on commercial basis because broilers can be grown more economically within the shortest period of time. The system of management practices of raising different strain of broiler are generally very poor in Bangladesh and feed cost is most important factor as it constitutes about 60-70% of the total cost of broiler meat production. Therefore, emphasis must be given to improve the standard of broiler management so efficiently that it can be grown very economically.

Many broiler strains are available in Bangladesh at present time. A few comparative studies had been under taken in the past to compare the performances of different strains in Bangladesh condition.

Comparative performances on Cobb 500 and Hubbard Classic were not studied yet. So the finding of this research will conveniently help to evaluate the standard of these two strains of broiler under same management condition. This type of study secured worthwhile and also to commercial use for broiler production. With this idea, an experiment was conducted using Cobb 500 and Hubbard Classic with the following objectives:

- To study the growth rate, feed efficiency, livability, and dressing percentage of two different broiler strains under same management condition.

- To study for the selection of a suitable strain from Cobb 500 and Hubbard Classic for commercial broiler production.

Chapter 2

REVIEW OF LITERATURE

CHAPTER 2

REVIEW OF LITERATURE

Various factors have been reported in literature to influence the growth performance and meat yield of broiler. The most important factors are genetics, age or weight, sex, nutrition, environment and disease (Perreault and Lesson, 1987). Many research works were conducted to compare the performance of different strains in different parts of the world; but, the comparative performance between Cobb 500 and Hubbard Classic has not yet been made in Bangladesh.

2.1 Effect of Genotype

Several genetics studies confirmed the effect of strain on broiler production with reference to weight gain, feed conversion and meat yield

2.1.1 Growth and feed efficiency

For commercial broiler production the growth rate is one of the most important traits. It varies among different strains and also among same strains under different or same environmental condition. Many researchers have investigated the variation of growth rate and feed efficiency of many broiler strains to find out the suitable strain for carcass yield.

Abdullah *et al.* (2010) stated that feed conversion ratio (FCR) of the Cobb 500 broiler strain was found to be superior to other strains. 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.

Forbes, (2006) reviewed that the ingestion of the optimal level of dietary nutrients, for birds whether 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.

Rezaei *et al.* (2004) cited that traditionally, the salient criteria for appraising the performance of the broiler strains is growth rate and feed conversion efficiency and carcass composition.

Korver *et al.* (2004) reported that genotype may affect the body weight of different broiler strains. Genetic variation of the strains amongst other factors might give rise to body weight variation between two individual birds. So it is assumed that more weight gain of Cobb- 500 broiler strain might arise from the genetic make-up during the embryonic stage, which can lead to having different growth potential, and it may be possible owing to the strain effect, and some other factors might be involved herewith.

Goliomytis *et al.* (2003) reported that feed intake was comparable between Cobb 500 and shaver Strabo strains through 154 days of age. Feed intake of broilers increased until 84 days of age and then declined until 112 days of age.

Sarker *et al.* (2002); reported that Cobb 500 broiler strain achieved heavier body weight and higher weight gain than the other strains. The improved body weight gain of this strain, possibly due to higher feed intake and several other factors might be involved herewith.

Islam, (2000) reported that broiler performance is reduced significantly when they are raised under hot-humid and dry seasons than the cold-climatic condition.

Smith *et al.* (1998) reported that feed consumption of Cobb 500 broiler strain corresponding to Hubbard classic. The higher feed consumption of the strains may be resulted from the heavier body weight and individual body requirements of the birds. In addition, the reason for higher feed intake may be explained by several other factors including breed or strain, feed quality, palatability of feed, age, sex, individual body requirement, stage of production, climatic effect and other environmental conditions.

Gonzales *et al.* (1998) also reported that 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. There were strain effects among several strains of birds in live weight.

Holoubek *et al.* (1995) studied with Ross-I broiler chicks; BVK (Protein Lucerne concentrate) was added to feed mixtures at a rate of 0.5% in experimental groups 1, 2 and 3 during the first age period (1-21 days of age) and in experimental groups, 4, 5 and 6 during die second age period (22-45 days of age). Experimental groups 7, 8 and 9 received BVK during the whole experimental period (1-45 days of life). Control groups 10, 11 and 12 received no portions of BVK. The best feed conversion efficiency was reached in the first three experimental groups of chickens (1.960 kg/kg live weight).

Schreurs *et al.* (1995) studied male and female chickens of a layer strain (White Leghorn), commercial broiler strain (Ross) and two experimental broiler lines (designated GL and FC) and concluded that feed conversion ratio and protein conversion ratio were highest for Leghorns. The FC birds showed the lowest feed conversion. Ross and GL birds showed intermediate values.

Renden *et al.* (1994) studied interactions of strain crosses [Peterson x Arbor Acres (PAA) or Ross x Ross (RR)] provided increased lysine with photo schedule on broiler performance and concluded that the PAA strain cross had better feed conversion, fewer Grade A carcasses and less yield of breast meat than RR.

Islam (1992) reported that Ross-1 and shaver tropicbro broilers both performances equally under Bangladesh condition, but the livability were better in shaver tropicbro than Ross-1.

Chahaner *et al.* (1992) studied male and female broiler chicks from five different broiler crosses; WI, LF, and HF = Israeli chicks selected for high body weight gain and low and high abdominal fat, respectively; FC and WN = Dutch chicks selected for favorable feed conversion and high body weight gain, respectively were raised at a high ambient temperatures (32 to 33°C).

Females of WI and WN crosses were as heavy as males at 6 wks and heavier at 8 wks. In LF, HF and FC crosses, both sexes had similar weights at 8 wk. The results suggested that females should be preferred over males for broiler production in hot facilities or locations. Broiler genotypes selected for feed efficiency at the expense of fast growth may allow for a more profitable broiler production in high temperature regions.

Holsheimer *et al.* (1992) studied the performance of Arbor Acres and Ross male broiler chicks and concluded that the weight gain of Arbor Acres chicks was significantly higher ($p<0.05$) than that of Ross chicks at 6 and 7 wk of age, but feed to gain ratios were also significantly higher ($p<0.05$) at 6, 7 and 8 wk. of age.

Islam *et al.* (1992) studied the effect of day-old chick's weight on the growth and dressing yield of broilers and reported that the lighter chicks of day-old had lower mortality and higher performance when grown in a hot humid environment.

Ali *et al.* (1991) conducted an experiment at the Bangladesh Agricultural University Poultry Farm to ascertain the performance of Starbro-15, normal Indigenous and deshi naked neck and concluded that daily feed consumption of starbro-15 birds was 170 g/bird. Indigenous and naked neck consumed on a average 130g of feed/day.

Hussain (1990) studied naked neck, Australorp and Starbro-15 broiler and reported that the naked neck showed remarkable superiority to broiler in survivability and meat yield in summer.

Rahman (1990) reported that Minibro broiler strain performed slightly better than Ross 208 and significantly over Tropicbro.

Zollitsch *et al.* (1989) stated that the live weight gain of Arbor Acres, Hubbard, Hybro and Vedette strains were 1561, 1620, 1521 and 1522g ($p>0.05$) respectively at 42 days of age.

Lopez and Antomarchi (1988) Compared three hybrid broiler strains; S47, ES36 and E24 in winter and summer and found the significant differences among the seasons. The performance of the ES36 was significantly better than those of other two strains.

Pavlovski, *et al.* (1987) compared the data of Jata, Prelux Bro, Hybro, Lohmann and Hubbard broilers. Hubbard broiler was found heaviest. The male broilers from Jatas and female from Prelux Bros were the lightest up to 47 days of rearing.

Leotta *et al.* (1987) reported that the body weight of Hubbard and Ross commercial strains averaged 1730 and 2019g respectively at 56 and 63 days ($p<0.01$) of age.

Lambio *et al.* (1987) studied the growth performance and carcass yield of 5 commercial broiler strains; Arbor Acre, Hubbard, Hybro, Lohmann and Pilch. Body weight, feed consumption, feed efficiency and mortality did not differ ($P>0.05$) among the strains at 7 weeks of age. Strain and sex showed no influence on eviscerated carcass, breast, thighs, wings, back and neck as per cent of live weight.

Peric *et al.* (1986) studied Hybro and Hubbard broiler strains and concluded that muscle tissue was larger in breasts and smaller in thighs of the Hybro broilers, as compared with the Hubbard ones. Softness of thigh muscles was higher in Hubbard than in Hybro broilers.

Branovic *et al.* (1985) reported that there were no significant differences ($P>0.05$) between Hybro and Lohmann concerning final weight, but Lohmann chicks were heavier at the end of fattening by 27.02g. Feed conversion was 2.24 kg in both line hybrids.

Najib *et al.* (1985) stated that broiler performance was affected by age at slaughter under Saudia conditions. The average body weight of Hybro fowls in an open house was increased up to 7 weeks and then declined at 8 and 9 weeks.

Keshri *et al.* (1985) analysed the data on body weight of four broiler strains (IC2, ICS, IR2 and IRS) slaughtered at 8 weeks and the average body weight for males were $973.2 + 27.25$, $1164.4 + 22.97$, 1060.4 ± 15.93 and

910.8 ± 16.22g respectively Vs. 842.2 ± 20.02, 904.6 £ 2 4 . 2 2 , 738.2 ± 36.80 and 769.8 ± 20.90g for females respectively.

Milosevic *et al.* (1984) investigated the productive characteristics of line hybrids Roos-1, Vedette-ISA, Prelux-Bro, Hubbard and Hybro. The greatest finished masses for the same period of time convincingly attained by Hubbard chicks. The Vedette-ISA and Prelux-Bro have somewhat less speed of growth, while Ross-1 and Hybro, according to speed of growth are in the middle between Hubbard, in the one side and Vedette-ISA and Prelux-Bro on the other.

Aguilar *et al.* (1983) reported that Chicken growth is well described as a sigmoid curve with an initial exponential development phase, and a final phase of inhibited growth that consists of gradual reduction in the growth rate following an asymptotic increase in the body weight.

Goverdhan *et al.* (1982) studied "Pilch" and "Samrat" broiler strains and reported significant differences between strains for some parameters. But, there were no difference in the eviscerated and edible yields between strains. The males weighed more than the females.

Bohren *et al.* (1982) studied broilers for fast and slow growth at two temperatures and reported that lighter chicks of day-old had higher performances and lower mortality when grown in a hot humid environment.

Diwyanto *et al.* (1980) reported that performances of six strains of broiler; CP 707, Hubbard, Hybro, Ross, Starbro and Teggel. During the period of 0-6 weeks, Ross and Starbro were the best strains; CP 707 was relatively good, while Hubbard, Hybro and Teggel were relatively the worse. At eight weeks old, Starbro showed the best performance, followed by CP 707, Ross and Hubbard while Hybro showed relatively lower performance and lowest in Teggel.

2.2 Environmental Effect

It has been observed date environment influenced the growth, feed intake, feed conversion efficiency and meat yield of broilers.

2.2.1 Effect of temperature and humidity on growth

Decuypere *et al.* (1994) observed 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 a longer growth period to reach 1.9-2.Okg weight.

Yousef and Singh (1989) reported that body weight gain of broilers 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.

Sundararsu *et al.* (1989) studied on effect of strain and season on broilers with Cobb and Samrat under four seasons. The strain and season had significant influence on gross income and the returns were lowest during hot-dry summer season.

Prasad et al. (1989) studied the performance of commercial broilers in different climate conditions. The weight gain and feed consumption to 10 week was lower for broilers raised in September - November and highest in April June.

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

Reece *et al.* (1972) reported that the heavier birds were more susceptible to heat prostration. They also reported that mortality due to heat prostration of broilers is a problem when summer temperature is high, especially in the humid areas. Various physiological changes occur in poultry when exposed to higher temperature which costs energy and therefore genetic efficiency for meat production declined. Poultry suffers more in a high temperature and high humidity than at high temperature alone.

Deaton and Reece (1970) reported that the growth is hampered due to inability of the broilers to dissipate heat when reared in a high temperature and high humid environment.

Felton and Hoffman (1969) reported that the percentage of carcass fat was lowest for the broilers finished at lowest (12.78°C) temperatures; 10.03, 10.59 and 12.70 respectively at 12.78°C, 18.33°C and 23.88°C. The assumption was that the broilers on the lower temperature used more energy to maintain body temperature in the cooler environment. As a result, with the increase of temperature the fat percentage increases.

Hustion *et al.* (1961) observed that body weights were lower at high environmental temperature than at low environmental temperature. Less feed was required per pound of gain at the high temperatures.

2.2.2 Effect of temperature and humidity on meat yield

A suitable environmental condition is very essential for better production of poultry meat. Environment, especially, high temperature and high and low humidity hinders the broilers meat yield.

Howlider and Rose (1989) reported that environmental temperature did not alter the total meat percentage in the carcass of Ross-1 broilers. But, with broilers weighing more than 2.0kg, those reared at 21°C had more breast meat than those reared at 31°C.

Bray (1983) observed that the 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 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.

2.3 Dressed yield

The dressing percentage is an important trait for broiler.

Hopic *et al.* (1993) reared different broiler strains up to 6-weeks of age which were Arbor Acres, Hybro, Indian river and Lohmann. Hybro chicks achieved the biggest average body mass. Most satisfactory values for conformation measures were obtained from Hybro chicks. The best slaughter yield of males was obtained from Hybro chicks and better slaughter yield of females were obtained from carcass of Arbor Acre chicks.

Holsheimer *et al.* (1992) studied the meat yield of Arbor Acres and Ross male broiler chicks and concluded that ready-to-cook and breast meat yields of Ross chicks were significantly higher ($p < 0.01$) in comparison with those of Arbor Acres chicks at 6, 7 and 8 wk of age and yields of edible organs, skin and fat and remaining carcass were found significantly lower ($p < 0.05$).

Dolmany *et al. (1991)* studied Hybro and Tetra broiler end-products. Ratio of slaughtering yield and valuable body parts and reported that significant difference could not be shown practically in the slaughtering yield results between the Hybro and Tetra at the end of fattening. The meat yield resulted at the age of 42 days was 63% in the Hybro and 62.4% in the Tetra. The absolute quantity of the valuable body parts in Hybro was not found significant difference but greater than in the Tetra end product.

Orr *et al.* (1985) studied the yield of carcass, parts, meat, skin and bone of eight strains of broiler. The differences among the strains were significant. Range for important traits were as follows: live weight 1935g (Peterson x Peterson) to 2133g (Shaver x Shaver); dressing percentage 69.9 (HubbaM x Hubbard) to 71.5 (Peterson x Peterson); percentage of white meat in the carcass 21.9 (Cobb X Cobb) to 24.5 (Ross x Hubbard); percentage of dark meat in the carcass 20.8 (Hubbard x Hubbard) to 21.8 (Peterson x Peterson).

Pandey *et al.* (1985) studied on carcass yields, quality and meat composition of broiler chicken as influenced by stain, sex and age. The three Cornish strains were superior to the two Plymouth Rock strains in live and dressed carcass weight and meat yield slaughtered at 8 and 9 weeks of age.

Mahapatra *et al.* (1985) studied carcass yield and meat quality of 4 strains; IC-3, IC -2, IR-3 and IR-2. Among 4 strains, IC-2 had significantly higher live weight and eviscerated weight. Rocks (IR-3, IR-2) were superior to Cornishes (IC-3, IC-2) in per cent breast weight. Males were superior to females in live weight and eviscerated weight.

Sabrani *et al.* (1980) reported that the carcass weight of HNN was significanty different with the other strains at certain age. Based on live selling value, CP 707, HNN, Hubbard and Ross reached market age faster than the others. However, based on carcass weight value, CP 707. Ross and Starbro reached market age faster than the others.

Bovwkamp *et al.* (1972) studied two strain crosses; Hubbard *{µS)* x Arobor Acres (9) and Vantress (d) x Arbor Acre (9) hereafter referred to as "HA" and "VA" respectively and concluded that as the birds matured (as indicated by chronological age) differences between the parts yield of the sexes increased or lessen. This was shown with the thigh, where the sex difference in thigh yields was greater at 9 than 8 weeks of age.

Keshri *et al.* (1985) stated that there was significant correlation of live weight with dressed weight of 2 broiler strains (IR2 and IR3). The correlations for males and females in the IR2 Strain were 0.30 and 0.54 and in IR3 for males and females was 0.56.

2.4 Livability and Economical viability

Livability is an economic trait of broiler production. It is very important factor which is mostly influenced by genetic and environmental factor.

Sarker *et al.* (2002) demonstrated that strains had no adverse effect on livability of the birds. Despite this non-significant effect, numerically higher livability was observed in Cobb 500 strain group, followed by Hubbard and MPK, respectively.

Sundararasu *et al.* (1989) studied Cobb and Samrat under different seasons and concluded that the strain and season had significant ($P<0.01$) influence on gross income from commercial broiler production and the hot dry summer season highly disfavored broiler production from economic view point.

Branovic *et al.* (1985) studied comparative investigations-on Hybro and Lohmann and concluded that mortality rate of Hybro was 6.52% and of Lohmarm was 5.68%.

Hulan *et al.* (1980) conducted two experiments. In experiment 1, 1960 male day-old chicks of seven different commercial genotypes were housed separately in 14 pens and in experiment 2, 3000 male of day-old chicks of two commercial genotypes were randomly assigned to 20 pens. Differences ($p<0.05$) were observed among the genotypes tested (Experiment 1) in the incidence of mortality, live weight and feed conversion, but not for mean Monetary returns per bird housed.

Chapter 3

MATERIALS AND METHODS

CHAPTER 3

MATERIALS AND METHODS

The experiment was conducted under farm condition, Bodeuzzaman Poultry Farm Issorgonj, Mymensingh to study the performances of Cobb 500 and Hubbard Classic for a period of 35 days.

3.1 Collection of experimental birds

Thirty Cobb 500 and Thirty Hubbard Classic day-old broiler chicks were collected from Quality Hatchery Limited, Dhaka.

3.2 Layout of the experiment

Sixty day-old chicks of above mentioned strains were divided randomly into two treatment groups having 3 replications of 10 birds in each. The layout of the experiment is shown in Table 1.

Table 1: Layout of the experiment

Strain	Age of birds	No. of birds in each Replication			Total No. of birds
		R1	R2	R3	
Cobb 500	Day-old	10	10	10	30
Hubbard Classic	Day -old	10	10	10	30

3.3 Experimental ration

The ration was composed of locally available feed ingredients. The chemical composition of the feed ingredients used for the formulation of experimental diet is shown in Table 2 & Table 3.

Table 2: Chemical composition of the ingredients used for the formulation of experimental diet for Broiler Starter (0 to 21 days).

Ingredients	Fresh amount	ME(kcal/kg)	%CP	%CF	%EE	%Ca	%p	%Lysine	%Methionine	%Linolic acid	%Tryptophan
Wheat	0.5	1500	0.06	0.012	0.009	0.00025	0.00155	0.0015	0.0008	0.0045	0.0009
Rice polish	0.15	465	0.018	0.0075	0.018	0.00009	0.00195	0.0009	0.000375	0	
wheat bran	0.05	73	0.00775	0.005	0.002	0.000075	0.00006	0.000315	0.000115	0.00045	
Soya bean meal	0.1	233	0.046	0.005	0.0015	0.00025	0.00065	0.00289	0.00063	0.001	0.00072
Mastered oilcake	0.07	149.1	0.02275	0.00805	0.00595	0.000497	0.0007	0.001211	0.000441	0.00007	0.000476
Fishmeal	0.05	152	0.03275	0	0.005	0.002	0.00125	0.002525	0.00091	0.00005	0.0004
Blood meal	0.06	165	0.051	0	0.0006	0.00018	0.00015	0.004842	0.00057	0.00006	
Soya bean oil	0.01	88	0	0	0	0	0	0	0	0	
Limestone	0.005	0	0	0	0	0.0019	0	0	0	0	
Common salt	0.005										
Total	1 kg	2825.1	0.23825	0.03755	0.04205	0.005242	0.00631	0.014183	0.003841	0.00613	0.002496

Source: "International Nutrient Standard for Poultry (INSP-1988, WPSA)

Table 3: Chemical composition of the ingredients used for the formulation of experimental diet for Broiler Finisher (21 upto sale).

Ingredients	Fresh amount	ME(kcal/kg)	%CP	%CF	%EE	%Ca	%p	%Lysine	%Methionine	%Linolic acid	%Tryptophan
Wheat	0.5	1500	0.06	0.012	0.009	0.00025	0.00155	0.0015	0.0008	0.0045	0.0009
Rice polish	0.15	465	0.018	0.0075	0.018	0.00009	0.00195	0.0009	0.000375	0	
wheat bran	0.05	73	0.00775	0.005	0.002	0.000075	0.00006	0.000315	0.000115	0.00045	
Soya bean meal	0.1	233	0.046	0.005	0.0015	0.00025	0.00065	0.00289	0.00063	0.001	0.00072
Mastered oil cake	0.02	42.6	0.0065	0.0023	0.0017	0.000142	0.0002	0.000346	0.000126	0.00002	0.000136
Fishmeal	0.03	91.2	0.01965	0	0.003	0.0012	0.00075	0.001515	0.000546	0.00003	0.00024
Soya bean oil	0.05	440	0	0	0	0	0	0	0	0	
Molasses	0.08	182.4	0.0032	0	0	0.00032	0.000064	0	0	0	
Limestone	0.015	0	0	0	0	0.0057	0	0	0	0	
Common salt	0.005										
Total	1 kg	3027.2	0.1611	0.0318	0.0352	0.008027	0.005224	0.007466	0.002592	0.006	0.001996

Source: "International Nutrient Standard for Poultry (INSP-1988, WPSA)

Embavit B:

Embavit B 250 g/100 kg ration. The nutrient requirements were fulfilled according to the ISI (Indian Standard Institution, 1989). The formulated diet was fortified with the proper vitamin-mineral premix (Embavit- B) at an inclusion rate of 2.5 g per kg (Table 4).

Table 4: Composition of Embavit B (Per 2.5 g)

Nutrient composition	Amount
Vitamin A	12500 IU
Vitamin D3	2500 IU
Vitamin E	20 IU
Vitamin K3	0.004 g
Vitamin B_1	0.0025 g
Vitamin B_2	0.005 g
Vitamin B_6	0.004 g
Nicotinic acid	0.04 g
Pantothenic acid	0.0125 g
Vitamin B_{12}	0.012 g
Folic acid	0.0008 g
Biotin	0.0001 g
Cobalt	0.0004 g
Copper	0.01 g
Iron	0.06 g
Iodine	0.0004 g
Manganese	0.08 g
Zinc	0.05 g
Selenium	0.00015 g

Source: Rhone Poulenc Bangladesh Ltd.

3.4 Methods of feeding

The chicks from both treatment groups were supplied with feed and water adlibitum throughout the experimental period (35 days). The feeds were supplied three times daily.

3.5 Management

Chicks were randomly distributed in previously cleaned and disinfected equal sized 6 separate pens of a house where fresh and dried rice husk were used as litter of about 6cm depth. The birds were provided with a floor space of 900cm^2/bird. Necessary care was taken uniformly to maintain comfortable condition for the experimental birds. The birds were kept separately in each pen under similar management condition. Chicks were brooded with electric bulb and providing with a temperature of 95°F at first week of age, decreasing gradually at the rate of 5°F per week for the adjustment to normal temperament of the house. A 100 watt electric bulb (Fluorescent) was provided up to end of the study period for the convenient of the feeding and drinking.

Sufficient feeders and waterer were provided to ensure adequate feed and water intake of all birds. Proper hygienic and sanitary measures were taken during the experimental period. All the birds were vaccinated against Ranikhet Disease with Baby Chick Ranikhet Disease Vaccine (BCRDV) at the age of 5 day and boaster dose at the 20th day. Gumboro Vaccine was administrated at the age of 14th day and boaster dose was given at the age of 28th day against gumboro disease.

3.6 Data Collection.

3.6.1 Body weight

The chicks of each replication were weighed at the beginning of the experiment and thereafter at the intervals of one week until the termination of the experiment at 35 days of age. The birds were weighed prior to morning feeding. The weekly average live weight was recorded replication wise for each treatment group (Cobb 500 & Hubbard Classic).

3.6.2 Feed intake

The amount of feed consumed by the experimental birds of different replications of each treatment group (Cobb 500 & Hubbard Classic) was weighed at the end of each week and feed refusals were also recorded weekly.

3.6.3 Livability

The livability of broiler chicks was recorded daily. The differences of livability were also calculated for each treatment group (Cobb 500 & Hubbard Classic).

3.7 Feed cost

Feed cost per kg live broiler was, calculated on the basis of market price of feed ingredients during the experimental period (35 days).

3.8 Methods of processing broilers

At the end of the experiment one male and one female broiler from each replicate were randomly selected and then weighed for processing ready-to-cook meat. To facilitate slaughtering all birds from each treatment groups were kept without feed and water for 12 hours prior to killing. After complete bleeding, the killed birds were individually weighed. The killed birds were immersed in water heated to 51 to 55° C for 120 seconds in order to enhance the defeathering. Final processing was performed by removal of head, shank, viscera, oil-gland, kidney and lungs of the carcasses. Heart and liver were removed from the remaining viscera by cutting them loose. As soon as they were removed, the gall bladder was cut off from the liver and pericardial sac and arteries were cut from the heart. After removal of the gizzard from the intestine it was clean with the help of knife, washed and the lining was removed by hand.

During the processing following parameters were recorded:

i) live weight,

ii) Blood loss,

iii) Feather loss,

iv) Shank weight

v) Giblet weight; and

vi) Dressing percentages,

Statistical Analysis

All recorded and calculated data were analyzed using SPSS program & Student's-t-test. Analysis of variance (ANOVA) was performed and Least Significant Differences were calculated for significant differences to compare parameters between the strains.

Chapter 4

RESULTS AND DISCUSSION

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Growth Performance

The average weekly body weight, feed consumption, feed efficiency, livability and feed cost per kg live broiler of Cobb 500 and Hubbard Classic are shown in Table 5, 6, 7, 8 and 9 respectively.

4.1.1 Body weight

The initial live weight of Cobb 500 broiler strain was higher ($p>0.05$) than that of Hubbard Classic. There were no significant differences ($p>0.05$) in body weight at day-old and 1st week of age between two different strains (Table-5). Cobb 500 birds recorded heavier body weight compared to Hubbard classic birds. Final weight differed significantly ($P<0.01$) between the strains. Birds of Cobb 500 strain were the heavier (1775.31 g) at 35 days of age compared to Hubbard Classic (1663.21g).

The results of the present experiment agree with the results of Rahman (1990). He stated that the live weight was persistently highest in Minibro, intermediate in Ross and lowest in Tropicbro at different ages.

Traditionally, the salient criteria for appraising the performance of the broiler strains have been growth rate and feed conversion efficiency, and less frequently, carcass composition (Cahaner *et al.* 1987; Cabel & Waldroup, 1991; Smith & Pesti, 1998; Rezaei *et al.* 2004), but some strains may show higher mortalities and a great variation in final body weight than others due to several factors (strains, sex, feed, disease incidences, environmental condition and so on). Chicken growth is well described as a sigmoid curve with an initial exponential development phase, and a final phase of inhibited growth that consists of gradual reduction in the growth rate following an asymptotic increase in the body weight (Aguilar *et al.* 1983). However, significant differences were observed in the live weight and average body weight gain among the two broiler strains rearing under the farming conditions of Bangladesh in this present study. Cobb 500 broiler strain achieved heavier body weight and higher weight gain than the other strain. The improved body weight gain of this strain, possibly due to higher feed intake and several other factors might be involved herewith. Our results are in agreement 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 rearing different strains under experimental conditions. 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. Genetic variation of the strains amongst other factors might give rise to body weight variation between two individual birds. So it is assumed that more weight gain of Cobb- 500 broiler strain might arise from the genetic make-up during the embryonic stage, which can lead to having different growth potential, and it may be possible owing to the strain effect, and some other factors might be involved herewith.

Table 5: Average body weight

Parameter	Age (wk)	Cobb 500	Hubbard Classic	Level of significance
Average body weight (gm/bird)	Int.wt	44.04±1.40	42.40±0.24	NS
	1^{st}	182.5±8.97	156.35±9.65	NS
	2^{nd}	444.2±40.13	411.26±11.50	**
	3^{rd}	822.15±15.85	799.39±9.01	**
	4^{th}	1252.31±40.36	1206.11±8.26	**
	5^{th}	1775.31±95.02	1663.21±20.82	**

NS, p>0.05; **, p<0.01

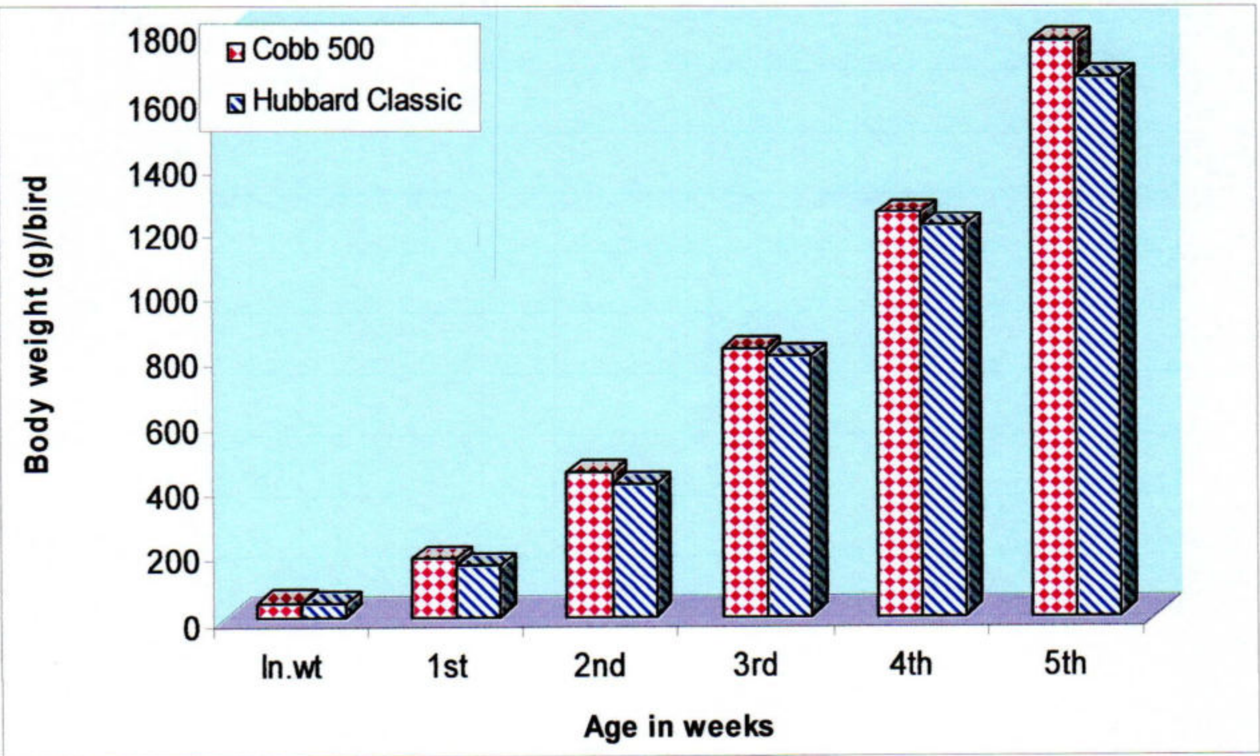

Figure 1: Average body weight

4.1.2 Feed consumption

Feed intake 3rd, 4th and 5th weeks of age was affected ($p<0.01$), ($p<0.05$) & ($p<0.01$) respectively by the strains, except for 1st and 2nd weeks of age (Table-6). Feed intake at 1st and 2nd weeks of age was not significantly different ($p>0.05$) between the groups (Cobb 500 & Hubbard classic) of birds. Average feed consumption of Cobb 500 was found higher than that of Hubbard Classic. Feed intakes of Hubbard classic and Cobb 500 broiler strains were 2642.60g and 2700.78g per bird, respectively, at 35th day 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). Birds have precise requirements for nutrients, both macro and micro, and energy-yielding components. Therefore, knowledge of their feed intake capacity is essential if dietary concentrations are to be appropriate. A bird's daily consumption of feed ultimately governs its health, development and potential for reproduction.

However, feed consumption of Cobb 500 broiler strain corresponding to Hubbard classic was found to be higher in this study. The higher feed consumption of the strains may be resulted from the heavier body weight and individual body requirements of the birds. In addition, the reason for higher feed intake may be explained by several other factors including breed or strain, feed quality, palatability of feed, age, sex, individual body requirement, stage of production, climatic effect and other environmental conditions. 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. However, in contrast, the poor performance and reduced feed intake of the broiler strain (Hubbard Classic) may be affected by the adverse environmental impact. This strain is supposed to be less heat tolerant than others, which might affect their feed consumption capacity and other performance as well. Baghel and Pradhan (1989) and Islam (2000) reported that broiler performance is reduced significantly when they are raised under hot-humid and dry seasons than the cold-climatic condition.

Table 6: Average feed consumption (gm/bird)

Parameter	Age (wk)	Cobb 500	Hubbard Classic	Level of significance
Average feed consumption (gm/bird)	1st	120.46±20.59	129.24±26.96	NS
	2nd	412.16±106.72	494.66±49.57	NS
	3rd	1042.67±54.98	1120.97±72.04	**
	4th	1764.07±141.02	1792.76±85.03	*
	5th	2700.78±243.70	2642.60±159.65	**

NS, p>0.05; *, p<0.05; **, p<0.01

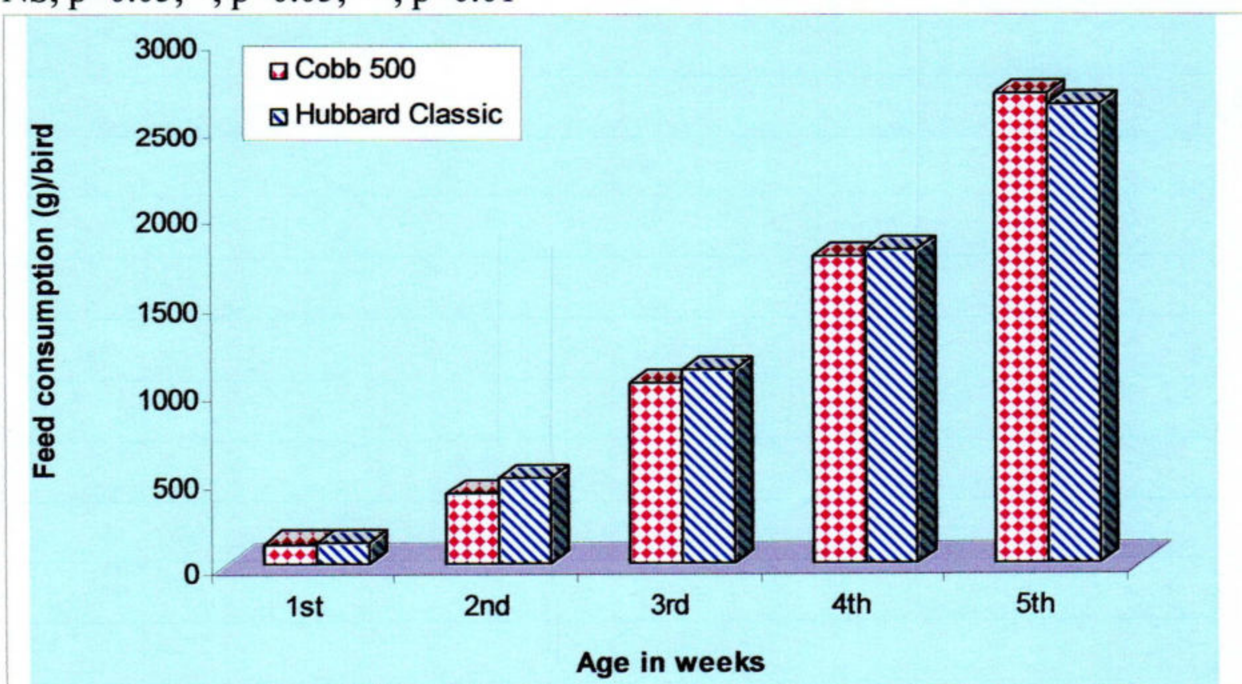

Figure 2: Average feed consumption (gm/bird)

4.1.3 Feed efficiency

Feed efficiency of 2nd, 3rd and 5th weeks of age was affected ($p<0.01$), ($p<0.05$) & ($p<0.01$) respectively by the strains, except for 1st and 4th weeks of age (Table-7). FCR, during the 1st and 4th weeks of age did not differ significantly ($p>0.05$), which showed no significant differences between the treatment group of birds. Significantly lowest ($p<0.01$) FCR value (1.56) was observed in Cobb 500 broiler strain. The lowest figure of FCR indicates that birds of this strain (Cobb 500) are supposed to be more efficient in converting feed to meat than Hubbard classic.

Feed conversion ratio (FCR) of the Cobb 500 broiler strain was found to be superior to another strain 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 another strain. 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, and then inferior trend of FCR values was followed by Hubbard classic strain subsequently at 35th days of age.

Table 7: Average Feed Conversion Ratio (F.C.R)

Parameter	Age (wk)	Cobb 500	Hubbard Classic	Level of significance
Feed Conversion Ratio(FCR)	1st	0.87±0.10	1.13±0.15	NS
	2nd	1.03±0.18	1.34±0.10	**
	3rd	1.34±0.06	1.48±0.09	*
	4th	1.46±0.11	1.54±0.08	NS
	5th	1.56±0.07	1.63±0.09	**

NS, $p>0.05$; *, $p<0.05$; **, $p<0.01$

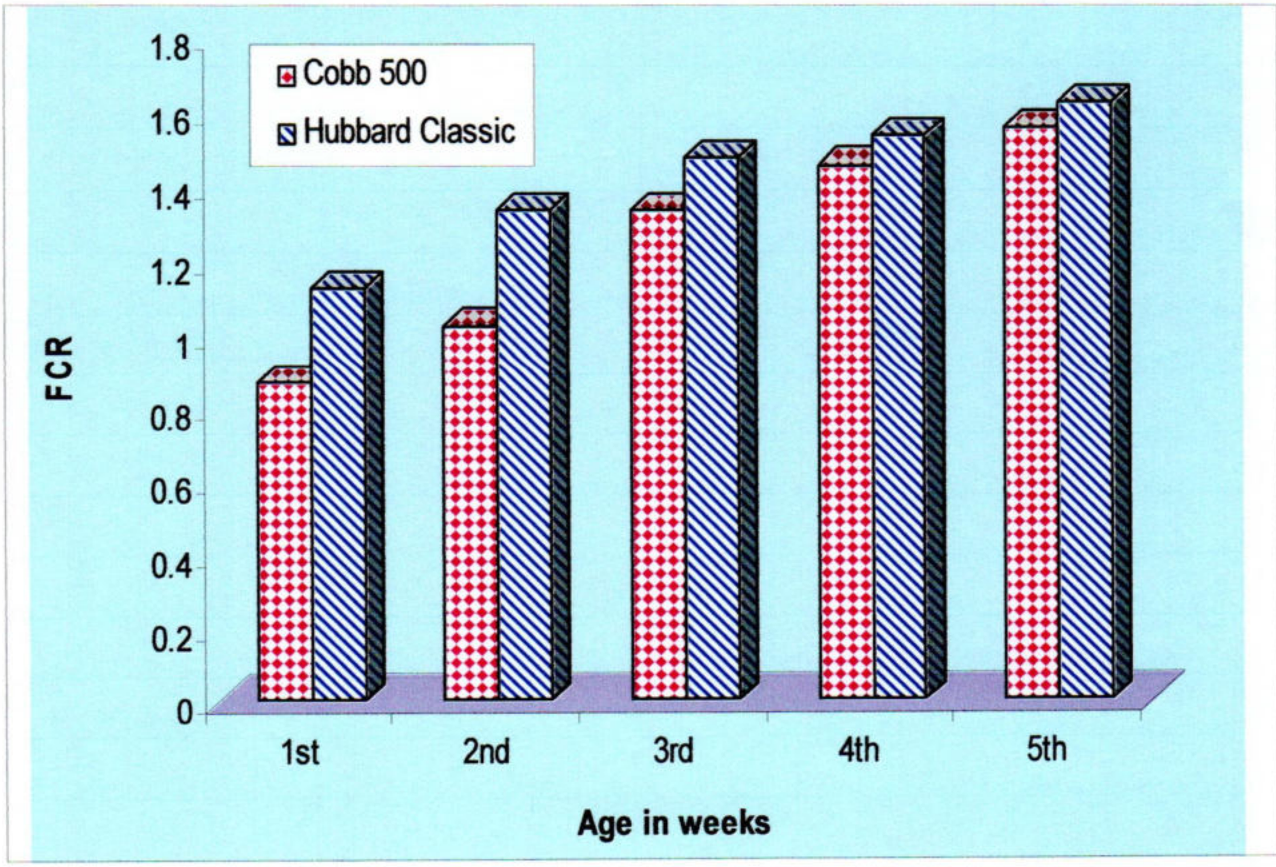

Figure 3: Average Feed efficiency

Table 8: Entire study period (35 days) FCR

Parameter	Cobb 500 (30 birds)	Hubbard Classic (30 birds)
Total Feed Consumed (gm)	60585	66753
Total Weight Gain (gm)	48468	47009
Total FCR	1.25	1.42

4.1.4 Livability

In the present study, the livability (%) of two broiler strains during the experimental period (35th day) were 96.66% and 93.33% in Hubbard Classic and Cobb 500 broiler strains respectively (Table-8). Livability of the two strains throughout the entire rearing period (up to 35 days) show significant ($p<0.01$) difference between the treatment groups.

Table 9: Livability at different weeks of age

Parameter	Age (wk)	Cobb 500	Hubbard Classic	Level of significance
Livability (%)	1st	100±2.11	100±2.13	NS
	2nd	96.67±2.10	96.67±2.11	NS
	3rd	93.33±2.15	96.67±2.12	**
	4th	93.33±2.13	96.67±2.10	**
	5th	93.33±2.12	96.67±2.10	**

NS, $p>0.05$; **, $p<0.01$

The livability (%) of the broiler strains was slightly affected by the treatment groups throughout the period (day 1-35). Birds of Hubbard classic strains grew poorly than the Cobb 500 birds. It indicates that strains affect the bird livability.

4.1.5 Feed cost

The data on cost of production of two broiler strains at 35 days of age are shown in Table 9. Higher ($p<0.01$) live weight was found in case of Cobb 500 group, while Hubbard Classic group of birds being the least. Numerically higher feed cost was found in Cobb 500 broiler strain than that of Hubbard classic broiler strain. Total cost of production (109.64 Tk/ kg live bird) was less for Cobb 500 group and net profit (20.36 Tk/kg live bird) was found higher in this strain than that of Hubbard Classic. Higher net profit and lower cost benefit ratio were observed in the Cobb 500 broiler strain than the other strain (Hubbard Classic) and found significant difference ($p<0.01$) between the strains in case of total cost of production & profit per kg live broiler. The reason behind this is possibly due to attaining heavier body weight and lower total production cost. In addition, FCR of this strain (Cobb 500) might influence higher net profit than in other strains (Hubbard Classic). Higher profit margin was obtained by the farmers by selling these birds in the market on the live weight basis, as this strain (Cobb 500) attained heavier body weight than another strain in this study.

Table 10: Cost of production and profit for per broiler per kg live broiler at 35 days of age

Parameter	Cobb 500	Hubbard Classic	Level of Significance
Average Live Weight (g/broiler)	1775.31±95.02	1663.21±20.82	**
Livability (Number)	28±3.21	29±2.85	**
Feed Cost (Tk/broiler)	40×2.7=108±5.11	40×2.6=104±4.91	NS
Total Cost/ Production	197.35±11.25	186.74±11.25	NS
Market Price Live Broiler (Tk/Kg)	130±0.00	130±0.00	NS
Average Market Price of Live weight (Tk/Broiler)	234±12.85	221±10.58	**
Profit (Tk/Broiler)	36.65±2.14	30.26±1.94	**
Total Cost of Production (Tk/kg Live Broiler)	109.64±3.65	112.2±5.41	**
Profit (Tk/Kg Live Broiler)	20.36±1.14	17.8±1.02	**

NS, $p>0.05$; **, $p<0.01$

Total cost of production includes feed cost, chick cost, litter cost, labor and medicine cost.

4.2. Meat yield characteristics

Meat yield parameters such as blood loss, feather loss, shank weight, head weight, giblet weight and dressing percentage of two broiler strains are shown in Table 10. Blood loss percentage of Cobb 500 was significantly higher than that of Hubbard Classic. It was not influenced by sex and by the interaction of sex and strain (Table 10). Shank weight of males were found significantly ($p<0.01$) higher than the females. But, strains and interactions of sex and strain did not affect on shank weight. Live weight, feather loss, digestive tract weight, abdominal fat and dressed carcass percentage were observed non significant ($p>0.05$) between the strains and these were not influenced by strains, sex and by the interaction of strain and sex (Table 10). The strains performed almost equally under same management condition, but Cobb 500 was slightly more adjusted than Hubbard Classic. However numerically, Cobb 500 broiler strain was found to attain highest body weight followed by Hubbard Classic.

Table 11: Meat yield characteristics of males and females of two different broiler strains

Parameter	Sex	Cobb 500	Hubbard classic	Level of significance
Live weight(g/broiler)	Male	1759.56	1651.66	NS
	Female	1623.72	1555.00	
	Mean	1691.64	1603.33	
Blood loss (%)	Male	3.77	2.68	NS
	Female	3.76	2.87	
	Mean	3.77	2.78	
Feather loss (%)	Male	2.68	3.79	NS
	Female	2.87	3.77	
	Mean	2.78	3.78	
Shank weight (%)	Male	4.39	4.43	**
	Female	4.05	3.94	
	Mean	4.22	4.18	
Giblet weight (%)	Male	5.60	5.04	**
	Female	4.61	4.58	
	Mean	5.11	4.81	
Digestive tract weight (%)	Male	13.57	14.30	NS
	Female	13.39	13.81	
	Mean	13.74	14.81	
Abdominal fat (%)	Male	0.32	0.37	NS
	Female	0.64	0.75	
	Mean	0.48	0.56	
Dressed carcass (%)	Male	70.37	68.12	NS
	Female	70.69	69.39	
	Mean	70.53	68.76	

NS, $p>0.05$; **, $p<0.01$

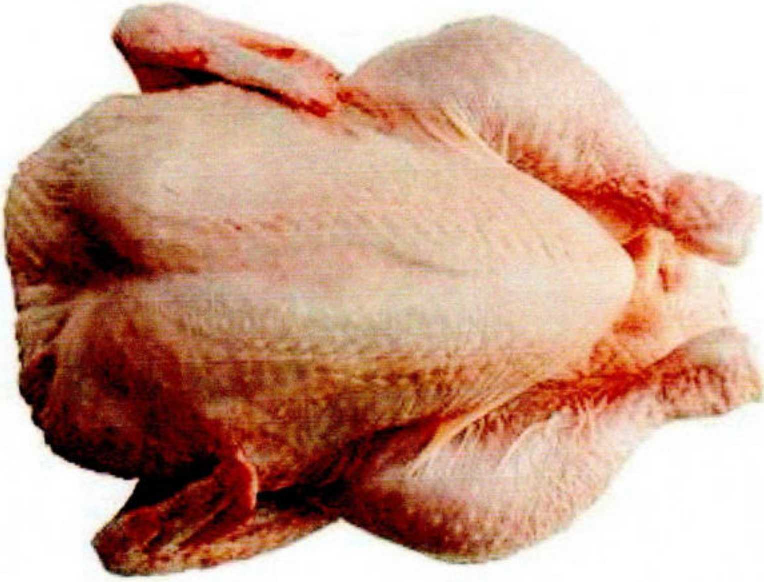

Figure 4: Dressed carcass of Cobb 500 broiler.

Figure 5: Dressed carcass of Hubbard Classic broiler.

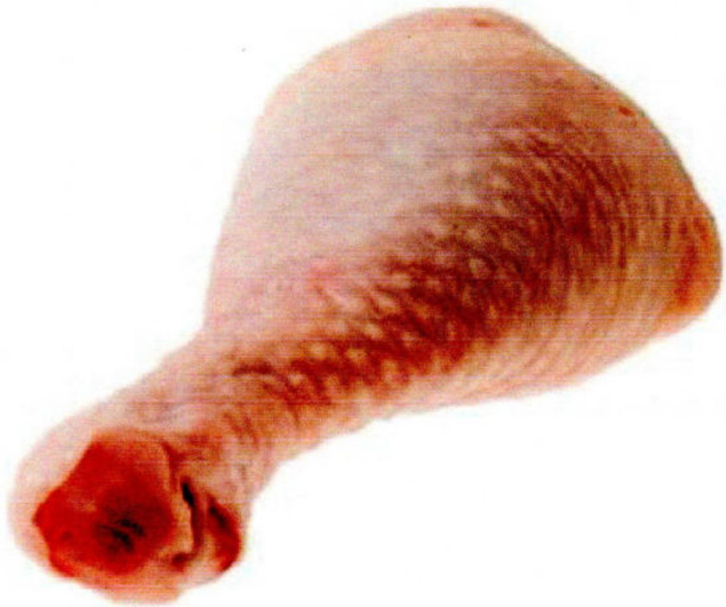

Figure 6: Whole Leg of Cobb 500 broiler.

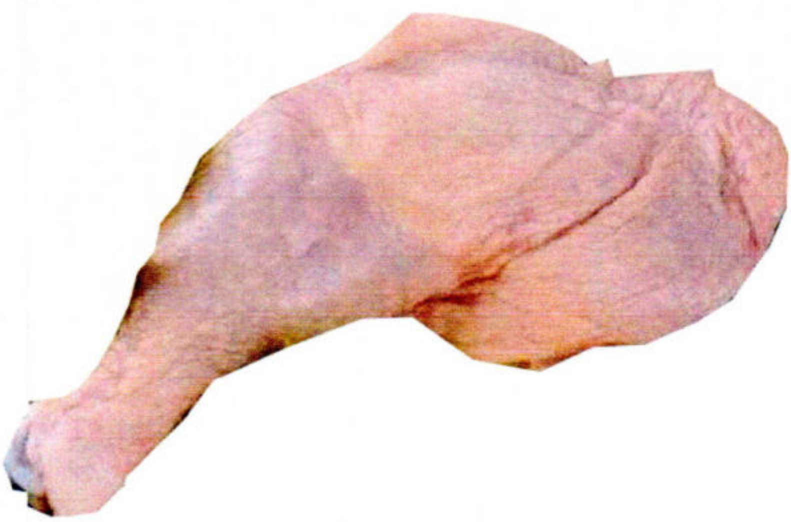

Figure 7: Whole Leg of Hubbard Classic broiler.

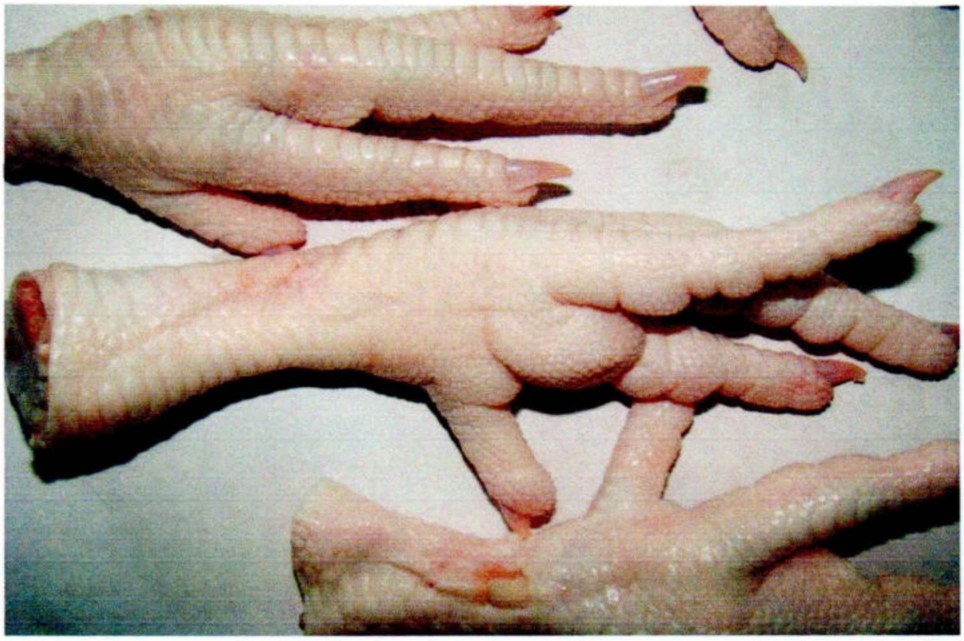

Figure 8: Shank of Cobb 500 broiler.

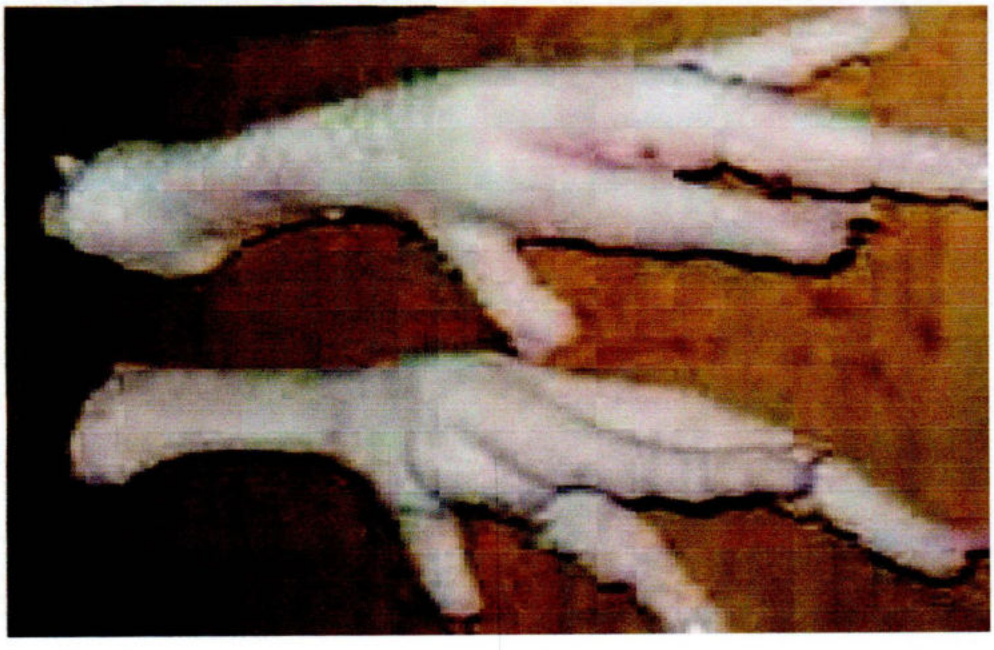

Figure 9: Shank of Hubbard Classic broiler.

Figure 10: Giblet of Cobb 500 broiler.

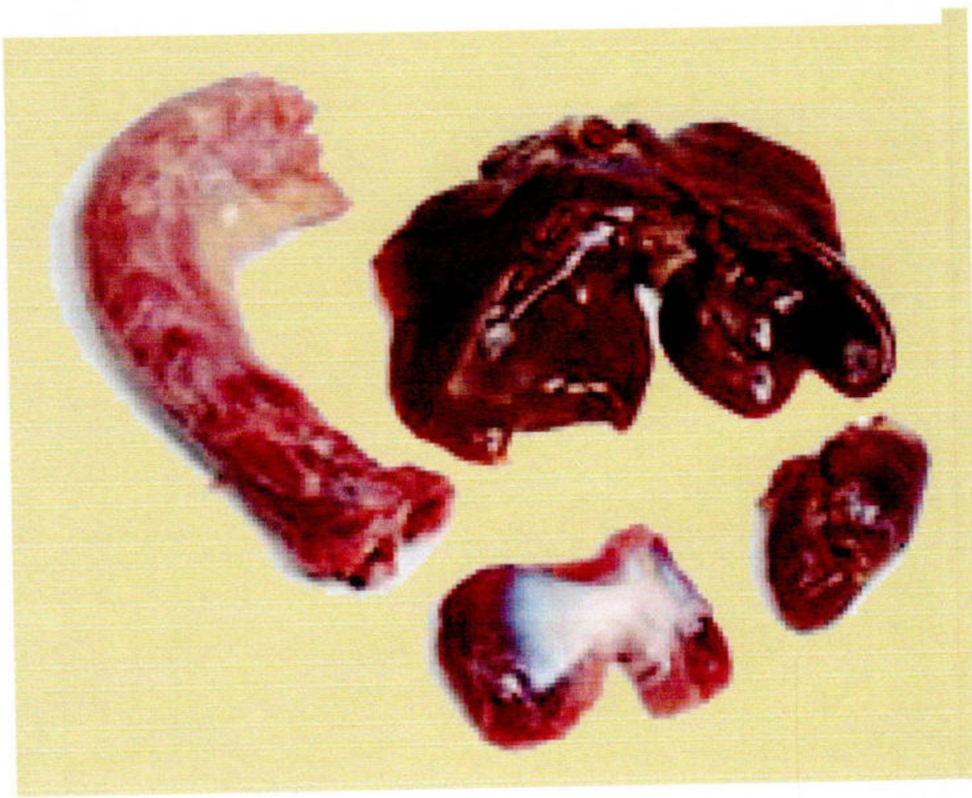

Figure 11: Giblet of Hubbard Classic broiler.

Table 12: Average meat yield parameters of two different strains at 35 Days of age

Parameter	Cobb 500	Hubbard classic	Level of significance
Live weight(g/broiler)	1691.64	1603.33	NS
Blood loss (%)	3.77	2.78	NS
Feather loss (%)	2.78	3.78	NS
Shank weight (%)	4.22	4.18	**
Giblet weight (%)	5.11	4.81	**
Digestive tract weight (%)	13.74	14.81	NS
Abdominal fat (%)	0.48	0.56	NS
Dressed carcass (%)	70.53	68.76	NS

NS, p>0.05; **, p<0.01

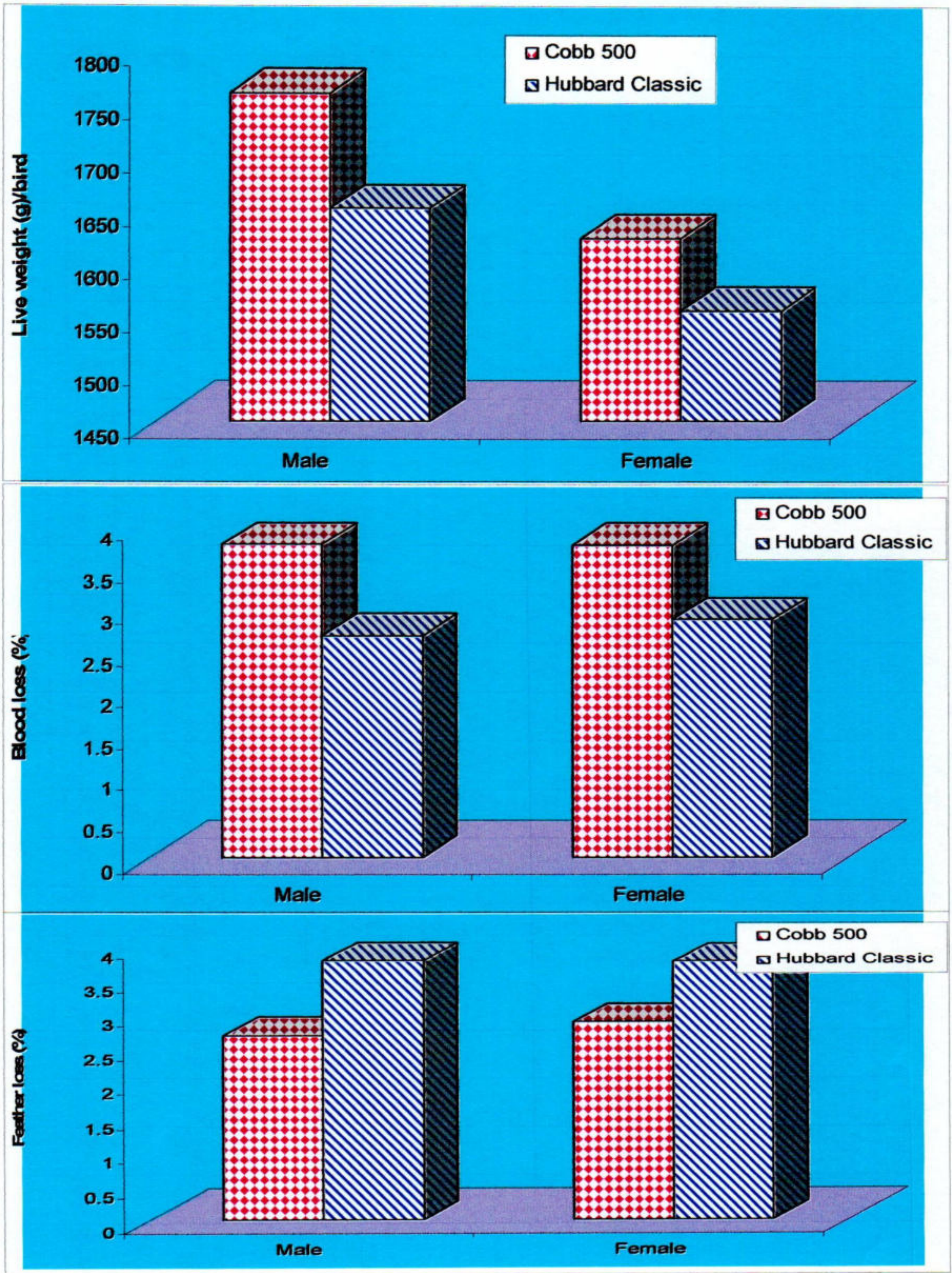

Fig.12: Meat yield parameters of two different strains at 35 Days of age

Chapter 5

CONCLUSION

CHAPTER 5

CONCLUSION

The experiment was carried out for a period of 35 days to study the performance of growth rate, feed efficiency, livability, feed cost and dressing percentage. In this experiment, total 60 chicks from Hubbard Classic and Cobb 500 strains were divided into six groups and put randomly into six separate pens according to treatment and replications. Birds were provided with same ration and reared under same management.

In this experiment, it has been observed that the body weight up to five weeks of age in Cobb 500 strains was found higher (1775.31g) than Hubbard Classic (1663.21). The mean body weight was significantly different from 2nd to 5th weeks of age, except 1st weeks of age. The average feed consumption per broiler was higher in Cobb 500 than Hubbard Classic. Significant differences were observed from 3rd to 5th weeks of age, except at 1st and 2nd weeks of ages. There was no significant difference of feed conversion ratio between the strains except 2nd, 3rd and 5th weeks of age. Livability recorded during experimental period was higher in Hubbard Classic than Cobb 500. Significant differences were observed on livability between the strains. Total cost of production of different broiler strains was calculated. Total cost of production was found higher in Hubbard Classic (112.2 tk. /kg live wt.) comparing with Cobb 500(109.64 tk. /kg live wt.). Average dressing percentage was found superior in Cobb 500 than Hubbard Classic. No significant differences were observed between males and females in this experiment.

Considering all the facts and findings of the experiment, it can be concluded that significant differences were observed in terms of body weight, feed consumption, feed efficiency, livability, feed cost and dressing percentage that could be explained by the differences of strain. The production characteristics of two strains were found equally satisfactory under same management in Bangladesh. But Cobb 5oo broiler strain was observed more suitable than Hubbard Classic broiler strain.

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APPENDICES

APPENDICES

Appendix 1: Feed cost and total cost of production and profit for per broiler and per Kg live broiler at 35 days of age.

Parameter	Cobb 500	Hubbard Classic
Average Live Weight (g/broiler)	1775.31	1663.21
Livability (Number)	28	29
Feed Cost (Tk/broiler)	40×2.7=108	40×2.6=104
Total Cost/ Production	197.35	186.74
Market Price Live Broiler (Tk/Kg)	130	130
Average Market Price of Live weight (Tk/Broiler)	234	221
Profit (Tk/Broiler)	36.65	30.26
Total Cost of Production (Tk/kg Live Broiler)	109.64	112.2
Profit (Tk/Kg Live Broiler)	20.36	17.8

Appendix 2: Initial and weekly average body weight (g/bird).

Strains	Replication	Weeks					
		Initial Weight(g)	1st	2nd	3rd	4th	5th
Cobb 500	1	45.60	192.07	398.21	839.27	1257.23	1695.10
	2	42.90	181.14	462.32	807.98	1209.71	1880.25
	3	43.62	174.29	472.07	819.20	1289.98	1750.57
	Mean	44.04	182.5	444.2	822.15	1252.31	1775.31
Hubbard classic	1	42.33	148.72	421.35	796.43	1207.39	1685.23
	2	42.67	167.20	398.67	809.51	1197.28	1643.85
	3	42.20	153.13	413.37	792.23	1213.65	1660.54
	Mean	42.4	156.35	411.26	799.39	1206.11	1663.21

Appendix 3: Average Feed Conversion Ratio (F.C.R) per broiler.

Strains	Replication	Weeks				
		1st	2nd	3rd	4th	5th
Cobb 500	1	0.98	0.89	1.34	1.59	1.57
	2	0.84	0.98	1.29	1.42	1.62
	3	0.79	1.23	1.41	1.38	1.48
	Mean	0.87	1.03	1.34	1.46	1.56
Hubbard classic	1	0.98	1.46	1.56	1.62	1.71
	2	1.27	1.31	1.46	1.54	1.65
	3	1.14	1.27	1.38	1.47	1.54
	Mean	1.13	1.34	1.48	1.54	1.63

Appendix 4: Average Feed Consumption (g) per broiler.

Strains	Replication	Weeks				
		1st	2nd	3rd	4th	5th
Cobb 500	1	143.54	313.82	1063.52	1926.49	2589.72
	2	116.12	411.03	986.95	1656.87	2976.51
	3	103.23	526.99	1093.57	1719.98	2526.29
	Mean	120.46	412.16	1042.67	1764.07	2700.78
Hubbard classic	1	105.24	554.83	1177.96	1889.02	2811.07
	2	158.75	466.98	1120.27	1778.82	2642.72
	3	126.23	471.13	1034.77	1721.74	2491.94
	Mean	129.24	494.66	1120.97	1792.76	2642.60

Appendix 6: Meat yield characteristics of males and females of to difference strains of broiler at 35 days of age.

Parameter	Sex	Cobb 500	Hubbard classic
Live weight(g/broiler)	Male	1759.56	1651.66
	Female	1623.72	1555.00
	Mean	1691.64	1603.33
Shank weight(%)	Male	4.39	4.43
	Female	4.05	3.94
	Mean	4.22	4.18
Giblet weight (%)	Male	5.60	5.04
	Female	4.61	4.58
	Mean	5.11	4.81
Digestive tract weight(%)	Male	13.57	14.30
	Female	13.39	13.81
	Mean	13.74	14.81
Abdominal fat (%)	Male	0.32	0.37
	Female	0.64	0.75
	Mean	0.48	0.56
Dressed carcass (%)	Male	70.37	68.12
	Female	70.69	69.39
	Mean	70.53	68.76