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Effect of Season on the Hatchability of Duck Eggs

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Abstract: This study was conducted in Regional Duck Breeding Farm, Daulatpur, Khulna, Bangladesh with a view to know the seasonal effect on the hatchability of duck eggs. The number of eggs set in the incubator and the number of eggs hatched was used to determine the hatchability percentage. Duck breeding farm practiced artificial incubation for hatching eggs. Data were collected from the record registers of the farm covering the year 1995 to 2002 and 5199928 eggs were set in incubator from 2789000 ducklings were hatched during the period. Data were analyzed using MSTAT-C Statistical Package Program. The result revealed that hatchability of duck eggs were highest in January (59.54%) and lowest in July (48.27%) in case of month wise hatchability whereas winter (57.676%) shows the highest followed by summer (54.135%) and monsoon or rainy season (49.134%). Least-square Analysis of Variance showed that both season and individual months had significant effects on the hatchability of duck eggs. Therefore, it can be concluded that both individual month and season influenced the hatchability of duck eggs.

Key words: Duck eggs, hatchability, seasonal effect

Introduction

Among the poultry farm enterprises duck production plays an important role in the rural economy of Bangladesh. The duck population in Bangladesh is 35 million that are commonly dual purpose (meat and egg producer) in nature and reared under traditional system in rural areas (FAO, 1990). Local ducks are ubiquitous in the country and most smallholder farmers keep them under a subsistent level of management (Islam *et al*., 2003). Duck comprises about 10% of the total poultry population, occupying second place to chicken in the production of table eggs in the country. It contributes major source of animal protein in Bangladesh, can be produced within a short time at reasonably low cost. It is an important component of farming system and plays a significant role to 80 per cent rural people of Bangladesh. It provides cash income and creates employment opportunity for rural people, particularly for small and landless farmers (Khan *et al*., 1999). It appears that the ducks can be raised cheaper than broiler and if market is properly organized (Singh, 2001). The process of hatching, which, in the span of 28 days for duck eggs, changes a microscopic germ into a downy chick, capable of walking, eating and expressing its needs by its voice and actions seems nearly magical (Banerjee, 1991). Novice poultry producers usually become interested in artificial incubation of their own chicks. The success of this type of project depends on proper care and incubation of the hatching eggs so healthy, vigorous chicks are produced (Smith, 2000). Bangladesh has different seasons in a year out of which summer, monsoon and winter are the most distinct in respect of temperature and relative humidity. Researchers have proved that climate has the direct bearing on the productive and reproductive performance of the animals. Determination of the seasonal effect on hatchability should be given priority because of their adaptability, resistance to disease and successful rearing of duck. Many domestic bird owners incubate eggs to help sustain their flock over time. Considering the above circumstances the study was undertaken with a view to determine the effects of season on the hatchability of duck eggs as well as to identify suitable season for hatching of eggs.

Materials and Methods

The study was conducted in Regional Duck Breeding Farm, Daulatpur, Khulna, Bangladesh. This farm was set up by Directorate of Livestock Services (DLS) in 1958 to produce outstanding ducks. These farms also supply ducklings to the farmers once per week. Data were collected from the record registers of the farm. The managerial condition of the farm during the observed period was uniform. Three different seasons were considered as summer (March-June), monsoon or rainy (July-October), and winter (November-February) for the experiment (Ali *et al*., 1999).

An Assistant Director and a Poultry Development Officer are supervising the farm. The birds were reared in intensive system. The birds were kept in floor and large spacious shed surrounded by half wall in lower portion and above it surrounded with wire mesh. Open space was provided for exercise. Feed was supplied in traft type feeder with sufficient feeding space. Clean drinking water was supplied in the channel. Birds were fed outside of the houses and feed was allotted at the rate

Table 1: Month wise mean hatchability with standard error of duck eggs

Month	Average	Standard error (S.E.)
January	59.54^{A}	0.79
February	59.13^{A}	0.79
March	56.78^{AB}	0.79
April	55.63^{BC}	0.79
May	53.41^{CD}	0.79
June	50.73^{DE}	0.79
July	48.27^{E}	0.79
August	48.46^{E}	0.79
September	49.87^{E}	0.79
October	49.93^{E}	0.79
November	54.96^{BC}	0.79
December	57.08^{AB}	0.79
Total	53.65	0.46

Mean with uncommon superscripts differ significantly by LSD.

Table 2: Analysis of variance table for month wise Hatchability of Duck eggs

Source of variation	Degrees of Freedom	Sum of Squares	Mean Square	F-Values	Significant (P<0.01)
Between month	11	1476.552	134.232	26.729	0.000
Within month	84	421.847	5.022		
Total	95	1898.399			

of 160 gm per head per day that was given twice a day. Water-soluble vitamin was added with feed mainly in winter season. Cleanliness and sanitary programs were followed regularly. Ducks were vaccinated with duck plague vaccine. The ducks were culled at regular interval, which were more than two years old.

In breeding flock one male duck was provided for every six females. Flock wise eggs were collected and graded for hatching purposes. Good quality medium size and clean eggs were collected for hatching purposes avoiding cracked ones. Hatching eggs were stored in a cold-humid storage area. Ideal storage conditions included 55°F temperature and 75% relative humidity. The eggs were stored with the small end pointed downward. Graded eggs were incubated in the 'PETERSIME' incubator of the hatchery in the farm. Candling was performed twice as 7th and 14th days of incubation to culled the infertile eggs. Hatchability was calculated on the basis of the number of eggs set into the incubator and the number of duckling hatched. Incubator temperature was maintained between 99°F and 100°F. The eggs were initially set in the incubator with the large end up or horizontally with the large end slightly elevated. This enables the embryo to remain oriented in a proper position for hatching. As soon as the chicks were dry and fluffy (6 to 12 hours after hatching) they were removed from the incubator. Fumigation of incubator was done carefully after every successful operation. Information from the record registers of the farm was collected covering a period from 1995 to 2003. Data were analyzed with the MSTAT-C computer program for analysis of variance. The least-square analysis of variance was done to determine the effect of season on the hatchability of duck eggs.

Results and Discussion

Month wise hatchability of duck eggs has been presented in Table 1. Highest hatchability was found in January (59.54± 0.79) and July bears the lowest (48.27 ±0.79). The least-square analysis of variance showed that the effect of month was highly significant (P<0.01) on the hatchability of duck eggs (Table 2). Season wise mean hatchability and standard error has been presented in Table 3. Winter bears the highest hatchability (57.68±0.59) followed by summer (54.14 ±0.59) and monsoon or rainy (49.13 ±0.59). The least-square analysis of variance represents that the season had highly significant effect (P<0.01) on the hatchability of duck eggs (Table 4). Similar results were found by Banerjee (1992) and he reported that the best time to hatch chicks altogether depends upon the climate. Farooq *et al.* (2003) observed that the hatchability of chicken eggs was higher in spring (78.0±1.03%) than in summer (46.5±3.01%). According to Sastry *et al.* (1996) temperature was the most critical factor for incubation and the temperature affected both quantity and quality of hatch. Species of birds vary in their temperature requirements for incubation. Some wild species incubate and hatch their eggs at 29.4 to 32.2°C. For example, Ruddy duck eggs hatch with little or no external heat except for a few days of initial incubation at higher temperature. High incubation temperature results in embryonic mortality, particularly when there was high

Table 3: Season wise mean hatchability and standard error of duck eggs

Season	Average	Standard error
Winter (November-February)	57.676	0.59
Summer (March-June)	54.135	0.59
Rainy/Monsoon (July-October)	49.134	0.59
Total	53.648	0.80

Table 4: Analysis of variance table for season wise Hatchability of Duck eggs

Source of variation	Degrees of Freedom	Sum of Squares	Mean Square	F-Value	Significant (P<0.01)
Between Seasons	2	294.739	147.370	52.063	0.000
Within Seasons	21	59.443	2.831		
Total	23	354.182			

temperature during the last part of incubation period (Sastry, 1996). Sastry *et al.* (1996) also reported that high humidity during incubation prevents sufficient evaporation from the eggs as a result of which large and soggy chicks were produced. High humidity also had a tendency to delay hatch and reduce hatchability. As sub-normal incubation temperature causes late hatching and poor hatchability (Sastry, 1996). The fertility and rate of hatchability of eggs produced in summer and early spring was low (Das, 1999).

The effect of season on hatchability of duck eggs implies that winter was the best for hatching of duck eggs, because of low rainfall and suitable room temperature. In conclusion, since the seasonal effect on hatchability is prominent, effort should be taken for more duckling production at that particular season to meet the increasing demand of ducklings in the region.

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