Chapter-1

**Introduction**

In Bangladesh poultry industry can be divided into two ways. One is the traditional or backyard production system, which has been practiced by the farmer’s time immemorial. The other is the emerging commercial production system. About 72% of the duck population of the world is reared under extensive and semi-extensive production system in South-East Asia (Hetzel, 1982) and about 98% of ducks in Bangladesh are traditionally reared under existing scavenging systems (Salah Uddin *et al*., 1991). Traditionally women and children are the raiser of those birds in Bangladesh. About 95 percent of the duck population in the country consists of indigenous variety (Huque, 1991) and production performance of these birds is very low.Majority of the population of duck are reared by the small holders in coastal and low-laying areas under scavenging system, with little or no supplementation.

The potential for increasing duck production under scavenging system is closely related with the development of better feeding system. Khaki Campbell and Jinding which are not yet recognized as breed but considered to be a valuable indigenous poultry genetic resource like Native (Deshi) in Bangladesh with many attributes better than other available indigenous types. In Bangladesh 90 to 95% of the ducks reared by village farmers are of Deshi (Native) type, which are very poor in egg production (Ahmed, 1986). But now a day the tendency of rearing of highly productive indigenous ducks rather then deshi increasing day by day in our country in the rural sides. The preliminary studies showed that Jinding and Khaki Campbell are medium sized egg laying duck having potentials to survive well and giving very good production (Zang *et al.,* 1986). The egg production performance are Total number of egg production (TNEP), Average no. of egg production (ANEP), Average egg weight (AEW), Total egg mass production(kg) (TEMP) , Egg mass production (EMP Age at sexual maturity (ASM), Survivability respectively. For these three genotypes of duck eggs the external quality of eggs was calculated by analyzing with eggs data that were collected at the age of 56 weeks. The egg production performance were also evaluating by the quality of the eggs that were obtained from ducks supplied supplementary feeds. Duck eggs are quite large compared to chicken eggs (1.4 times), which makes them easily distinguishable. The duck egg contains relatively less water and higher percentage of proteins and fats in the yolk, albumen and total contents of egg as compared to chicken egg. Because of higher percentage of fat, its energy value is also higher than chicken egg (Winton and Winton, 1996).

Poultry population estimates differ depending on the source of information. According to numbers provided by the Government of Bangladesh’s Livestock Department (figure 4), the total chicken population is steadily increasing, from about 143 million birds in 2001 to 195 million birds in 2006. Over the same period the duck population increased from 25.8 million in 2001 to 38.1 million in 2006. The pigeon population was reported to be 10.8 million in 2005 (Bangladesh Bureau of Statistics,2006). Other types of domesticated birds such as geese are present in only small numbers.

***Fig 1.1: Duck population of Bangladesh in Graphical presentation.***

*Source:* Government of Bangladesh's Department of Livestock Service's website: www.dls.gov.bd, 2008

A comparative study was therefore conducted at farmer’s level in two coastal districts with the following objectives a) to determine the total number of eggs of three genotypes (Jinding, Khaki Campbell and Deshi) of ducks on semi-scavenging feeds. b) to know the egg production performace of three genotypes (Jinding, Khaki Campbell and Deshi) of ducks under semi-scavenging rearing system.

**Objectives**

By this study our aim to gain these objectives:

1. To identify the egg production performance of different genotypes of duck.
2. To select the best type of duck for rearing at costal area

Chapter-2

**Review of Literature**

**Ansary *et al*. (2008),** repted thata study was conducted to determine the meat production potential of Pekin (P) x Pekin (P), P x *Desi* (D) and P x Jinding (J) ducklings up to 8 weeks of age. 54 day old ducklings were randomly allocated to 3 genotypic treatments having 3 replications in each genotype. One duckling from each replication was dissected to determine the meat yield. The initial and final live weight was found highest (P<0.01) in P X P, followed by those of P X D and P X J ducklings respectively. Feed conversion was poor in P X J, better in P X P and best in P X D (P<0.01). However, feed conversion for all genotypes decreased with the advance of age. At all ages except 1st week, better feed utilization was observed in P X D crossbred than that in P X P and P X J. Higher breast meat was observed in P X P (P<0.05) than in P X D and P X J. Thigh meat was found higher (P<0.05) in P X P and P X D than that in P X J. Considering the growth performance (growth rate and feed utilization) and meat yield characteristics, it may be concluded that crossing of Pekin with local ducks might produce a suitable genotype to improve meat production potential of duck to reared under Bangladesh condition.

**Yasmeen *et al*.(2008),** reported that, production performance and egg quality characteristics of pullets and spent layers were compared inthis study. Forty birds, each from the flocks of pullets (24 weeks old) and spent layers (76 weeks old) wereselected as experimental birds. The birds from each age group were divided into five replicates, eachcomprising of eight birds. All the experimental birds were fed a commercial layer ration @ 110g/bird/dayfor 12 weeks. The data on egg production, feed consumption, egg weight and egg quality characteristicsviz. shell thickness, shell weight, breaking strength, albumen diameter, albumen weight and yolk weightwere recorded. The data thus collected were utilized for calculation of FCR, Haugh unit and yolk indexvalues. The results revealed that pullets produced more eggs and utilized their feed more efficiently than spent layers. However, egg weight in spent layers was higher than in their counterparts. Pullets also produced eggs with thicker shell and higher Haugh unit values when compared to the spent layers. Feed consumption and yolk index values remained unaffected due to the age. Pullets also had better egg quality characteristics than those of spent layers.

**Rashid *et al*. (2002),** reported that, three monts of old 600 ducklings khaki campble,deshi and KC X deshi were reared for a period of 13 months in avillage of surrounds of Bangladesh agricultural university in order to study the ecomonic traits of duck with and without extra feed for scavenging system of rearing.

**Halder *et al*. (2007),**the present study was carried out in south 24 parganas and north 24 parganas district, West Bengal. From each of the two districts, three blocks were selected randomly. From each of the selected blocks three Gram panchayets (GP) were also selected randomly to study the socio-economic background of duck owners and status of duck rearing. Three hundred respondents were selected for the purpose of data collection and the direct face to face interview method was followed to collect data. It was found that cultivation was the main occupation followed by labourer among the farmers. The ducks were mostly fed home made feed with foraging facilities. The annual average egg production per duck was very poor and most of the duck owners earned a good amount of subsidiary income from duck rearing. Most of the duck owners belonged to poor, small or marginal income group. Most of duck farmers were literate. Women were mainly involved in duck rearing. The majority of flocks comprised of 6-10 ducks. A few duck of improved varieties was found in north 24 parganas but no improved duck was found in south 24 parganas.

**Su *et al*. (2009),** stated that,The genetic polymorphisms of 17 microsatellites were investigated in four indigenous laying-type duck breeds in China. The average number of alleles (*Na*) and average rates of homozygotes of each breed were counted. Accordingly, allele frequencies of the 17 microsatellites, polymorphism information content (*PIC*), mean heterozygosity (*H*) and genetic distances (*Ds*) were also calculated. Moreover, dendrograms using UPGMA and the neighbour-joining method were produced. The four breeds have a high average *PIC* (0.643) and *H* (0.682). *Ds* are between 0.514 and 0.662, the gene differentiation among the four breeds is 14.4%.

**Rahman *et al*. (2009),** reported that, the majority of the farmers (39%) belonged to middle-aged category. Thirty per cent farmers have got primary level of education. The majority of farmers (82.25%) are rearing *Desi* ducks followed by Crossbred (12%) and Hybrid (5.75%). Forty four per cent of the farmers cleaned their duck houses 2-3 times in a month whereas only 11 per cent cleaned their duck houses everyday, 22 per cent once in month, 18 per cent 4-6 times in a month and 5 per cent farmers cleaned their duck houses 7-10 times in a month. About 39 per cent farmers reared ducks under scavenging system with only natural feed resources and 61.5 per cent farmers used supplemental feed, mainly rice polish (118 g/bird/day) in summer season. Eighty five per cent farmers in both districts did not use vaccines against duck diseases. However, 10 per cent of the farmers buried their dead ducks somewhere else.

**Devkar *et al*. (2001),** reported that, one day old pullets of Indi~ RIR breed were reared under LD 12:12 (NLD) throughout, or under a step down photic schedule of LD 18:6 (long photoperiod; LP; from day 1 to day 90) followed by ill 12:12. The effect of these photoperiodic schedules on physiCal features and biochemical composition of eggs haS been aSSCilssed. The. L.P hens laid marginally heavier eggs compared to the NLD hens. The eggs of LP hens showed higher weights of yolk and albumen and a lower yolk: albumen ratio. On a temporal scale, the percentage water content of yolk and solid content of albumen showed a reverse trend between the NLD and LP eggs. The total protein and total cholesterol contents were significantly increased In both yolk and albumen of LP eggs while the carbohydrate and total lipid contents decreased In yolk and albumen respectWely. A comparison of calorific value shows significantly greater energy content (13.4%) In LP eggs.

**Bhuiyan *et al*. (2005**), reported that, the experiment was conducted with 40 Pekin, 40 Muscovy and 40 Deshi White day-old as hatched broiler ducklings under farmers condition to investigate the comparative performance of three breeds of ducks under farmer's management up to the 09 weeks of age. The final live weight in Pekin, Muscovy and Deshi White were 1763.0, 1225.0 and 1208.0 g/ducks respectively (P < 0.05 ). The total feed consumption up to the brooding period in three breeds were 2047.00, 1652.06 and 1430.05 g/ducklings respectively (P < 0.05) and the respective feed conversion ratios were 2.40, 2.91 and 3.05. Mortality was non- significant (P>0.05) among the breeds of ducks.

**Pingel ,(2009),** reported that, the production of waterfowl can contribute to the improvement of the nutritional standards of the human population. Feed for waterfowl is not commonly used for human consumption and there is no strong competition between waterfowl and human nutrition. In comparison with chicken ducks and geese play a minor role in production of meat and egg. But in certain parts of the world significant amounts of meat and eggs are produced from ducks and geese and there was a sharp rise in waterfowl production in the last decades. Duck meat production was increased from 1991 with 1.3 million tons to 3.6 million tons in 2007; geese meat output was 0.76 million tons in 1991 and 2.2 million tons in 2007, both together makes 6.6 % of total poultry meat. The biggest duck and goose producer is China with 65 % and 94 % of the world production. Duck egg consumption has a long tradition in China and South-East Asia with 10-30 % of total egg consumption. Waterfowl is also widely used as source for feathers and downs.

**Liu *et al*. (2008),** reported that, the Chinese breeds showed high variation with the observed heterozygosity ranging from 0.401 (Jinding) to 0.615 (Enshi), and the expected heterozygosity ranging from 0.498 (Jinding) to 0.707 (Jingjiang). In all of the breeds, the values of Ho were significantly lower than those of He, suggesting high selection pressure on these local breeds .Specific genetic and behavioral adaptations have developed to accommodate to both climatic differences and food preferences (Harley et al., 2005). The world famous meat duck “Peking” originated in northern China, while “Jinding” duck, which can produce more than 260 eggs per year, was developed in the southern coastal area. These breeds vary in body size, plumage color, and other characteristics. Facing the challenge from much more efficient commercial duck strains, almost all of the Chinese indigenous duck breeds are decreasing in population size, and even of more concern, some of the indigenous duck breeds are on the verge of extinction.

Chapter-3

**Materials and Methods**

This experimental findings have collected from a research conducted by a student of B.A.U.

***3.1.Selection of the study areas***

Selection of study area is an important step for collection of data in accordance with the objectives set for the study. In order to obtain detailed information on duck egg quality characteristics, the experiment was conducted in two southern coastal districts of Barisal and Bhola in Bangladesh.

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**Fig 3.1 : Map of Costal area of Barisal**

**Source: http://www.mathbaria.com/index.php/mathbaria/geography/maps/barisal\_division**

***3.2.Selection of farmers***

Twenty four farmers were selected from two locations having twelve farmers from each location. The farmers were selected on the basis of their previous experience on duck rearing. The farmers were the beneficiaries of NGO’s named COAST trust of Bhola and BDS of Barisal districts. Each farmer was given eight birds from any three (Khaki Campbell, Jinding and Deshi) genotypes of duck.

***3.3.Training of farmers and field assistance***

Farmer’s were given day long training on duck feeding, management and prevention of disease. The farmers were also given training on duck and duck eggs weighing process.

***3.4.Location and time of experiment***

Sexually mature ducks of three genotypes viz. Khaki Campbell, Jinding and Deshi were reared and managed up to peak production in order to study the egg quality characteristics in semi-scavenging system of rearing. Feeding trail was conducted at farmer’s house with conventional management practices in Semi-scavenging rearing systems for a period of 5 weeks between November-2011 to March-2012 in two coastal district of Barisal and Bhola.

***3.5.Sources of Birds***

Khaki Campbell and Jinding ducks used for the experiment was purchased from govt. duck breeding farms of Sonagazi, Noakhali and Noagaon. Deshi ducks were purchased from a commercial privet farm in Burhanuddin.

***3.6.Experimental design and treatments***

The experiment was conducted following Completely Randomized Design (CRD) having 4 replicates (families) for each genotype of Khaki Campbell, Jinding and Deshi (Table 3.1). All ducks were vaccinated against duck cholera before distribution to the farmers. The experimental ducks were reared under the existing husbandry practices conventionally done in the village.

**Table 3. 1: Experimental design that followed during experiment.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Genotypes** | **Locations** | | | | | | | | **Total number of ducks in each genotype** |
| **Barisal** | | | | **Bhola** | | | |
|  | | | |  | | | |
| R1 | R2 | R3 | R4 | R1 | R2 | R3 | R4 |  |
| Khaki Campbell | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 64 |
| Jinding | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 64 |
| Deshi | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 64 |
| **Total** |  | | | | | | | | 192 |

***3.7.Feeding and Management***

In addition to scavenging feed, all the birds belonging to three different genotypes were supplied with a composite feed composed of rice polish, broken rice, crushed maize and wheat bran @ 25, 30, 30 and 15% respectively in the form of wet mash (Table 3.2). Each duck was supplied with 70g composite feed, divided into two equal halves and were given twice daily; first in the morning at 07.30 hour before scavenging and second time in the evening at 17.30 hours after returning to the house from scavenging. Feeds were supplied in the bowls and the bowls were cleaned properly before each time of feeding. Sufficient clean drinking water was also supplied in bowls in each time.

**Table 3.2 Composition of concentrate mixture**

|  |  |
| --- | --- |
| **Ingradients** | **Amounts (%)** |
| Rice Polish | 25 |
| Broken Rice | 30 |
| Crushed maize | 30 |
| Wheat bran | 15 |

***3.8.Methods of Data Collection:***

Farmers kept the data daily on the basis of the performance of the given ducks. Then the data was collected in every month by me from their record sheet what was given to the farmers previously. Then all the data from two different place were gathered together and a data sheet was made.

***3.9.Egg production performance*:**

It should better to mentioning that the egg production performance of duck be varied on analyzing freshly or preserved eggs.Theegg production performance of ducks including these charcters.

1. **Total number of egg production (TNEP): Total amount of egg laid a type .**
2. **Average no. of egg production (ANEP): Total number of egg / Total number of duck.**
3. **Average egg weight (AEW: Total egg wt / total no. of eggs.**
4. **Total egg mass production(kg) (TEMP): Total egg wt in kg.**
5. **Egg mass production (EMP): Total egg wt / Total no. of duck.**
6. **Age at sexual maturity(days) (ASM): 1st laying time.**
7. **Survivability: Total number of live duck / total number of duck.**

Chapter-4

**Results and Discussion**

From the analyzed data we have found different number of result in different parameter. The average no of egg production performance was 74, 86, 48 at Barisal for Kc, J, D respectively and 69, 81, 46 in Bhola for KC, J, D respectively in 140 days (Table 4.1). Average egg weight was 65.20, 64.30, 58.70 in Barisal for KC, J, D and 65.90, 64.80, 58.40 at Bhola for KC, J, D. respectively (Table 4.1). Age at sexual maturity was 157 and 160 at Barisal and Bhola respectively for Jinding duck, which is less from other duck (Table 4.1). Among the results Jinding’s performance was best. The yearly no of egg production of Jinding will be 224 eggs and 211 egg in Barisal and Bhola respectively . These are some beneficial feature that we have found in the data.

**Table 4.1 Production performance of three genotypes of ducks in Barisal and Bhola district from 24 to 44 weeks (140 days) of age.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameters** | **Locations** | | | | | |
| **Barisal** | | | **Bhola** | | |
|  | **K.C.** | **Jinding** | **Deshi** | **K.C.** | **Jinding** | **Deshi** |
| **Total number of egg production** | 2368 | 2752 | 1536 | 2208 | 2592 | 1472 |
| **Average no. of egg production** | 74 | 86 | 48 | 69 | 81 | 46 |
| **Average egg weight (g/egg)** | 65.20 | 64.30 | 58.70 | 65.90 | 64.80 | 58.40 |
| **Total egg mass production(kg)** | 34.67 | 34.19 | 31.69 | 35.58 | 34.99 | 31.54 |
| **Egg mass production (g/bird/day)** | 26.80 | 30.72 | 15.65 | 25.26 | 29.16 | 14.92 |
| **Age at sexual maturity(days)** | 168 | 157 | 194 | 173 | 160 | 177 |
| **Survivability (%)** | 94.70 | 97.48 | 96.60 | 95.60 | 95.20 | 91.70 |
| **Egg production % of TNEP** | 35.57 | 41.35 | 23.07 | 35.20 | 41.33 | 23.47 |

**Figure 4.1 : Productition performance of KC, J, D at Barisal**

**Figure 4.2: Production performance of KC, J, D at Bhola**

**Table 4.2. Difference of Egg production % of TNEP**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Area** | **Egg % of J** | **Egg % of KC** | **Egg % of D** | **Difference** |
| **Barisal** | 35.57 | 41.35 |  | 5.70 |
|  | 23.07 | 18.28 |
| **Bhola** | 35.20 | 41.33 |  | 6.13 |
|  | 23.47 | 17.86 |

**Liu et al. (2008) reported that,** “Jinding” duck, which can produce more than 260 eggs per year, was developed in the southern coastal area.Age of the first egg is 100~120 days. Average egg number is 260~300 per year per duck **(Report on Domestic Animal Genetic Resources in China,2003).** We found that the egg production of Jinding were 224 and 211 in Barisal and Bhola respectively.

Duck egg consumption has a long tradition in China and South-East Asia with 10-30 % of total egg consumption.(**Pingel , 2009) .** Our study also revealed that sufficient production of duck egg can decrease the poverty because the demand of duck eggs is also good in our country.The above result is almost similar to our study . It varies a little form the standard level.

The egg production performance of J was 5.70% and 18.28% higher than KC and D respectively at Barisal; and 6.13% and 17.86% higher than KC and D respectively at Bhola.

Chapter-5

**Conclution**

From the above result we found that Jinding duck was the best for adaption in costal area like Barisal and Bhola of Bangladesh, due to its more productivity, early sexual maturity, and more survivability. Its egg production is moreover 18% higher than D and 6% higher than KC. The costal people has get benefited from rearing Jinding duck for better performance and improved their economic status. Due to higher survivability than other ducks, the farmers loss has become less. They should start rearing Jinding duck at high scale to overcome poverty.

Chapter-6

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