

The Effects of Storage Period on Hatching Characteristics of Pheasant (*P. colchicus*) Eggs

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This research was carried out to determine the effects of storage period on hatching characteristics of Pheasant eggs. A total of 258 pheasant eggs were divided into three groups and each group were stored at 18 °C respectively for 4-7 d, 8-11 d and 12-15 d. Eggs were incubated at 36.5°C and 90 % relative humidity for 21 days during at which they were rotated hourly at an angle of 45°. Thereafter; these eggs were transferred into hatching machine during the last three days. A temperature of 36.0°C and relative humidity of 95 % were provided to the eggs at hatching period. Hatchability declined with storage period, for maximum hatchability less than 7 d of egg storage appears to be the best. The effects of storage period on embryonic mortality, hatchability of fertile eggs, hatchability of total eggs and chick hatching weight were significant ($P<0.01$). Egg weight loss increased with increased storage length ($P<0.01$). The chick weight tended to decline in relation with storage period up to 7 days.

Key Words: Pheasant; egg storage; hatching characteristics; storage period

Introduction

The hatchability of eggs depends on many factors. Pre-incubation factors that determine embryo and eggshell quality include parental genetics, nutrition, maternal age, and environmental conditions such as weather and lighting (French and Tullett, 1991) as well as methods of egg collection and egg storage period (Ayorinde *et al.*, 1994, Bhuvnesh *et al.*, 1994, Danczak and Majeska 1999, McLoughlin and Gousi 1999, Nahm 2001). Egg storage conditions prior to incubation can influence hatchability and are thus of considerable concern to commercial hatchery practice (Butler, 1991). Storage conditions should be sufficiently cool to prevent embryonic development during this period (Drent, 1975). There are strong positive correlations among preincubation egg weight, storage periods, chick weight and subsequent performance of different kinds of poultry (Ayorinde *et al.*, 1994, Nahm 2001).

Domestic poultry and waterfowl eggs generally lose 11 to 15% of their initial weight during incubation (Rahn, 1981; Davis and Ackerman, 1997 Hulet *et al.*, 1987), although weight loss averages for various species can range from 10 to 23% (Carey, 1986). Hoyt (1979) suggested that eggs of most species of birds will hatch if weight loss is similar to that of chicken eggs.

This study was conducted to find out the effect egg storage period on hatching characteristics of pheasant eggs.

Materials and Methods

The research was carried out at the Livestock Research and Application Unit ensured of Faculty of Agriculture Uludağ University. 140 pheasants were placed into pens with 5x5 m² dimensions, being 8 female and 1 male pheasant in each pen at the Research and Application Farm of Faculty of Agriculture, Uludağ University. The pheasants bred intensively were fed with rations comprising 14 % crude protein and 2700 ME kcal/kg ad libitum. The pheasant eggs in the pens were collected twice

daily, being in the morning and in the evening then recorded. Totally 258 eggs without shell abnormalities and malformations were used in the trial. The pheasant eggs were divided into three groups and each group were stored at 18 °C respectively for 4-7 d, 8-11 d and 12-15 d.

Eggs were weighed with an electronic scale balanced at 0,01 g precision before being placed into incubator. Eggs were incubated at 36.5°C and 90 % relative humidity for 21 days during at which they were rotated hourly at an angle of 45°. Thereafter; these eggs were transferred into hatching machine during the last three days. A temperature of 36.0°C and relative humidity of 95 % were provided to the eggs at hatching period. Fertility ratio, hatchability of fertile eggs, hatchability of total eggs and early, medium and late term embryo mortalities were determined. Values related to the characteristics investigated were subjected to analysis a variance, and Duncan's multiple range tests was applied in the comparison of means (Minitab, 1989).

Results and Discussion

Many researchers have reviewed the effects of storage period on the hatchability of eggs (Butler 1991, Wilson *et al.* 1997; Ar and Gefen, 1998; Nahm, 2001). The effects of egg storage period on hatching characteristics are given Table 1.

Table 1. The effects of storage period on hatching characteristics of pheasant eggs ($\bar{X} \pm s.e.$)

Parameter	Egg Storage Period (day)			
	4-7 d	8-11 d	12-15 d	
Total eggs (<i>n</i>)	86	86	86	
Eggs weight (g)	30.7±1.2	31.2±1.4	31.4±1.1	NS
Fertility, %	79.0±3.9	76.7±3.2	77.9±3.5	NS
Hatchability of fertile eggs, %	67.6±2.2 ^a	60.6±3.1 ^b	52.2±2.8 ^c	**
Hatchability of total eggs, %	53.4±1.4 ^a	46.5±1.2 ^b	40.6±1.4 ^c	**
Embryonic mortalities, % (Early, mid, late dead embryos)	32.3±1.1 ^c	39.3±1.5 ^b	47.7±1.8 ^a	**
Chick hatching weight, g	22.1±0.8 ^a	21.5±0.5 ^b	20.4±0.7 ^c	**
Egg weight loss, %	11.2±0.1 ^c	11.9±0.2 ^b	12.8±0.2 ^a	**

^{a,b,c} Row means with common superscripts do not differ ($P < 0.05$).

In the study mean egg weight of pheasant was found 31.1 g. Some authors reported mean egg weight for pheasant were 31.9-34.4 g (Blake *et al.* 1987), 31.0-32.3 g (Slaugh *et al.* 1988), 30.49 g (Tserweni-Gousi and Yannakopoulos 1990) and 30.6 g (Woodard *et al.* 1983). These findings were similar with our results.

Hatchability declined with storage period, for maximum hatchability less than 7 d of egg storage appears to be the best. The effects of storage period on embryonic mortality, hatchability of fertile eggs, hatchability of total eggs and chick hatching weight were significant ($P < 0.01$). Egg weight loss increased with increased storage length ($P < 0.01$). The chick weight tended to decline in relation with storage period up to 7 days.

Becker, (1960), Bohren *et al.* (1961), Kosin (1964) and Arora and Kosin (1966) reported some adverse effects of extended storage on hatchability and the subsequent performance of the domestic fowl. These adverse effects include reduced hatchability of the stored eggs and increased mortality and decreased chick weight of the chicks hatched from eggs which had been subjected to extended preincubation storage. Bakst and Gupta (1997) stored freshly laid eggs at 15 C for 3, 7, 14 d and there were no significant differences in embryo development either within or between groups.

The fertility ratio of pheasant's eggs were reported as 78.4 – 89.3% by Blake *et al.* (1987), as 78 – 94.5 % by Slaugh *et al.* (1988), as 88.7 – 92.2 % by Deeming and Woodland (2002), and as 81.63 % by Cetin *et al.* (1997). Our findings were lower than these author's results.

The hatchability of fertile eggs in pheasant eggs was reported between 45 – 76.9 % (Gibes *et al.* 1987; Praff *et al.* 1990; Deeming and Woodland 2002).

Storage period of hatching eggs has been shown to interfere with normal progress and egg constituents of chicken (Brake *et al.*, 1997). Though, hatchability decreases rapidly after 6-7 day

holding periods although eggs, properly stored, can be held 10 to 14 days with reasonable results (Ensminger 1992). Hatchability of eggs decreases quickly after 7 days of storage period for pheasant (Woodard 1982), fertility, hatchability and hatchability of fertile eggs decrease with increasing storage time (Elibol *et al.*, 2002, Fassenko *et al.* 2001, Woodard and Morzenti 1975, Woodard 1982).

The laid eggs should be storage for seven days to obtain the best hatchability of fertile eggs. In this study, the best storage period was determined to be seven days. In addition, it was observed that as the period of storage increased, the hatchability of fertile eggs and hatchability of total eggs decreased. Furthermore, the prolonged storage period provided to the embryonic mortality to increase.

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