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Correlation study of fertility, hatchability and mortality in Kuroiler and Chabro breeds of poultry

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Abstract
An investigation was carried out to study the effect of strain and egg weight on chick's weight in large, medium and small sized eggs of chicken strains. The study was conducted at poultry farm, SKN College of Agriculture, Jobner. A total of 297 eggs were collected and grouped into three egg size categories i.e. Small (38-44 g), medium (45-52 g) and large (53-59 g). It was observed that fertility was positively correlated with hatchability on (TES) and hatchability on (FES) for both the breeds. In both the breeds, fertility was negatively correlated with mortality and chick weight.

Keywords: fertility, hatchability, mortality, Chabro and Kuroiler

Introduction
Poultry is fastest growing sector of Indian agriculture today. Production of good-quality chicks is the prime objective of modern hatcheries in the world. However, basic information about effect of strain and egg weight on fertility and hatchability is required to develop this industry. While much research has been done on egg quality characteristics of existing breeds, there is limited knowledge on varieties produced and popularized in rural and tribal areas for backyard farming. The thorough characterization of these breeds is generally unavailable with respect to their features of egg fertility, hatchability, and growth efficiency.
There are important relationships between weights of the poultry eggs and fertility. Egg weight directly influences the fertility, hatchability, length of hatching, embryonic mortality, hatching weights and subsequent chick performance (Witt de and Schwalbach, 2004; Alkan *et al*., 2008; Alabi *et al*., 2012) [4, 2, 1]. Many researches (Donald *et al*., 2002; King'ori *et al*., 2007) [5, 8] has been found that performance of hatchability is closely related with egg weight because the prime impact of egg size lies in the mass of residual yolk sac that chick retain at hatching. Therefore, the present study was designed to determine the correlation between fertility, hatchability, mortality and chick weight for Chabra and Kuroiler breed.

Material and Method
Study Area
The experiment was conducted at Poultry Farm, S.K.N. College of Agriculture, Jobner, District Jaipur, (Rajasthan, India). The climate of this region is a typically semi-arid, characterized by extremes of temperature during both summers and winters.

Experimental procedure
For the present study, eggs were collected daily and stored at 21℃ temperature. 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 will be discarded. A total of 207 eggs of hatchable backyard strain for each strain 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. There were 3 treatments with 3 replication per treatment. Each treatment had 198 eggs with 99 eggs per replicate. All experimental eggs were incubated in an automated sanitized electrical incubator at 99.50̊ F-99.75̊ F (37.5℃) with 60-65% relative humidity and turning hourly. Candling was done on 18th day to determine infertile eggs and dead in germs respectively. Number of eggs that hatched per replicate within each egg size group were recorded at 21 day of incubation. The hatchability were recorded for each replicate. By using these data, fertility and hatchability. were calculated for each strain.

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

Hatchability of Eggs
Hatchability percentage was estimated on the basis of total egg set i.e. both fertile and infertile included and on the basis of fertile eggs. The hatchability percentage was determined in each replicate by dividing the number of hatched eggs per replicate by the total number of eggs set in each replicate and then multiplying by one hundred. The hatchling weight was measured by weighing the chicks in each replicate immediately after hatching**.**

(A) Hatchability percentage (on total egg set basis):
Hatchability on total egg set (TES) is determined by ratio of number of chicks hatched to the total number of eggs incubated.

Hatchability = (No. of chicks hatched ÷ Total no. of egg incubated) ×100

(B) Hatchability percentage (on fertile egg set basis):
Hatchability on fertile egg set (FES) is calculated by ratio of number of chicks hatched to the total number of fertile eggs incubated.

Hatchability = (No. of chicks hatched ÷ No. of fertile egg incubated) ×100

Statistical analysis
The correlation study was performed for both breeds using Pearson's method of correlation.

Result and Discussion
The correlation studies for Kuroiler breed revealed that, the egg fertility was positively correlated with hatchability on (TES) (Table 1). Similarly, egg fertility was positively correlated with hatchability on FES. The fertility was negatively correlated with mortality and chick weight for Kuroiler breed. Meanwhile, hatchability on (TES) was positively correlated with hatchability on FES but negatively correlated with mortality and chick weight. Likewise, hatchability on FES was negatively correlated with mortality and chick weight. The chick weight was positively correlated with mortality but magnitude was very small.

Table 1: Correlation of fertility, hatchability, mortality and chick weight for Kuroiler breed

	Fertility	H(TES)	H(FES)	Mortality	Chick weight
Fertility	1				
H(TES)	0.99	1			
H(FES)	0.99	0.99	1		
Mortality	-0.99	-0.99	-1	1	
Chick weight	-0.28	-0.18	-0.17	0.17	1

H (TES)- hatchability (on total egg set basis); H (FES)- hatchability (on fertile egg set basis)

The correlation studies for Chabro breed revealed that, the fertility was positively correlated with hatchability on (TES) and hatchability on (FES) (Table 2). The fertility was negatively correlated with mortality and chick weight for Chabro breed. Similarily, hatchability on (TES) was positively correlated with hatchability on FES but negatively correlated with mortality. Both hatchability on (FES) and hatchability on (TES) were positively correlated with chick weight but values were very low. The chick weight was negatively correlated with mortality but magnitude was very small.

Table 2: Correlation of fertility, hatchability, mortality and chick weight for Chabro breed

Parameters	Fertility	H(TES)	H(FES)	Mortality	Chick weight
Fertility	1				
H(TES)	0.84	1			
H(FES)	0.78	0.99	1		
Mortality	-0.78	-0.99	-1	1	
Chick weight	-0.51	0.02	0.13	-0.13	1

Similar result was reported by Patra *et al*. (2016) [9] and they found that fertility was positively correlated with hatchability on TES and hatchability on FES but negatively correlated with chick weight. Our result was consistent with a previous studies findings, which stated that egg weight was inversely correlated with hatchability (Farooq *et al*. 2001) [6] and that too large eggs should be discarded while incubating (Kalita 1994) [7]. Anandh *et al*. (2012) [3] discovered that as the weight of the turkey egg increased, the overall hatchability, viable egg hatchability, and fertility % increased as well.

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