

Effect of Housing System on Production Performances of Different Broiler Breeder Strains

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Abstract.- The study was carried out to investigate the effect of housing system on the production of Arbor acres and Hubbard broiler breeder strains and monitor the differences in production potentials on open and controlled housing on deep litter systems, using data collected in 25 broiler breeder farms visited physically situated within Lahore district and data was generated. At Arbor acres and Hubbard breeder farms under controlled (n=12) and open housing systems (n=13) farms (Un-balanced data to minimize error) under each housing system respectively. It was observed that the number of eggs and peak production average was higher at breeder farms under controlled housing system than those managed under open housing system; while feed intake from 0-24 weeks was almost equal under both the housing systems; but relatively higher under controlled housing from 25-64 wk. There was significant (P<0.05) difference between groups for 25-64 wk production, initial body weight, number of eggs/bird, peak production averages, feed intake 0-24 weeks and 25-64 weeks. Environmentally controlled housing system is recommended to breeder farm owners; despite initial higher cost. The egg production per hen was however not significantly different from that in open housing.

Keywords: Broiler breeder, housing systems, feed intake, egg production, mortality.

INTRODUCTION

Poultry farming is widely adopted in Pakistan for its nutritive and economic values. The households keep birds for household consumption, sale and reproduction purposes including other social and cultural roles (GOP, 2011). Broiler breeders supply day-old grandparent and parent stock chicks to customers and there are three major brands in the world including Arbor acres, Ross, and Hubbard. The reproductive inefficiency of broiler breeders increases with age.

Housing and management of poultry parent stock is mainly aimed at providing the conditions that ensure optimum performance of the birds (Bell and Weaver, 2001). The poultry provided with standard management are very successful at hatching their chicks, but good hatchability using artificial incubation relies on careful management of temperature, humidity, ventilation, position and egg turning. The water loss during incubation depends on

shell structure and the humidity of the air surrounding the egg (Barnett *et al.*, 2001).

Most of the farmers usually do not take advantage of controlled housing. The controlled housing, though has initial higher investments, but ultimately have more profitability margins.

The present study was carried out to investigate the effect of open and controlled housing system on the production of two different strains, Arbor acre and Hubbard broilers breeder parent stock, to statistically evaluate its different parameters on two major housing systems of intensive housing on deep litter floors on risk husk litter material.

MATERIALS AND METHODS

This study was carried out to investigate the effect of housing system on the production of Arbor acre and Hubbard broilers in 25 broiler breeder farms in Lahore District during 2010 to 2011 under controlled (n=12) and open housing systems (n=13). For collection of data, only those farms were selected which already had culled their previous flocks. A complete picture of the flock from day old upto culling age, which was 0-64 weeks, was

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studied. A proforma for collection of data related to broiler breeder parent flocks, farm details, inventories and land/housing was used. The specific parameters recorded were feeding schedule during two phases *i.e.* rearing from (0-24 weeks) and production (25-64) weeks, and vaccination under specific climatic conditions and during disease outbreaks, lighting schedule of breeder farm. Mortality was also recorded in each flock during rearing and production period. Percent mortality and percent egg production was calculated.

Out of total production of hatching eggs there was average which was calculated on the basis of maximum of production days

Pearson product-moment correlation Formula: $r = \frac{\sum (xy)}{\sqrt{(\sum x^2) * (\sum y^2)}}$

Linear correlation (sample data): $r = \frac{1}{(n-1)} * \sum \left\{ \left[\frac{(x_i - \bar{x})}{s_x} \right] * \left[\frac{(y_i - \bar{y})}{s_y} \right] \right\}$

The data thus collected was subjected to statistical analysis by using SPSS 7.0 version of computer software, and un- balanced data available in each strain and housing system of the area was analyzed.

RESULTS

Arbor acre parent stock

Table I shows production performance of Arbor acres parent flocks in two different housing systems (controlled and housing). It was observed that the number of eggs and peak production average was higher at breeder farms under controlled housing than those of open housing; while feed intake from 0-24 weeks was relatively higher under open housing system than controlled housing. However, the mortality of broiler breeders was markedly higher under controlled housing system as compared to those housed in open housing system (Table I).

Hubbard parent stock

Table II shows production performance of Hubbard parent flocks in controlled and housing systems. The data indicate that the initial live body weight of Hubbard broiler breeder chicks managed

Table I.- Production performance of Arbor acres parent flocks in two different housing systems.

Treatment	System of housing	No. of farms	Mean±SE
Initial live body weight in (g)	control house	12	44.42±0.68
	open house	13	44.37±0.84
Egg production (No.)	control house	12	137.93±1.86
	open house	13	133.31±1.94
Peak egg production averages (No.)	control house	12	83.57±0.82
	open house	13	81.81±0.88
Feed intake 0 to 24 weeks (kg)	control house	12	13.85±0.31
	open house	13	14.08±0.38
Feed intake 25 to 64 weeks (kg)	control house	12	48.52±0.99
	open house	13	48.78±0.94
Total mortality (Percent)	control house	12	10.26±0.57
	open house	13	7.78±0.89

Table II.- Production performance of Hubbard parent flocks in two different housing systems

Housing system	No. of farms	Mean±SE	
Hen housed in total numbers	Control House	12	8331.83±1339.39
	Open House	13	7167.69±2076.35
Bodyweight (g)	Control House	12	40.33±0.71
	Open House	13	40.23±0.82
No of eggs per hen housed	Control House	12	143.83±2.08
	Open House	13	142.08±2.65
Peak production in %	Control House	12	83.67±0.90
	Open House	13	82.92±1.00
Feed intake 0-24 weeks (kg)	Control House	12	14.12±0.24
	Open House	13	14.15±0.25
Feed intake 25-64 in (kg)	Control House	12	47.79±0.86
	Open House	13	46.92±0.75
Rearing mortality% 0-25 week	Control House	12	5.56±0.54
	Open House	13	6.23±1.13
Production mortality% 25-64 weeks	Control House	12	12.54±0.69
	Open House	13	10.19±1.17

under controlled housing (n=12) and open housing system (n=13) was 40.33±0.71 and 40.23±0.82 g indicating no marked difference in the initial body

weight of chicks under both the housing systems. The total number of hen housed at 12 breeder farms under controlled housing was 8331.83 ± 1339.39 birds, while under open housing system the total number of hen housed was 7167.69 ± 2076.35 birds. The total number of eggs per hen housed under controlled housing system was higher (143.83 ± 2.08) than those in open housing system (142.08 ± 2.65). The peak egg production was higher under controlled housing system ($83.67 \pm 0.90\%$) as compared to open housing system ($82.92 \pm 1.00\%$) (Table II).

The results of 't' test (Table III) indicated non-significant ($P > 0.05$) differences between groups for 25-64 weeks production ($F=3.29$, $P=0.08$), initial body weight ($F=1.646$, $P=0.21$), number of eggs/bird ($F=0.00$, $P=0.99$), peak production averages ($F=0.11$, $P=0.74$), feed intake 0-24 weeks ($F=1.86$, $P=0.18$), feed intake indicate no marked variation between the groups for any of the parameters investigated.

Table III.- Production parameters of Hubbard strain between groups ('t' test)

Parameters	F	Prob.	't'	Mean Difference	Std. Error Difference
Production 5-64 weeks	3.29	0.08	2.26	2.48	1.09
Initial body weight	1.64	0.21	0.04	0.05	1.10
No. of eggs	0	0.99	1.71	4.62	2.71
Peak production averages	0.11	0.74	1.45	1.76	1.21
Feed intake to 24 weeks	1.86	0.18	-	-0.22	0.50
Feed intake 25 to 64 weeks	0.1	0.75	0.19	-0.26	1.37

Correlation

Correlation of total egg production in open housing system for keeping broiler breeder in study area indicates that larger size of broiler breeder reared and hen housed has higher positive co-related between each other (Table IV). By providing recommended feed in gms/kg, the broiler breeder produced and maintained level of production and similarly number of hen housed and total egg

produced per hen housed is higher in controlled housing system with is the major goal of the farming at time of housing system. Furthermore broiler breeder parent stock business of study area have capabilities to better performance peak production feeding intake during rearing and mortality percent during rearing and production.

Table IV.- Correlation of open/controlled housing on the basis of total egg production in both the strains

Description	Correlation value in open housing system	Correlation value in controlled housing System.
Total egg production: Hen housed in total numbers.	0.74	0.87
Total egg production No of eggs per hen housed	0.37	0.41
Total egg production Bodyweight (g)	0.86	0.98
Total egg production Peak production (%)	0.97	0.97
Total egg production: Feed intake 0-24 weeks (kg)	0.05	0.05
Total egg production : Feed intake-25-64 (kg)	0.05	0.05
Total egg production : Rearing Mortality% 0-25 week	0.58	0.65
Total egg production : Production mortality % 25-64 weeks	0.70	0.74

DISCUSSION

It was observed during the study of Hubbard entrepreneur that the number of eggs and peak production average was higher at breeder farms under controlled housing system than those managed under open housing system; while feed intake from 0-24 weeks was almost equal under both the housing systems; but relatively higher under controlled housing from 25-64 weeks. Pakistan holds a share 53-54% of broiler breeder parent stock from Hubbard. It is equally good competitive strain in Pakistan with other larger strains and sometimes shown its dominance over others, anyhow market competition is there.

However, the mortality of broiler breeders from 0-24 weeks was higher under open housing system, but from 25-64 weeks, the mortality was higher in flocks under controlled housing system

Arbor acres, these results coincide with those of Bell and Weaver (2001) who found that housing conditions of poultry birds play very important role and poultry parent stock should be provided the conditions that ensure optimum performance of the birds. They also argued that housing quality differed markedly in developed and developing countries of the world; but in recent times controlled housing systems are flourishing very fast. The present study is in agreement with the findings of Barnett *et al.* (2001), Le-Bihan *et al.* (2001) and Dagher (2001) who reported higher mortality, under traditional housing and lower mortality under controlled housing condition. Lewis and Morris (2006) and Ahlers *et al.* (2009) reported that improvement in the housing system results in improved welfare health of the birds. Arbor Acres Farms Inc was started by the Frank Saglio and his brother near Glastonbury, Connecticut in 1917 as a fruit and vegetable farm and the first chicken house was built from a discarded piano crate in 1923. Poultry production grew and continued growing until in 1939 when Harry Saglio and his two brothers commenced poultry breeding. The company produced layers and broilers and was most noted for the female line broiler in the US and international market. With the broiler the original breeding plan was to produce a female line which produced large number of broiler chicks. Each broiler production company choosing the male best suited to their market needs. The most successful cross in the post World War 2 years was with the Vantress male. Charles Vantress developed the Vantress Cornish male and with the Nichols female won the first and second (and last) "Chicken-of-Tomorrow Contest". Housing and management of poultry parent stock is mainly aimed at to provide the conditions that ensure optimum performance of the birds (Bell and Weaver, 2001).

Broiler breeder meat type

Viagen has three poultry breeding brands: Arbor acres, Ross and L.I.R. delivering day-old grandparent and parent stock chicks worldwide. C.W.T. provides hatching eggs for the broiler

market. Cornish cross strains mostly available in Pakistan in the form of white chicken broiler we observe every day. Most of today's meat-type breeds of chickens are not really breeds at all. Instead, they are hybrid varieties or combinations of many different breeds. The combinations of breeds are selected to produce a variety or strain with meat characteristics that the producer desires most. These strains are used by broiler producing companies that commercially produce broilers sold in supermarkets *i.e.* White Leghorn (WL) cockerels with Australorp (AL) hens. Redbro, Mastergris JA57 Co'NU Gris Barre and Colopak are some of the strains.

Cornish and Cornish crosses

This breed is the finest for the meat industry and lays the foundation of the broiler industry. The development and arrangement of the muscles give it a good carcass shape. The color of the skin of this breed is yellow and the color of the eggshell is brown. They are found in dark, white, white laced and buff varieties and weigh somewhere around ten pounds. This breed developed in the county of Cornwall country in England. They have a broad and well-muscled body. The management quality is different in developed and developing countries of the world. The poultry provided with standard management are very successful at hatching their chicks, but good hatchability using artificial incubation relies on careful management of temperature, humidity, ventilation, position and egg turning; because in the course of incubation period the water vapor through its shell and water losses. The water loss depends on both the shell structure and the humidity of the air surrounding the egg (Barnett *et al.* 2001; Dagher, 2001). The hatching quality also associated with the age and health of the breeder flock, evenness and cleanliness of the eggs. Hence, the poultry management is of utmost importance and management includes poultry health, appropriate brooding, rearing, growing and laying conditions; vaccinations as per recommendations and appropriate feeding program (Barnett and Glatz, 2004; Glatz and Bolla, 2004; Galobart and Moran, 2005; Lewis and Morris, 2006). In developing countries, the performance of could be lower than the standards due to relatively weaker housing conditions, lack of quality feed,

vaccines and vaccinations and more importantly availability of trained staff (Ahlers *et al.*, 2009).

CONCLUSIONS

Co- relation in controlled housing is higher than the open indicates the controlled housing shown better productive performance than open housing system. Number of eggs was higher in Hubbard breeders than the arbor acres. In Arbor acre breeders the mortality was higher in controlled housing system than open housing system; while in Hubbard breeders the mortality from 0-25 wk was higher under open housing system and during 26-64 wk the mortality was higher under controlled housing system. The initial body weight of Arbor acre chicks was almost higher than the Hubbard. Environmentally controlled housing system is suggested to breeder farmers as well as broiler farmers in order to get good production results, Apart from its higher initial expenditures it is more profitable to the farmers, easier in management, reduced labor cost, lower risks of diseases, lower mortality, good production percentages and improved quality of egg shells. Egg production per hen housed is comparatively better as compared to the open housing system.

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