

REPRODUCTIVE PERFORMANCE OF HARCO, SHAVER STAR CROSS AND HYPECO WHITE UNDER THE HUMID ENVIRONMENT

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ABSTRACT

Reproductive performance measured by fertility and hatchability of eggs, was studied in three commercial breeds of chicken; Harco, Hypeco White and Shaver Star Cross. Day-old parent stock chicks were obtained from three different sources, raised and stocked in a sex ratio of 1 cock: 7 hens for monitoring of the two traits under the sub-humid environment. No significant difference ($P < 0.05$) was obtained for percent fertility of eggs, mean values of which were 84.67, 80.89 and 81.17% for Harco, Hypeco White and shaver Star Cross respectively. Average percent hatchability of fertile eggs was significantly higher for Shaver Star Cross (89.96%) than for Harco (83.11%) and Hypeco White (79.02%).

INTRODUCTION

The recent increased awareness in poultry production in the country demands a corresponding increase in day-old chicks supply by hatcheries. Lack of good quality hatchable eggs and highly productive indigenous parent stock chicken appear to contribute to the inadequate day-old chick supply to farmers in the country.

According to Oluyemi and Roberts (1979) fertility and hatchability of eggs are both functions of breed and environment. Nesheim *et al.* (1979) observed that breed differences exist in fertility and hatchability, hence the authors suggested a careful parent stock selection for these genetically controlled traits under different environments. Inclusive among environmental factors that affect fertility and hatchability of chicken eggs are the pre-incubation storage factors like length of storage time and temperature at which eggs are held (Wilson, *et al.*, 1984). Thus Kaltofen and Jack (1981) suggested optimum storage temperature and humidity for

hatchable eggs to range between 58-60°F and 80-85% respectively. Merrit (1964) recommended that eggs can be stored for between 7 and 14 day without any significant decrease in hatchability.

There is a dearth of information in the country on breed differences in the two parameters. The following experiment was designed to compare fertility and hatchability of eggs from Harco, Hypeco White and Shaver Star Cross under the warm humid environment.

MATERIALS AND METHODS

Stocks:

Three commercial breeds of chicken were used for the study. Harco and Hypeco White breeders were obtained from two Poultry Farms within the country, Ota and Sapele respectively while Shaver Star Cross Chicks were imported from Belgium. Harco and Shaver Star Cross are commercial egg-type breeds while Hypeco White is a meat-type. All birds were received on the research farm as day-old chicks and raised to point of lay under standard deep-litter management.

Experimental Procedure:

Each genetic group of birds used in the study comprised 250 hens and 36 cocks of 30 weeks of age which were respectively raised in two replicates to give a total of 500 hens and 72 cocks. Breeders were managed under the deep litter system in a mating ratio of 7 hens: 1 cock. Experimental birds were fed with a commercial breeder mash (3.08 Mcal/M.E., 15.31% protein) and watered *ad-libitum*. Collection of eggs for setting commenced at an average age of 32 weeks which was two weeks after cocks were introduced to the hens. Eggs from the groups were marked according to breed and stored 1 to 10 days at 14°C before setting. However, prior to setting, eggs were fumigated with formalin and

potassium permanganate in the ratio 1:2 for 15 minutes.

Fertile eggs were identified by candling at the 18th day of incubation and transferred to hatching trays immediately. A commercial "Western 19" incubator with a capacity for about 5,000 eggs was used. Fertility and hatchability of fertile eggs were measured from 32 to 41 weeks of age and a total of six hatches were monitored.

Statistical Analysis

Fertility and hatchability percentages were analysed using the model:

$$Y_{ijk} = \mu + B_i + H_j + \epsilon_{ijk}$$

where

Y_{ijk} = the observation (fertility & hatchability).

μ = True population mean.

B_i = Breed effect.

H_j = Hatch effect.

ϵ_{ijk} = Experimental error.

Percent fertility and hatchability were analysed by a one-way analysis of variance between breeds

TABLE 1. MEAN PERFORMANCE OF HARCO, HYPECO WHITE AND SHAVER STAR CROSS

Trait	Breed		
	Harco	Hypeco White	Shaver Star Cross
Age at first egg (days)	150a	154a	152a
Body weight at point of lay (g)	1155a ± 2.35	1215b ± 3.75	1125a ± 2.54
Average egg weight (g)	58.50a ± 1.75	60.02a ± 0.98	54.05a ± 1.02
Mean Percent Fertility	84.67a ± 3.11	80.89a ± 1.76	81.17a ± 4.02
Mean % Hatchability	83.11a ± 1.60	79.02a ± 1.55	89.96b ± 3.21

^{a, b} Percentages within a row with different superscripts are significantly different ($P < 0.05$).

and hatch. Significant differences among means were determined by Duncan's new multiple range test (Snedecor and Cochran, 1967).

RESULTS AND DISCUSSION

Hens of the three commercial breeds came into lay at their 22nd week of age. However, it was observed that Hypeco White hens started to lay on the average 2 days later than their Shaver Star Cross counterparts and 4 days after the Harco hens (Table 1). Okorie (1977) suggested that good layers should start egg production between 21 and 22 weeks of age. Mean body weights of the pullets at point of lay were 1215, 1225 and 1154g for Hypeco White, Shaver Star Cross and Harco respectively. A similar trend was noted with mean egg weights which were 60.02g (Hypeco White), 54.05g (Shaver Star Cross) and 56.56g (Harco) during the period of 32-41 weeks. The apparently higher mean body and egg weights recorded in this study for Hypeco White over those of Shaver Star Cross and Harco could be that Hypeco White used as a broiler parent stock must have been selected in favour of higher value of body weight. Results of this study also suggest a positive correlation between body size and egg weight.

Percent fertility for the six hatches within the genetic groups were similar (Table 2). Results show a decreasing trend in percent fertility with age for both Harco and Hypeco White. This observation agrees with findings of Avigdor, Zafrira and Israel (1986).

Percent hatchability of fertile eggs showed significant difference ($P < 0.05$) among the breeds with highest value (92.10%) for Shaver Star Cross and lowest value (76.94%) for Hypeco White (Table 2). Significant differences in hatchability indicate higher breed sensitivity to environment in embryonic development and mortality than fertilization which was as well suggested by Avigdor *et al.* (1986). A decreasing trend in percent hatchability with age similar to that for % fertility was also observed in Harco and Hypeco White. This could be partly due to increasing number of large sized eggs produced by the two breeds with age. Dasparakayastha (1980) observed that large eggs do not hatch well.

TABLE 2. FERTILITY AND HATCHABILITY PERCENTAGE OF EGGS LAYED BY HARCO, HYPECO WHITE AND SHAVER STAR CROSS

Hatch	Harco		Hyperco White		Shaver Star Cross	
	%Fertility	%Hatchability	%Fertility	%Hatchability	%Fertility	%Hatchability
1.	89.50	85.05	83.01	81.33	79.10	83.50
2.	85.16	84.90	82.52	80.06	79.20	90.91
3.	85.84	83.33	81.25	79.29	77.42	92.10
4.	84.52	82.46	80.76	78.27	81.40	91.35
5.	82.79	81.50	79.25	78.25	81.10	91.30
6.	80.22	81.44	78.56	76.94	88.80	90.60
-						
x	84.67	83.11	80.89	79.02	81.17	89.96
S.D.	± 3.11	± 1.60	± 1.76	± 1.55	± 4.02	± 3.21

Eggs of the Hypeco White and Harco were larger than those of Shaver Star Cross. The superiority of Shaver Star Cross and Harco over Hypeco White in hatchability could be attributed to breed and type effects described by Pascal (1981) and Oluyemi and Roberts (1979).

Under wet tropical condition, therefore, hatchability of eggs from Shaver Star Cross (89.96%) which was significantly higher than those (83.11 and 79.02%) for eggs of Harco and Hypeco White respectively, was above the 88% recommended for hatcheries by Muller (1980).

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