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Hatching Performance of Broiler Parent Stocks as Affected by Seasons under Bangladesh Conditions

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Abstract: Hatching performance of eggs of two broiler parent stocks was investigated in three different seasons of the year under Bangladesh conditions. Two strains of broiler breeder flocks were reared separately on floor from 22 to 48 weeks of age and eggs laid by these birds during spring, summer and monsoon were considered for this study. Each season was treated as treatment with 4 sets, each of 50 eggs as replicates within a treatment. One thousand two hundred hatching eggs (600 from Starbro and 600 from ISA MPK) were incubated in a James-way forced-draft electric incubator and the required records were kept during incubation and following taking out of hatches. The results of the experiment showed that hatching performance of eggs from Starbro was significantly better in spring than those observed during summer and monsoon. The hatchability results from ISA MPK also showed trends similar to Starbro but data did not differ significantly among seasons of the year. It may be concluded from the study that it is better to consider hatching of large number of eggs during spring if the broiler parents are reared in open-sided house.

Key words: Fertility, hatchability traits, spring, summer, monsoon, broiler parents

Introduction

Hatchability of eggs from broiler breeders is one of the most important factors affecting profit in a hatchery. Although, the principal objective of a hatchery is to obtain maximum hatchability of eggs, the production of "quality baby chicks" is the demand of the broiler growers for successful commercial production. Reputed hatcheries also take this factor into consideration. Fertility and hatchability being heritable have variations among strains of chicken and due to a number of management factors. The environment, particularly the temperature and humidity of the seasons in which breeders are raised, affect physiology of the birds and consequently, the fertility and hatchability of their eggs. Singh *et al.* (1983) observed a significantly higher embryonic mortality of White Leghorn and White Rock breeders in summer in comparison with winter and monsoon seasons. There was little variation in fertility among seasons. Kumaraswamy and Rathnasarbapathy (1975) reported higher hatchability during September to February and comparatively lower during March to August. Nazligul (1993) found maximum hatchability in December, May and October for three broiler parent groups. Dead in shell was reported to be highest during August to September and lowest during December to January (Basnet *et al.*, 1976). Poultry industry is an important sub sector in Bangladesh agriculture, which is currently playing a significant role for her economic development. According to Rahman (2000), parent stocks in Bangladesh reached to 470,000 in 1998 and the forecast for 1999 was 900,000 for the production of 105 million day-old chicks in the country. A recent report states that the number of hatcheries producing day-old chicks in Bangladesh has increased from 42 in 1999 to approximately 120 in 2001. Commercial broiler production in Bangladesh has gained momentum only a decade back. Many small-scale and medium scale producers are considering it as a source of income and therefore dependent on hatcheries for quality baby chicks. Although a good number of broiler parent chicks are being imported and reared for the production of hatching eggs for domestic hatcheries, information with regard to hatching performance of parent stocks in different seasons under Bangladesh conditions are lacking in the literatures. Earlier works mostly dealt with eggs from breeds and varieties. The present study was, therefore, aimed at determining the effect of seasons on the hatching performance (fertility, hatchability, dead in shell, abnormal chicks hatched etc.) of two modern broiler parent stocks commonly available in Bangladesh.

Materials and Methods

The breeder birds and their management: For determining seasonal influence on hatching performance, eggs were considered from Starbro (Strain 1) and ISA MPK (Strain 2) broiler parent

stocks. The birds were reared separately in open-sided houses at Bangladesh Agricultural University Poultry Farm during 22 to 48 weeks of age providing identical care and management including feeding diets of similar composition from the same feed mill. There were 60 females and 12 males (male: female ratio 1:5) in each strain. The males were gradually introduced with females from separate pens which begun at the onset of lay.

Experimental protocol: Hatching eggs were collected during three seasons of the year: spring, summer and monsoon. The seasons were considered as treatments with 4 sets of hatch, each of 50 eggs as replicates. Selection criteria for hatching eggs were those of clean, medium-sized, and normal shaped and free of cracks. The eggs were stored for 3-7 days at room temperature before undergoing incubation.

Incubation of eggs and record keeping: The artificial incubation of eggs was carried out in a James way forced-draft electric incubator after keeping records of their weight. The management of incubator in terms of maintenance of appropriate temperature, proper humidity, adequate ventilation and required turning were performed as per instructions of the manufacturer. Infertile eggs and eggs with dead embryos were removed from the incubator following candling at 7th and 14th days of incubation. Eggs were transferred from setters to hatcher at 18th days of incubation. At the end of 21 days, hatches were taken out and records of chick weight, sticky chicks, dead in shell and abnormal chicks hatched were kept. Fertility and hatchability records were obtained by calculations.

Statistical analysis: Data on hatchability traits were statistically analyzed in a completely randomized design (Steel and Torrie, 1984) considering each set of hatch as an experimental unit within each treatment (season). MSTAT statistical packaged program was used for analysis of variance. Significant difference between treatment means was separated by least significant difference (LSD). Statements of statistical difference were based on $P < 0.05$.

Results and Discussion

Hatching performance of strain 1 (Starbro): The results on hatching performance of strain 1 are shown in Table 1. Fertility was the highest in spring, lowest in summer and intermediate in monsoon and data showed significant differences among treatments ($P < 0.01$). Significant influence of seasons on fertility was previously reported by Kumaraswamy and Rathnasarbapathy (1975). These authors reported lower fertility during March to August months of the year (55 to 71%). On the contrary, Singh *et al.* (1983) observed high fertility from White Leghorn and White Rock chickens in both summer and monsoon seasons which

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Table 1: Hatching performance of strain 1 (Starbro)

Variables	Seasons			Level of significance
	Spring	Summer	Monsoon	
Egg wt. g/egg	70.8± 0.48	71.3± 0.75	72.0± 0.41	NS
Day-old chick wt. (g)	51.3± 0.94	51.1± 0.68	50.4± 0.78	NS
Fertility, %	84.5 ^a ± 0.96	77.0 ^c ± 0.56	80.0 ^b ± 0.82	**
Hatchability, %				
On all eggs	74.5 ^a ± 0.50	63.0 ^c ± 1.30	67.5 ^b ± 1.30	**
On fertile eggs	88.2± 0.88	81.8± 1.20	84.4± 1.50	*
Dead-in-shell, %	7.0 ^b ± 0.56	9.8 ^a ± 0.29	10.5 ^a ± 0.49	**
Sticky chicks, %	3.0± 0.21	4.2± 0.30	3.5± 0.27	NS
Abnormal chicks, %	1.7± 0.56	3.1± 0.66	2.5± 1.02	NS

Data indicate± SE Means having uncommon superscripts differ significantly *, P< 0.05; **, P< 0.01; NS, Non significant

Table 2: Hatching performance of strain 2 (ISA MPK)

Variables	Seasons			Level of significance
	Spring	Summer	Monsoon	
Egg weight, g/egg	62.0± 0.41	63.5± 0.65	64.3± 0.63	NS
Day-old chick wt., g	43.0± 0.80	42.8± 0.43	43.5± 0.49	NS
Fertility, %	79.0± 1.29	77.5± 0.96	78.5± 0.96	NS
Hatchability, %				
On total eggs	64.0± 1.40	61.5± 0.50	63.0± 1.30	NS
On fertile eggs	81.0± 1.51	79.4± 0.85	80.2± 1.20	NS
Dead in shell, %	11.0± 0.43	11.5± 0.22	10.5± 0.60	NS
Sticky chicks, %	4.0 ^a ± 0.23	5.5 ^b ± 0.23	5.0 ^b ± 0.29	**
Abnormal chicks, %	2.4± 0.98	3.7± 1.58	3.6± 0.75	NS

Data indicate± SE Means having uncommon superscripts differ significantly **, P< 0.01; NS, Non significant.

Seasonal influence on hatchability of broiler parents

differed with the results of the present study. Such discrepancies might be due to differences in breeder management and/or egg storage conditions. Hatchability data of different seasons showed trends similar to fertility results. Hatchability results based on both total eggs and fertile eggs were significantly higher during spring as compared with those observed during summer and monsoon. Singh (1983) also observed lower hatchability in summer. Dead in shell was the highest in monsoon, intermediate in summer and lowest in spring. This result was in agreement with Basnet *et al.* (1976), who reported highest dead in shell during August to September (summer and autumn). There was no influence of season on other hatchability traits such as sticky chicks, egg weight of breeder flock and day-old chick weight.

Hatching performance of strain 2 (ISA MPK): Table 2 shows hatching performance of strain 2 (ISA MPK). The hatching of abnormal chicks and day-old chick weight did not differ significantly. These results were similar to those obtained for strain 1 in this study. Although, the results on fertility, hatchability and dead in shell followed the trends similar to strain 1, data obtained in different seasons were found to be close to each other for these variables, consequently showed non-significant differences. The result on fertility disagreed with that of Ramkrishnan and Unni (1976), who reported significant effect of months within seasons. Little variations in fertility among seasons agreed well with Singh *et al.* (1983). The results on dead in shell disagreed with Basnet *et al.* (1976). Sticky chicks were found to be significantly lowest in spring (P< 0.01) compared to those observed during summer and monsoon.

The non significant differences in weight of the hatching eggs considered for this study for strain 1 and strain 2 resulted no significant difference in day-old chick weight. The hatching performance results of the current study with eggs from broiler parents laid in different seasons clearly demonstrated that spring is better than summer and monsoon for incubating eggs from broiler parent stocks reared in open-sided house.

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