Original Research Article

Impact of Storage Period on Fertility and Mortality in Chabro Breeds of Poultry

Abstract

An investigation was conducted to study the effect of storage period on fertility and hatchability in large, medium and small sized eggs of Chabro breed. The study was conducted at poultry farm of SKN College of Agriculture, Jobner. For the present study, a total of 297 eggs were collected for this study. These eggs were grouped into three egg size categories i.e. Small (38-44 g), medium (45-52 g) and large (53-59 g). To study the impact of incubation period, eggs were stored at 21℃ temperature for three different time periods (fresh, 3 day and 6 day). It was observed that egg fertility was increased on 3rd day and decreased on 6th day as compared to 0 day. For small egg class, egg fertility was 95.55, 96.02 and 92.13% respectively, on 0, 3 and 6 day of storage. Similarly, for medium-sized egg class, fertility was 95.17, 95.64 and 90.28% and for large sized egg class, it was 91.11, 92.15 and 87.41% respectively, on 0, 3 and 6 day of storage. Embryonic mortality increased with increase in storage duration. For small egg class, egg mortality was 20.95, 17.56 and 24.87% respectively, on 0, 3 and 6 day of storage. Similarly, for medium-sized eggs class, mortality was 10.15, 8.45 and 12.63% and for large sized egg class, it was 29.30, 20.14 and 33.41% respectively, on 0, 3 and 6 day of storage. The egg fertility and mortality are affected by the storage period. For best hatchability, egg storage should not exceed 3 days.

Key words: Fertility, mortality, breed, egg weight, Chabro

1. Introduction

Poultry is currently India's fastest-growing agricultural sector (Augustine and Shukla, 2015). The primary goal of modern hatcheries around the world is to produce high-quality chicks. To grow this sector, basic information on the influence of storage period and egg weight on fertility and mortality is required. Fertility in poultry refers to the percentage of incubated eggs that are fertile. Fertility tests are used to determine a bird's genetic and reproductive fitness, as well as to assess the economic efficiency of parent stocks. Fertility

and mortality are influenced by a variety of environmental factors. Improper temperature and humidity, male/female ratio, and prolonged storage period are the most common factors. Many research (King'ori et al., 2007, Yadav et al. 2021) have found that the length of storage has a significant impact on fertility and mortality. Egg storage for longer than 7 days results in a delay in embryo growth, a change in metabolic rate, and decrease in fertility (Petek and Dikmen, 2006 and Yassin et al., 2008). As a consequence, precise knowledge of fertility in relation to egg weight and storage period can help in the selection of fertile eggs in a logical manner. As a result, the purpose of this study was to see how the storage duration affected the fertility of large, medium, and small sized eggs from the chabro breed of poultry. Chabro breed is a multicoloured dual purpose breed.

2 Material and Method

Description of the Study Area

The experiment was conducted at Poultry Farm, S.K.N. College of Agriculture, Jobner, District Jaipur, (Rajasthan, India). Geographically Jobner is located 45.0 km west of Jaipur at 26°05' North latitude, 75°28' East longitude and at an altitude of 427 meter above the mean sea level. The area falls in agro-climatic zone III–A (Semi-arid eastern plain zone of Rajasthan). The climate of this region is a typically semi-arid, characterized by extremes of temperature during both summers and winters.

Experimental procedure

After collection of eggs, all the eggs were sampled and eggs with visible external abnormalities were screened out. In this process extra-large or very small eggs and abnormal eggs (irregular in shape and extremely small) were discarded. A total of 297 eggs were collected for this study. At commencement of the study, the eggs were weighed individually using sensitive weighing balance and later grouped into three egg size categories as follows: Small (38-44 g), medium (45-52 g) and large (53-59 g) eggs of different sizes. All experimental eggs were stored at 21℃ temperature for three different time periods (fresh (0), 3 days and 6 days) and incubated in an automated sanitized electrical incubator at 99.50° F-99.75° F (37.5℃) with 60-65% relative humidity and turning hourly. Candling was done on 18th days to determine infertile eggs and dead in germs. By using these data, fertility and hatchability were calculated for each strain as follow

$$Feretility\ rate = \frac{number\ of\ fertile\ eggs}{number\ of\ incubeted\ eggs}\ x\ 100$$

Hatchability=.

Fertility of Eggs

The percentage of fertility was calculated on the basis of total eggs set:

Fertility rate (%) = No. of fertile eggs

No. of egg incubated) ×100

Mortality of Eggs

Mortality rate was determined in each replicate by dividing the number of unfertilized egg to the total number of fertile eggs.

Statistical analysis

Data obtained were subjected to statistical analysis using Completely Randomized Design (CRD). Consequently, a level of (P<0.01) was used as the criterion for statistical significance.

3 Result and Discussion

3.1 Effect of storage period on fertility and hatchability

The effect of the storage period on egg fertility and hatchability is presented in Fig 1 and fig.2, respectively. It was observed that egg fertility was higher on 3rd day as compared to fresh for all egg weight classes but the percent increase was small (0.48-1.12%). In contrast to this, fertility was decreased on 6rd day as compared to 0th day for all egg weight classes and percent decrease was 3.7-5.4%. For small egg class, egg fertility was 95.55, 96.02 and 92.13% respectively, on 0, 3 and 6 day of storage. Similarly, for medium-sized egg class, fertility was 95.17, 95.64 and 90.28% and for large sized egg class, it was 91.11, 92.15 and 87.41% respectively, on 0, 3 and 6 days of storage. The fertility and hatchability were found to be decreased as storage duration increased. Petek et al. (2005) reported fertility of quail eggs at 1, 3, 5 and 7 days were 89.52, 92.93, 89.34 and 86.71, respectively, which show a decrease in fertility of eggs with long storage. Othman et al. (2014) also reported that storage period had highly significant (P<0.0l) effect on fertility. A similar result was observed by Yadav et al (2021) in the Kuroiler breed of chicken.

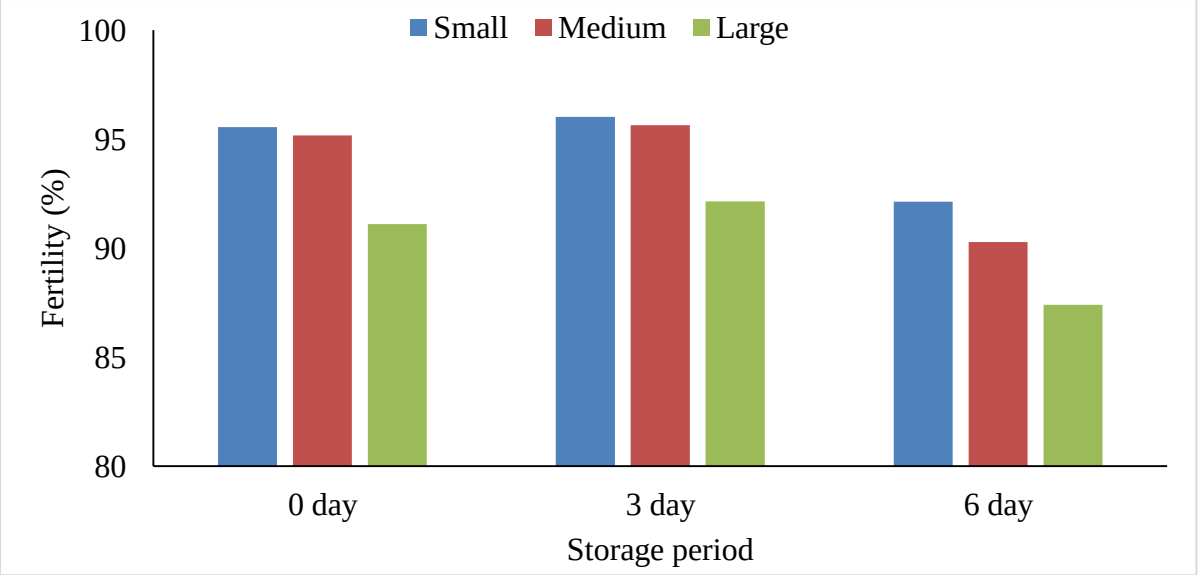

Fig 1: Effect of storage period on egg fertility in Chabro breed

3.2 Effect of storage period on mortality

The effect of storage period on mortality is given in Fig 2 and data revealed that embryonic mortality increased with increase in storage duration. Embryonic mortality was found higher on 6th day of storage as compared to 0 day and percent decrease was 12.3-19.6%. For small egg class, egg mortality was 20.95, 17.56 and 24.87% respectively, on 0, 3 and 6 day of storage. Similarly, for medium-sized egg class, mortality was 10.15, 8.45 and 12.63% and for large sized egg class, it was 29.30, 20.14 and 33.41% respectively, on 0, 3 and 6 day of storage. Fresh eggs had a significant rate of embryonic mortality, which could be attributed to internal egg causes. Alsobayel et al. (2017) found that embryonic mortality of Baladi eggs held for 5, 10, and 15 days was 16.40 %, 30.40 %, and 33.87 %, respectively, in their study. Reijrink et al. (2009) and Khan et al. (2014) found that embryonic mortality increases as storage time increases.

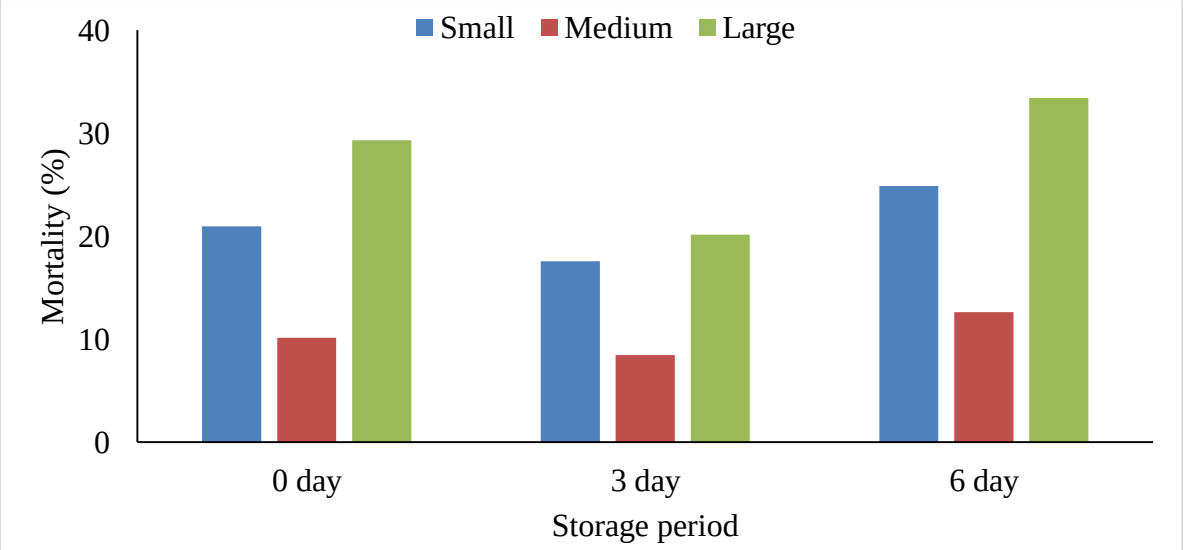

Fig 2: Effect of storage period on embryo mortality in Chabro breed

The regression equations and R^2 of exponential, linear, polynomial, Logarithmic, polynomial and power models are represented in Table 1. The relationship between egg fertility and embryo mortality was highest for polynomial equation (R^2=0.47) followed by Linear and logarithmic. Least correlation was observed for power equation with R^2=0.35.

Table 1: The regression equation between egg fertility and embryo mortality

Trend line name	**Regression equation**	**R^2**
Exponential	$y = 121730e^{-0.095x}$	0.36
Linear	$y = -1.8959x + 195.71$	0.44
Logarithmic	$y = -175\ln(x) + 812.49$	0.44
Polynomial (2^{nd} order)	$y = 0.1136x^2 - 22.828x + 1159.4$	0.47
Power	$y = 3E+18x^{-8.755}$	0.35

4. Conclusion

An investigation was conducted to study the effect of storage period on fertility and mortality in large, medium and small sized eggs of Chabro breed. The egg fertility was higher in eggs stored for 3 days as compared to 0 day while a decline was recorded for eggs stored for 6 days. Similarly, it was noticed that mortality increased with the increase of storage duration. Overall mortality was lowest for medium sized egg when compared to small and large sized.Therefore, egg storage should not exceed more than 3 days.

Reference

Ahmad Mohd, Singh B, Chauhan SS, Singh KS. Effect of breed, egg size and shape on fertility, late embryonic mortality and hatchability. Ind. J. Poult. Sci. 2000, 35(2): 207-210.

Alsobayel AA, Albadry MA. Effect of age and sex ratio on fertility and hatchability of Baladi and Leghorn laying hens. J. Anim. Plant Sci. 2012, 22(1): 15-19.

Augustine I, Shukla R. An analysis of opportunities and challenges in poultry sector in global and Indian perspectives. International Journal in Management & Social Science. 2015, 3(1): 27-35.

Khan MJ, Khan SH, Bukhsh A, Amin M. The effect of storage time on egg quality and hatchability characteristics of Rhode Island Red (RIR) hens. Vet. Arhiv. 2014, 84(3): 291-303.

Kingori AM, Tuitoek JK, Muiruri HK, Wachira AM, Birech EK. Protein intake of growing indigenous chickens on free-range and their response to supplementation. International Journal of Poultry Science. 2007, 6(9): 617-621.

Othman RA, Amin MR, Rahman S. Effect of egg size, age of hen and storage period on fertility, hatchability, embryo mortality and chick malformations in eggs of Japanese quail (Coturnix coturnix japonica). IOSR Journal of Agriculture and Veterinary Science. 2014;7(1):101-6.

Petek M, Dikmen S. The effects of prestorage incubation and length of storage of broiler breeder eggs on hatchability and subsequent growth performance of progeny. 2006, 51(2):73-77

Petek M, Başpınar H, Oğan MM, Balcı FM. Effects of egg weight and length of storage period on hatchability and subsequent laying performance of quail. 2005, 33(4): 242-247.

Reijrink IAM, Meijerhof R, Kemp B, Graat EAM, Van den Brand H. Influence of prestorage incubation on embryonic development, hatchability, and chick quality. Poultry Science. 2009, 88(12): 2649-2660.

Yadav S, Datt M, Choudhary OP, Kumar L. Effect of storage temperature and duration on fertility of Kuroiler breed of chicken. 2021, SP-10(2): 138-140

Yassin HAGJ, Velthuis AG, Boerjan M, van Riel J, Huirne RB. Field study on broiler eggs hatchability. Poultry Science. 2008, 87(11): 2408-2417.