Abstract

A study was carried out in three renowned breeder farms in Chittagong district of Bangladesh. The objectives of the study were to compare the management practices and production performances of parent breeder stock of about 29800 Cobb 500 strain reared in those farms (farm A, B and C). The duration of the study was August 10 to August 30' 2016 which was done on 18-50 weeks of ages of birds. Relevant information's related to management of birds (i.e. housing feeding, lighting, vaccination schedule, temperature management, bio-security etc.) were recorded from register book of farms and compared with the standard. Data related to production performance (i.e. feed intake by male and females, live weight, egg production etc.) were also recorded and analyzed. It was revealed that farm A, B and C maintained standard management systems. There was no significant difference ($P>0.05$) in feed intake by female breeders of three farms though it differed significantly ($P<0.05$) in males and was higher in farm B and C in comparison with farm A. However, no significant differences ($P>0.05$) were observed among body weight of male and female birds of farm A, B and C. Egg production was insignificantly ($P>0.05$) higher in farm B compared to farm A and B. Peak egg production in farm A was observed at 30^{th} weeks (90%), farm B at 31-42^{th} weeks (95%) and farm C at 32^{th} weeks (91%). From the study it was evident that there were fewer differences in existing management systems of farm A, B and C. Cob 500 performed well in that system. Insignificant amount of differences were observed among the production data of three farms almost in all parameters. It was also noted that production performance in a breeder farm depends mainly on the management practices and there is a negative correlation between the feed intake and egg production of birds.

Key Words: Cobb 500, management, production performance

Chapter-1

Introduction

Poultry is an integral part of the livestock sector. Approximately 40% of total animal protein is supplied by poultry meat in our country (Rahman, *et al.,* 1998) at present chicken contributes 56% of total meat production of the country through the share of broiler. Every person should consume 55gms of protein per day who weigh 150 pounds. According to DLS, (2007) meat requirement is about 120gms/day/head and 6.26 million metric ton/year. But our achievement is 20gms/day/head and 1.04 million metric ton/year. Poultry meats contribute approximately 37% of the total animal protein supplied in the country (Rahman, *et al.*, 1998). Bangladesh bureau of statistic (BBS, 2002) reported that about 89% of the rural household rear poultry and the average number of per household is 6.8. With a view to meet the protein gap in a shortest possible time, there has been a shift of policy emphasis on intensive poultry farming in recent years. Consequently a number of poultry farms have been established on commercial basis in an around the cities and towns. The demand of day old chicks is also increasing gradually. A number of breeder farms and hatcheries have been established by the private entrepreneurs for getting a higher profit within shorter possible time. Data revealed that total number of chicken in 2008 was about 118.7 million (Banglapedia, 2015). It has been found by the survey (ATDP/IFDC) that there are 63 hatchers at the ends of year 1999. Now the number of hatcheries in Bangladesh is 75% (Poultry khamar bichitra, 2010).

Chowdhury, *et al*., (2003) reported that exotic broiler parent stocks reared in open-sided house under Bangladesh conditions, in general, able to achieve expected body weight though they were found to be very sensitive to environmental stresses. Robinson and Wilson, (1996) showed that broiler breeder either fed ad-libitum or restricted to achieve typical industry target weight during 22 to 26 weeks of age. Ad-libitum fed hens weighed significantly heavier and produced fewer eggs than restricted fed hens. Rahman, (2003) reported that scientific

breeding feeding management and disease control program the key points of success in improvement of poultry farming.

Cobb 500 is an English strain which shows an excellent production and reproduction performance in standard condition. It has a worldwide reputation for the lowest cost of producing chicken meat. Cobb geneticists have developed this breed by the research of more than 30 years progress using a combination of both traditional pedigree selection and new technology. They have developed a very high breeder performance of Cobb 500. Such as Cobb 500 starts laying at 18-22 weeks of age. Age at 5% egg production is 24 weeks of age. At 65 weeks of age - total eggs/hen housed is 175, hatching eggs/hen housed is 170, peak hatchability 91 %, broiler chicks/hen housed 144 (Cobb 500 breeder management guide, 2009). For such high breeder performance different renowned farms in Bangladesh choose Cobb 500 as a broiler parent stock for rearing. Production performances in a poultry farm depend on largely on its management practice.

Therefore the present study was undertaken with the following objectives:

1. To observe the comparative management practices, biosecurity of Cobb 500 broiler breeder parent stock of three different farms in Chittagong

2. To compare the production performance of the birds in different farms

Chapter-2

Materials and methods

2.1 Study area

The study was conducted within the facilities of comparative study of the performance of the Cobb 500 parent breeder. The study areas were three renowned breeder poultry farms of Chittagong, Bangladesh.

2.2 Study population

The study populations were 10,000 Cobb 500 parent breeder stock from A, 12000 from farm B and 7800 from C with the grand total of 29800 birds.

2.3 Study period

The study carried out from August 10, 2016 to August 30, 2016 at the laying stage of birds.

2.4 Data collection and analysis

Data were collected from three renowned poultry farm of Chittagong, Bangladesh, including egg production, body weight gain along with other related data like housing, lighting, feeding, of the study batch. The birds which were selected for data ranged from 18-50 weeks.

2.5 Study design

This experiment was conducted by a completely randomized design (CRD). From each farm 40 samples were collected randomly.

2.6 Feeding intake management

The feed that are supplied to the male and female breeder in their laying period are produced by respective farms by their own. In the farm the male and female birds

are supplied with different feeds in laying period. These feeds having the optimum level of nutrient required for the breeder. Feed was given once daily for short period, usually by the early morning of the day. There the chicks were offered ad-libitum feeding unto 2 weeks of age from 15 weeks up to stimulation usually reproductive organs develop so in this period the amount of feed were strictly maintained according to recommendation. After stimulation feed were increased according to the production percentage.

Table 1: Feed ingredients used for feed formulation

	Starter	**Grower**	**Layer**	**Male breeder feed**
Maize	60	50	56	50
Soyameal	28	20	22	15
Full fat soy	-	-	4	-
Rice polish	3	11.2	8	15.4
Calcium	2	8.3	8	3
DCP	2	1.8	2	1.6
DORB	-	12		15

Source: Cobb 500 breeder management guide, 2009

Table 2: Recommended minimum specifications of feed

	Starter	**Grower**	**Layer**	**Male breeder**
Crude protein %	21-22	19-20	18-19	17-18
Metabolizable energy (Kcal/kg)	3008	3086	3167	3191
Lysine %	1.32	1.19	1.05	1
Methionine %	0.50	0.48	0.43	0.41
Tryptophan %	0.20	0.19	0.19	0.18
Na %	0.16-0.23	0.16-0.23	0.15-0.23	0.15-0.23
Chloride %	0.17-0.35	0.16-0.35	0.15-0.35	0.15-0.35
Potassium %	0.63-0.95	0.60-0.85	0.60-0.80	0.60-0.80
Linoleic acid	1	1	1	1

Source: Cobb 500 breeder management guide, 2009

According to AOAC (Association of official analytical chemists) I have studied feed ingredients of all three farms and found all three farms maintain feed specifications as close as standards

2.7 Lighting Management

Lighting is an important factor for the breeder at the period of laying specially. At the growing period there was no need of artificial light in open sided housing system other than daylight. But during production light should never be reduced in time on intensity. It is important to start the light stimulation in time, but not before the bird is ready. It means that, the lighting schedule should be started when the flock reached at right body weight as well as sexual development and fleshing should be sufficient. It is better to delay light stimulation slight than to stimulate too early. There are two factors influencing the intensity of light falling on birds - power of light source the amount of light given out by the bulb is directly proportional to its wattage and distance of surface from the light source the light intensity decreases, as the source of light is placed further away from the surface (Cobb 500 breeder management guide, 2009).

2.8 Body weight and uniformity monitoring of three farms

The body weights of 40 birds of each three farms were taken in a breeder farm once weekly at the weekend in empty stomach. The main objective in a breeder farm during rearing of birds is to reach the target body weight and uniform growth rate according to the standard of birds.

2.9 Housing and floor space

Under modern conditions the hen is required to lay many eggs throughout the year and this object can best be achieved if a comfortable shed is provided for them. It is very important that chicks should be housed and cared for so as to provide an environment that will enable them to maintain their thermal balance. Because of being warm blooded they have the ability to maintain a rather uniform temperature of their internal organ (Cobb 500 breeder management guide, 2009)

For economic production of laying hens it is always better to keep them in small units of 15-20 bird. This number can go up to a maximum limit of 250 birds. The house should be about 400 feet long to accommodate large number of birds. In farm A, B, and C the standard length of was maintained. Spray was also done as regular practice and the litter was scratched once a day. The litter was replaced by new litter ½(half) or ⅔ (two third) if they become too damp.

2.10 Ventilation

Ventilation in the poultry house is necessary to provide the birds with fresh air and to carry off moisture since the birds are small animal with rapid metabolism. Air requirement per unit of body are high in comparison with that of other animals. Since CO_2 content of expired air is about 3.55.

2.11 Vaccination program

One needs to develop uniform disease resistance in parents and produce high levels of maternal antibodies that can be passed on to the chicks by the eggs. It has several methods - water vaccination, spray vaccination, intra-ocular vaccination, intranasal vaccination, subcutaneous injection system, intramuscular injection, wing web punching and vaccination through feed.

Table 3: Vaccination schedule for Cobb 500 broiler breeder

Age (day)	Age (Week)	Name of Vaccine	Route
4th	-	IBD Live (INTER)	Eye
5th	-	Cocci Vaccine	Water
6th	-	Debeaking	_
7th	1	MA5 Clone 30+ ½ dose IBD Killed	Eye & S/C
9th	2	Reo live	S/C
12th	2	IBD live + ½ dose ND killed	Eye & S/C
13th	2	IB 4/91	I/O
16th	2	ND Lasota	Eye
26th	3	IBD live	Eye
35th	5	Reo Live	S/C
42th	6	ND+IB Killed	S/C
45th	7	Fowl Pox	Wing Web
56th	8	Fowl Cholera (killed)	I/M or S/C
63th	9	Salmonella (killed)	S/C
70th	10	4/91 IB	I/O
80th	12	Coryza (Optional)	I/M or S/C
84th	12	Fowel cholera (killed)	I/M or S/C

91th	13	Salmonella (killed)	S/C
98th	14	AE + Pox	Wing Web
105th	15	Coryza(Optional)	I/M or S/C
112th	16	ND+IB killed MA5+(IB live)	S/C &Eye
126th	18	EDS Killed	S/C
147th	21	ND+IB+IBD+Reo killed	S/C

Source: Cobb 500 breeder management guide, 2009

2.12 Bio-security

Bio-security is necessary to prevent the introduction of disease organisms into the flock by any means. Some of the bio-security practice includes-

- Farm location and construction: It is best to build up the farm in an isolated area, at least 2 km distance from the nearest poultry farm. It should fence the perimeter of the farm to prevent unwanted visitors. The design and construction of the houses should be in a manner that does not provide openings for wild birds and animals to enter the buildings.
- Preventing disease transmitted by humans: Restriction of the movement of visitors to the poultry farms. If supervisory personnel must visit, they should make an effort to visit the youngest flock first then visits flock with disease problems last. All people entering the farm should follow a bio-security procedure. All workers and visitors should shower and use clean & calendared farm clothes.
- Preventing disease transmitted by animals

Whenever possible all in all out placement cycle of birds should be followed. A minimum downtime of two weeks between flock is recommended. It should provide an entry

barrier to rodents and wild animal, keep wild birds out of all buildings and should maintain an effective rodent control program.

2.13 Statistical Analysis

All the data of male and female related to production performance of parent breeder stock (i.e. live weight of male and female, feed consumption by male and female, egg production) were entered into MS excel (Microsoft office excel, 2007, USA). Data management and data analysis were done by STATA version-12.1 (STATA corporation; college station, Texas). A P value of ≤ 0.05 was considered statically significant.

Chapter-3

Result and Discussions

Management practices

Lighting

Table 4: Standard lighting schedule for broiler parent stock

Age in weeks	Duration of light	Intensity(Lux)
1 day	24	60
2 days	24	60
3 days	23	40
4 days	22	30
5 days	21	20
6 days	20	15
7 days	19	10
8 days	18	10
9 days	17	10
10 days	16	5
11 days	15	5
12 days	14	5
13 days	13	5
14 days	12	5
15 days	11	5
16 days	10	5
17 days	9	5
18 days-21 days	8	5
22 days	10	40 minimum

23 days	11	Do
24 days	12	Do
25 days	13	Do
26 days	14	Do
27 days	15	Do
28-end	16	Do

Source: Cobb 500 breeder management guide, 2009

Farm A, B and C follow a lighting schedule of 16, 15 and 16 hours, respectively. For laying birds the minimum light stimulation should around 16-17 hours (Broiler Breeder production, 2009). Brooding temperature ranges from 98-101ºF in all three farms which is close with several researcher Meijerhof, *et al.*, (2004) stated that the brooding temperature must be constant between 100-100.5ºF with a maximum of 101ºF. Brooding period of three farms almost same on 7^{th} or 8^{th} day. All three farms check fertility by candling.

Hatchability

Hatchability of farm A was 90%, farm B 88% and farm C 90%. It is revealed that Farm B has lower hatchability than other two farms. Elibol, *et al.*, (2003) stated that hatchability of fertile eggs was significantly lower when there was no pre-warming period compared to having a per-warming period of 10 hours or 18 hours. Doc mortality rate of A, Farm B and Farm C is 3%, 2% and 2% respectively.

Male Female ratio

All these three farms follow same Female and male ratio 10:1. Although mating ratio of all three farms were same but mating ratio should be reviewed weekly (Ross PS management hand book, 2013). In all litter system of rearing the male and female bird are reared together. The male and female are reared separately at the early

age. When they reached at 22 weeks, they are joined in the same shed. The male female ratio should 1:10 (Cobb 500 breeder guide management, 2009).

Drinker and water management

It is desirable to supply an adequate amount of portable water for chicken considering the few points - should use a reliable water sanitizer such as chlorine or iodine, testing of the chlorine level of the drinker and testing of the water monthly to ensure acceptable coli form levels. In open drinking system gradually to move chick drinker towards the automatic drinkers. Until seven days of age, the top lip of the drinker should be set to the height of the average bird's back. After 7 days of age, the drinker should be gradually raised. The proper water depth is 1.9 cm and Drinker should be washed daily.

In nipple drinking system it should make sure that the nipple drinker lines and litter are level. Just prior to pacing the birds on the nipple drinking system, triggering all of the nipples to check perfect flowing of water. The height of the water lines should adjust in such a way that the lines are at the bird's eye level for the first two days (Cobb 500 breeder management guide, 2009). Overall water management of all three farms was good. All three farms used nipple drinker and deep well as water source.

Vaccination and Anthelmentics

Vaccines commonly used in these three farms are Mareks vaccine, Ma5+clone 30 (IB% ND), D78 (IBD live), 228E (IBD live), ND Clone 30 (ND live), Corvac (Coryza), CIVAC ND IB EDS-K, Fowl cholera vaccine etc. In these three farms most of vaccines used were live vaccines. It may because of live vaccines have advantages of quick and easy administration, inexpensive and give almost immediate immunity (Broiler breeder Production, 2009). Anthelmentics that are used commonly in these three farms are piperazine, livamisole, albendazole.

Routine Tests

Common routine tests (i.e. feed sample analysis, aflatoxin detection test and CS test) are performed in these three farms. It is cited that less than 1 ppm of aflatoxin may cause liver damage, reduced egg production and hatchability (Broiler Breeder Production, 2009). A recent survey in Holland, Goren, 1994 indicated sensitivity of *E. coli* to a range of antibiotic, ranging from less than 5% to greater than 70%. So CS test become a vital test for antimicrobial administration in breeder parent stock.

Record Keeping

Records that maintained in these three farms include vaccination, feed and water consumption, egg production, mortality, body weight, egg weight, fertility percentage, hatchability percentage, Production cost etc. Record keeping is an essential aid to effective management. Records should include all factors related with rearing, laying, treatment and significant events and target performance (Ross PS management hand book, 2013).

Production Performances

Feed intake

Table 5: Feed intake of female breeders of different farms (gm/bird)

Farms	Mean	Standard deviation (SD)	Chi square value	P value
A	147.66	27.81	4.37	0.96
B	149.66	26.55		
C	149.15	37.12		

Table 5 represents that feed intake by female breeders was increased in farm B and C in comparison with farm A though the differences were not significant statistically (P>0.05). Scott *et al*., (1999) found that feed restriction reduce feed intake, body weight and hen day egg production proportionately. As farm A followed restricted feeding what probably influenced on feed intake.

Table 6: Feed intake of male breeders of different farms (gm/bird)

Farms	Mean	Standard deviation (SD)	Chi square value	P value
A	132.06	11.64	1.57	0.45
B	137.93	14.09		
C	138.72	14.23		

Significant (P<0.05) differences in feed intake of males were observed among difference farms. Feed consumption by male breeders of Farm B and C was higher than farm A (table 6). Leclercq and Whitehead, (2004) stated that male birds ate more than females and vary with breeding lines which may responsible for feed intake variability.

Body weight

It is a great advantage to achieve a uniform flocks during laying. It is crucial to maintain the uniformity in the flock. When flock uniformity become low it is necessary to place those higher and heavier birds in separate pan. To correct poor uniformity flocks should be guarded early at 4 weeks but not later than 5 weeks. The lighter birds should give extra feed for achieving weight and the heavier birds should restrict the feeding till reduces the weight (Cobb 500 breeder farm management, 2009).

Table 7: Body weight of females of different farms (gm/bird)

Farms	Mean	Standard deviation (SD)	Chi square value	P value
A	3419.18	561.95	0.007	0.96
B	3359.21	553.67		
C	3409.45	559.44		

There was no significant difference (P>0.96) among body weight of breeder males of different farms (table 7). So females are more or less homogenous in weight. Hurwitz and Plavnik, (1989) concluded that the weight of egg is related to both age and body weight during the onset of production. The egg weight and the body weight were significantly correlated for one year of production. As all the birds of these farms were at the same stage of production for that reason body weight of female birds got close enough.

Table 8: Body weight of males of different farms (gm/bird)

Farms	Mean	Standard deviation (SD)	Chi square value	P value
A	4043.03	524.41	1.01	0.68
B	4043.03	524.41		
C	3940.39	610.95		

From table 8 data indicating that male gain more body weight than female birds. Birds of farm C has lower body weight than farm A and B. Deschepper and Degroot, (1994) stated that body weight may be higher if birds were fed on low protein diet with supplementary synthetic amino acids, which might be a factors for higher body weight gain of farm A and B.

Table 9 - Egg production in different farms

Farms	Mean	Standard deviation (SD)	Chi square value	P value
A	54.93	31.98	0.06	0.87
B	62.69	31.79		
C	50.93	30.70		

Apparently, egg production of farm B is higher than other two farms (A, C). However, the difference is not significant (P>0.05), statistically. Spralt and Leeson, (1987) reported that the excess intake predominantly fat cause gradually results in increased body weight of female birds which was negatively correlated with hen day egg production. So higher fat intake might be responsible for lower egg production of farm A and C. Egg production before peak at farm A, B and C was 50% on 30^{th} week, 22.1% on 16^{th} week, and 50% on 26^{th} weeks, respectively. Egg production at peak was 90% at 30^{th} weeks in farm A, 95% at 31- 42^{th} weeks in farm B and 91% at 32^{th} weeks in farm was C.

Limitations

1. Limited excess in breeder farms
2. Duration of the study period was short

Conclusion and Recommendations

I can be concluded that the production performance of Cobb 500 broiler breeder parent stock is overall good in environmentally control house. The management practices in farm A, B and C were very close to the standard. However, the males gained more live weight than females in those farms. Egg production was highest in farm B than farm A and C. The difference was due to higher feed intake in farm A and C. So it can say that standard management practices should be followed strictly in a breeder farm to gain maximum production.

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Biography

I am Md. Shahadat Hossain, son of Mr. Tofazzal Hossain and Mrs. Chemona Khatun. I passed Secondary School Certificate examination in 2006 (G.P.A-4.94) followed by Higher Secondary Certificate examination in 2008 (G.PA-4.50). Now I am an intern veterinarian under the Faculty of Veterinary Medicine in Chittagong Veterinary and Animal Sciences University. In the future I would like to work as a veterinary practitioner and do research on clinical animal diseases in Bangladesh.