The Haryana Veterinarian (March, 2024) **63(SI),** 15-18 ISSN 0033-4359 (P) **Research Article**

SURVEY OF BROILER FARMS IN HARYANA TO ASSESS THEIR PERFORMANCE EFFICIENCY AND FACTORS AFFECTING IT

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ABSTRACT

The Indian poultry population showed a growth rate of 16.81% during 2012-2019 and is expected to grow further. The performance of broilers can be assessed by calculating Feed Conversion Ratio (FCR) and measures can be taken to increase the performance of broilers with low FCR which helps in growth of broiler industry. A total of 75 farms were selected randomly in Haryana and the questionnaire with the predetermined set of questions required to fulfill the objective of study was filled by the interviewer. The study was undertaken with the objective of assessing the average body weight of broilers in various broiler farms scattered over the state of Haryana and its relationship with various factors like age, agro-climatic zone, type of operations, etc. Farms located in the Western zone had birds with lower body weight (1.99±0.36 kg) as compared to Eastern zone (2.11±0.43). The average body weight of birds fed on paper underlay was 2.09±0.42 kg, higher than without it (1.92±0.36 kg). Birds of farms that were closed for 15-30 days and <10 days had body weights of 2.12±0.42 and 1.97±0.46, respectively. Farms where other livestock were housed in the shed for 3 months had lower body weight (1.92±0.29 kg) as compared to those where no such animals were housed (2.11±0.44 kg). Farms that provided access to outsiders had lower body weight birds (1.93±0.32 kg) as compared to farms that don't allow outsiders in their farms (2.10±0.43 kg). To increase the average weight gain of birds, biosecurity measures like sanitation/disinfection of farm and utensils, restricted access on the farm, proper disposal of waste and dead birds, timely treatment of affected birds and vaccination of the apparently healthy birds for control of disease outbreak should be employed.

Keywords: Body weight, Broilers, Haryana, Performance efficiency

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The Indian poultry population showed a growth rate of 16.81% during 2012-2019 i.e., 729.21 million to 851.81 million. Out of the 851.81 million poultry population of India, Haryana alone contributes 46.29 million despite its small geographical area (~1.4% of the total land area of India) accounting for 5.43 % of the total poultry population (DAHD, 2020) making place among the top five states in terms of meat production from poultry (CSE, 2014).

Various measures of assessing performance efficiency in broilers utilize live weight as one of the components like Feed efficiency or feed conversion ratio, Broiler Performance Efficiency Factor and Broiler Farm Economy Index (TNAU, 2010). This study was undertaken with the objective of assessing the average body weight of broilers in various broiler farms scattered over the state of Haryana and its relationship with various factors like age, agro-climatic zone, type of operations, etc.

MATERIALS AND METHODS

Selection of farms: For the study, a total of 75 farms were selected randomly. It was also ensured that there is at least a 5 km difference between the two farms (Fig. 1). Information about average body weight was acquired from the owner along with another factor that may affect the performance of birds through a well-designed questionnaire as given below. The farms were surveyed from Nov. 2019 to Feb. 2020.

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Designing of the questionnaire: Questions were selected for the questionnaire that were required for the fulfilment of the objectives of the research work. A Questionnaire from previously existing study (Lyngstad *et al.*, 2008) was improvised to make it suitable for the present study. The Questionnaire involved both Open-ended and close-ended questions. The Questionnaire involved information related to i) General characteristics of farms (including geographical location using Epi Info™ software), ii) Routine managemental practices, iii) Biosecurity measures followed, iv) Antimicrobial usage, v) Vaccination history, vi) Disease occurrence history and management, vii) Nutrition and viii) Ventilation system adopted. The Questionnaire was filled out by the interviewer himself.

Data entry, coding and analysis: All the data collected through questionnaires was entered and systematically organized in Microsoft Excel. The data was appropriately coded for making it suitable for analysis by statistical software. The farm characteristics that had less than five farms in any of the categories were excluded for analysis to enhance the validity of the research. All the statistical analysis was carried out using STATA™IC/15.1.

RESULTS AND DISCUSSION

The average body weight of birds of surveyed farms was 2.06±0.41 Kg with a minimum of 1.2 and maximum of 3.25 Kg.

Relationship between body weight and age of birds: Scatter plot (Fig. 2) and Correlation analysis of the relationship between age and average body weight indicated a significant association between the two with a correlation coefficient of 0.7211 ($p<0.001$) (Table 1).

Linear regression equation between body weight and age is given by: $Y = 93.19113X - 1007.724$

Where Y is body weight in grams and X is age in days.

The adjusted R2 value was 0.5199, which indicates that 51.99% variation in body weight can be attributed to the age of the bird. These findings are in correspondence with fact that weight of broiler birds increases with the age provided proper feeding, managemental and environmental conditions and this relationship may change if feeding, managemental or environmental conditions become adverse.

Using the above formula body weight of broilers in Haryana at 4-6 weeks of age can be calculated as in Table 2.

According to Virbac India (Virbac, 2019), the average body weight of broilers at 28, 35 and 42 days is around 1.4, 1.98 and 2.62 kg, respectively. In comparison to these standards, the average body weight of broilers in Haryana is significantly higher which may be due to better environmental and managemental conditions.

Relationship between various factors and body weight of birds:

Correlation analysis of the relationship between flock size and average body weight showed that the two are not related to each other with a correlation coefficient of 0.0076 ($p=0.95$) (Table 1). The relationship between body weight and various farm characteristics is given in Table 3.

Analysis for confounding: To rule out the confounding by age, the association between different farm characteristics and age was assessed. It was observed that there was a significant association between age and the kind of litter used ($p=0.0093$) and also, whether there is access to outsiders or not (0.0214). However, models adjusted for age showed no significant association between body weight and the kind of litter used ($p=0.6061$) as well as body weight and access to outsiders ($p=0.7579$) (Table 4).

Although we were not able to prove an association between the body weight of the birds and some farm characteristics, further study with more no. of farms in the survey with targeted farm characteristics may elucidate this relationship. These characteristics include:

i) Location of farm: Though statistically non-significant, farms located in the Western zone had birds of lower body weight (1.99±0.36 kg) as compared to farms in the Eastern zone (2.11±0.43). The state of Haryana is divided into agroclimatic zones, namely, Eastern and Western, based on the average rainfall it receives in a year (Govt. of Haryana, 2011). In the western zone of Haryana, the climate is harsher than in the eastern zone and may affect the performance of broilers of farms located in two zones (Vaishali *et al.*, 2020).

Table 1. Relationship between body weight and age and flock size (N=75)

Characteristic	Min.-Max.	Mean±S.D.	Correlation coefficient	p-value
Age (in days)	28-44	32.88±3.16	0.7211	<0.01
Flock size (No. of birds)	1500-18500	10085.7±3495.2	0.0076	0.95

Table 2. Body weight of broilers in Haryana at 4-6 weeks of age

Age in weeks	Body weight (Kg)
4 (28 days)	1.60
5 (35 days)	2.25
6 (42 days)	2.90

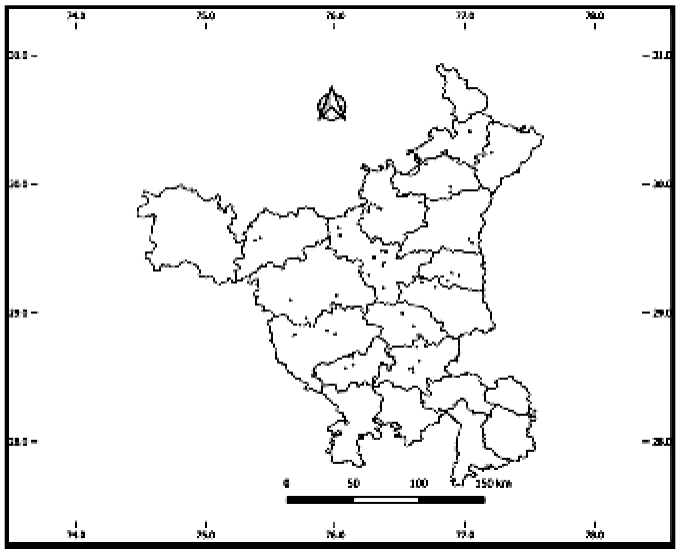

Fig. 1. Location of Farms under study in the Haryana state

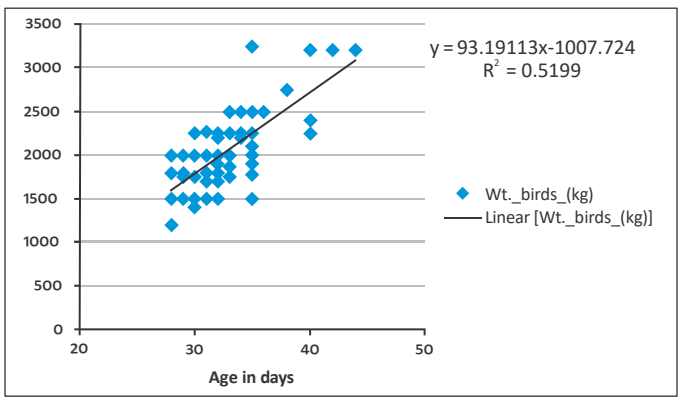

Fig. 2. Scatter plot between age (in days) and average body weight of broilers in different farms of Haryana

Table 4. Association between average body weight and different farm characteristics adjusted for age calculated by multivariate ANOVA

Characteristic	Category	No.	Body weight (Mean±S.D.)		p-value
			28-35 days	36-44 days	
Kind of litter used in the broiler house	Packed	62	2.00±0.33 (59)	2.55±0.18 (3)	0.6061
	Unpacked	13	1.89±0.32 (9)	2.96±0.48 (4)	
Access to outsiders	No	55	2.00±0.33 (48)	2.79±0.42 (7)	0.7579
	Yes	20	1.93±0.32 (20)	-	

Table 3. Association between average body weight and different farm characteristics calculated by ANOVA

Characteristic	Category	No.	Body weight (Mean±S.D.)	p-value
Type of farm	Contracted operations	20	1.95±0.41	0.166
	Independent operations	55	2.10±0.40	
Number of flocks on farm	1	25	1.96±0.38	0.363
	2 to 3	36	2.11±0.43	
	>3	14	2.08±0.39	
Agroclimatic zone	Eastern	40	2.11±0.43	0.200
	Western	35	1.99±0.36	
Kind of litter used in the broiler house	Packed	62	2.02±0.34	0.114
	Unpacked	13	2.22±0.63	
Access to outsiders	No	55	2.10±0.43	0.099
	Yes	20	1.93±0.32	
Presence of any farm nearby in the range of	<1 km	9	1.94±0.44	0.610
	1-5 km	35	2.09±0.43	
	>5 km	31	2.05±0.38	
Livestock or pet animal housed in the shed for 3 months	No	54	2.11±0.44	0.064
	Yes	21	1.92±0.29	
Days, broiler house closed before new input (days)	<10	12	1.97±0.46	0.512
	10 – 15	33	2.03±0.38	
	15 – 30	30	2.12±0.42	
No. of labourers	≤1/shed	10	2.07±0.46	0.911
	>1/shed	65	2.05±0.4	
Intensity of house flies(/m^3) outside the farm	≤ 5	45	2.03±0.35	0.463
	6 to 50	30	2.10±0.48	
Hygiene measures (Hand washing)	No	51	2.09±0.43	0.342
	Yes	24	1.99±0.36	
Hygiene measures (Feeding of the chickens on paper underlay (placed on the floor) during the first few days)	No	15	1.92±0.36	0.139
	Yes	60	2.09±0.42	
Routine of adoption of hygienic measures	Occasionally	11	2.14±0.52	0.486
	Routine basis	64	2.04±0.39	
Rodent problem	No	9	1.95±0.29	0.408
	Yes	66	2.07±0.42	

ii) Feeding of the chickens on paper underlay (placed on the floor) during the first few days: Average body weight of birds fed on paper underlay rather was 2.09±0.42 kg, higher than without it (1.92±0.36 kg). It has been observed that sprinkling a little starter ration on a paper towel or paper plate helps the chicks find feed, which leads to more feed consumption leading to an increase in weight gain. As soon as most chicks start pecking freely, the feed-covered paper is removed (Damerow, 2017).

iii) Days, broiler house closed before new input: Birds of farms that were closed for 15-30 days had a body weight of 2.12±0.42 and the birds housed in farms that were

closed for <10 days had a body weight of 1.97±0.46 which may be due to reduced load of pathogenic organisms during higher inter-flock interval. Sasaki et al., 2014 also documented that flocks with an intermediate or long-time interval between successive flocks had a higher production index than those with a short time interval ($P < 0.05$).

iv) Livestock or pet animal housed in the shed since 3 months: Birds in the farms where other livestock or pet animal was/were housed in the shed since 3 months had lower body weight (1.92±0.29 kg) as compared to those where no such animals were housed (2.11±0.44 kg).

v) Access to outsiders: Farms that provided access to outsiders had lower body weight birds (1.93±0.32 kg) as compared to farms that do not allow outsiders in their farms (2.10±0.43 kg).

Allowing other livestock/pet at broiler farms and allowing outsiders to the farm breach the bio-security measures leading to reduced performance of birds on the farm (DAHD, 2015; Souris *et al.*, 2014).

CONCLUSION

To increase the average weight gain of birds, biosecurity measures like sanitation/disinfection of farm and utensils, restricted access on the farm, proper disposal of waste and dead birds, timely treatment of affected birds and vaccination of the apparently healthy birds for control of disease outbreak should be employed. Creating awareness among the farm owners and workers about adequate anti-microbial drug use, the significance of hygienic practices and the strict adoption of biosecurity measures will help in boosting the income of broiler farmers.

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RETRACTION OF ARTICLE

This article earlier available at https://www.luvas.edu.in/haryana-veterinarian/download/harvet2016-dec/1.pdf entitled *"Occurrence of some organochlorine pesticide residues in poultry feed and meat"* has been retracted by the authors because of some error made during the data analysis process of the experimental observations due to counting the number of samples showing the concentration of pesticide below its corresponding Limit of Detection. All authors take full responsibility for this mistake and sincerely apologize for any inconvenience it may cause.

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