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Research Article

EFFECT OF DIFFERENT LITTER MATERIALS ON GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILER CHICKEN

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Abstract

The experiment was conducted to assess the effect of two different types of litter materials (saw dust and rice husk) on growth performance and carcass characteristics of broiler chicken. A total of 150 nos. of day-old Ross broiler chicks were randomly selected and divided equally into five groups, 3 replications were carried out for each group taking 10 birds in each replicate. In this study, Group-I was provided with 100% saw dust, Group-II -100% rice husk, Group-III -75% sawdust +25% rice husk, Group-IV -50% saw dust + 50% rice husk and Group-V 25% saw dust + 75% rice husk. During the experimental period, standard feeding and uniform management practices were applied. Growth performance parameters viz. live body weight (LBW), cumulative body weight gain (CBWG), cumulative feed intake (CFI), and feed conversion ratio (FCR) were measured at weekly intervals up to 6 weeks of age. After 6 weeks of the study, six birds were randomly selected from each replicate group, and slaughtered and dressed for evaluation of carcass characteristics of broiler chicken. The results showed that up to 2 weeks of age, there was no significant difference in LBW, CBWG, CFI and FCR among the groups; but during growing to finishing stages (from 3 weeks to 6 weeks) the litter materials had played significant role, and comparatively better performance was noticed in birds those were raised on saw dust. Therefore, saw dust may be used as a litter material for better growth performance in broiler chicken.

Key words: Broiler chicks, Carcass traits, Growth performance, Litter materials

INTRODUCTION

Poultry business is one of the top rising sections of farming sector in India with around 8 percent annual growth. In India, this sector has undergone a perceptible wing in structure and operation from a meagre backyard activity to a key mercantile agri-based industry over a period of four decades. Generation of broiler varieties (2.4-2.6 kg at 6 wks of age) together with standardized package of practices on nutrition, housing, management and disease control have contributed a lot of imposing significant growth rates in broiler production (8-10 per annum), and in turn increases the per capita availability to 2.5 kg of meat. However, it is far below the recommended level of consumption of poultry meat 10.8 kg per person per annum by Indian Council of Medical research (Chatterjee and Rajkumar, 2015). Poultry meat also serves as important source of high quality animal protein

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in those areas of the world that have protein insufficiency (Onu *et al.*, 2011).

Broiler farming is mainly performed on deep litter system in India and the management of the litter is one of the key factors under deep litter housing. There are many factors which must be taken into litter management consideration for successful broiler production.

Litter management can be influenced by type of litter material used, depth of the litter material, floor space per bird, composition of feed, watering facility used, floor type, ventilation system and time of the year. Generally the litter material is used in broiler farm to give more comfort to the birds for more income generation. Scientists also noticed that the quality of the litter material has significant influences to the overall performances of the broiler (Sigroha *et al.*, 2017).

A variety of litter material including paper products, gypsum, hardwood bark, peanut hulls, sand rice and wheat straw, ground corn cob, soybean straw have been used as substitute bedding materials with various level of success. Billgilli *et al*. (1999) described that the bedding types can significantly affect growth performance and carcass quality of broilers.

So, the present experiment was planned to study the effect of different litter materials on growth performance and carcass characteristic of broiler chicken.

MATERIALS AND METHODS

The present experiment was carried out at poultry unit shed of the Department of Livestock Production and Management, Faculty of Veterinary and Animal Sciences of West Bengal University of Animal and Fishery Sciences, Kolkata with the prior approval of Institutional Animal Ethics Committee.

For the present study, 150 nos. of day-old Ross broiler chicks (belonging to single hatch) were purchased from Arambagh Hatchery, West Bengal. Good quality of litter materials saw dust and rice husk were procured from reputed local supplier. There were five equal treatment groups, each treatment group was further divided into three replicates and each replicate consisted of 10 birds. Chicks after purchase, were thoroughly checked and randomly distributed into five groups and routinely vaccinated. The experimental birds were reared under hygienic conditions maintaining the all standard uniform managemental practices including brooding, proper lighting, adequate ventilation, cleaning of feeder and drinker regularly, health check-up etc. As per standard ration formulation of broiler, pre starter, starter and finisher feeds were provided to the birds during the experimental period. At every week interval, birds were weighed individually by a digital weighing balance and others parameters like cumulative body weight gain (CBWG), cumulative feed intake (CFI) and feed conversion ratio (FCR) were measured and recorded as per standard methods (Sigroha *et al.*, 2017).

After completion of 6 weeks of the study, a total of six birds randomly selected from each groups and scientifically slaughtered and dressed at the Department of Livestock Products Technology of the WBUAFS for measuring all slaughter traits. Slaughter weight, dressed weight, dressing percentage and percentage of different wholesale cuts of broiler chicken were measured and calculated as per the standard methods (Das *et al.*, 2004). All data were compiled and summarised for statistical analysis.

Data obtained were subjected to statistical analysis using Completely Randomized Design (CRD) and all groups were differentiated by one way analysis of variance (ANOVA) with statistical package (IBM, SPSS® version 20). The mean differences among different treatment were estimated by Duncan's Multiple Range Tests, consequently, using 1 and 5% level of significance (Duncan, 1955).

RESULTS

The results showed the effect of different litter materials on growth performance in five treatment groups (Group-I, II, II, IV and V) at different ages (Table 1). It was found that up to 2 weeks of age, there was no significant change on live body weight (LBW), cumulative body weight gain (CBWG), cumulative feed intake (CFI) and feed conversion ratio (FCR).

After 3rd weeks, the LBW and CBWG of Group-IV (628.67 g and 588.66 g) was found to be significantly ($p<0.01$) higher than the others groups, whereas the CFI of Group-I (883.00 g) was significantly ($p<0.01$) higher than other groups. Significantly ($p<0.01$) higher FCR was noticed in Group-III and I, followed by Group-II, V and IV respectively.

After 4th weeks of age, significantly ($p<0.01$) higher values of LBW, CBWG and CFI were noticed in Group-I (1077.00 g, 1037.00 g and 1655.33 g) than the others groups. But FCR of Group-III and IV were found to be significantly ($P<0.01$) higher than other groups.

After 5th weeks of the experimental period, it was found that LBW, CBWG and CFI of Group-I (1574.66 g, 1534.66 g and 2763.33 g) were significantly ($p<0.01$) higher than the others groups. But FCR was significantly ($p<0.05$) higher in Group-III as compared to other groups.

After 6th weeks of the experimental period, similar trend was also observed. Significantly ($p<0.01$) higher LBW and CBWG of Group-I (2075.66 g and 2035.66 g) birds were noticed than other groups. Whereas, significantly ($p<0.01$) higher CFI was noticed in Group-V (3891.33 g), followed by Group-II, III and I (3852.00 g, 3851.33 g and 3826.00 g) and least in Group-IV (3826.00 g). But values of FCR was significantly ($p<0.01$) higher in Group-V, III, II and IV than the Group-I.

In this experiment, at the age of 42 days, significantly ($p<0.01$) higher dressed weight or eviscerated weight was noticed in Group-I (1387.67 g), followed by Group-III (1365.00 g), Group-V (1348.33 g) and IV (1347.00 g), and least in Group-II (1342.67 g) (Table-2). But there was no such significant difference were noticed among the groups in dressing percentage and other wholesale cuts of broiler chicken (like neck, wing, breast, thigh and drumstick percentage) except back. The back percentage is significantly ($p<0.01$) higher in Group-II and I than the other three groups.

DISCUSSION

The present investigation showed that there was no significant effect of litter materials on body weight and body weight gain up to second weeks of age, but from third weeks onwards there was significant effect of litter materials on live body weight, cumulative body weight gain and cumulative feed intake. These results are not in agreement with the findings of Monira *et al.* (2003), Grimes *et al.* (2007), Thirumalesh *et al.* (2013), Shah *et al.* (2013) and Onu *et al.* (2011). This deviation might be due to difference in amount of feed consumed by birds under different litter types, where significantly less feed intake were noticed in birds maintained under rice husk as compared to sand.

However, result of present study is alike with the result of Malone *et al.* (1982) and Anisuzzaman and Chowdhury (1996). Malone *et al.* (1982) reported a significantly higher body weight when maintained on shredded paper than saw dust, and Anisuzzaman and Chowdhury (1996) noticed significantly higher body weight in birds those were maintained on rice husk as compared to other litter materials used. This may be due to the fact that sometimes birds may get source of nutrition from litter materials or eating litter materials may depressed feed intake of birds.

Regarding FCR, result of the present study may be comparable to the findings of Chakma *et al.*

Table 1.Table depicts the week wise mean values of the live body weight (LBW), cumulative body weight gain (CBWG), cumulative feed intake (CFI) and feed conversion ratio (FCR)

Attributes	Group-I (100% SD)	Group-II (100% RH)	Group-III (75% SD +25% RH)	Group-IV (50% SD +50% RH)	Group-V (25% SD +75% RH)	Pooled SEM	P-Value
Week -1							
Initial Avg. body wt. (g)	40	40.5	41	42	40.5	0.004	0.998
LBW (g)	136	135.33	131.33	129.67	132.67	2.34	0.336
CBWG (g)	96	95.33	91.33	89.66	92.66	2.34	0.336
CFI (g)	115	112	110	109	105	0.41	0.998
FCR	0.98	0.95	0.90	0.89	0.85	0.015	0.304
Week -2							
LBW (g)	317.33	318.00	316.67	317.00	317.66	0.93	0.858
CBWG (g)	277.73	278.67	276.67	277.00	277.67	0.41	0.600
CFI (g)	361.00	363.00	362.67	361.00	362.67	0.68	0.792
FCR	1.30	1.30	1.30	1.30	1.30	0.004	0.974
Week -3							
LBW (g)	611.67^{bc}	616.33^{b}	603.33^{c}	628.67^{a}	617.67^{b}	2.72	0.001^{**}
CBWG (g)	571.66^{cd}	576.33^{bc}	563.33^{d}	588.66^{a}	584.33^{ab}	3.17	0.002^{**}
CFI (g)	883.00^{a}	861.00^{d}	876.66^{ab}	863.66^{bc}	861.33^{c}	4.27	0.000^{**}
FCR	1.54^{a}	1.49^{b}	1.56^{a}	1.46^{c}	1.47^{bc}	0.004	0.000^{**}
Week -4							
LBW (g)	1077.00^{a}	1020.00^{c}	1002.33^{d}	1004.66^{d}	1038.33^{b}	3.65	0.000^{**}
CBWG (g)	1037.00^{a}	980.00^{c}	962.33^{d}	964.66^{d}	998.33^{b}	3.65	0.000^{**}
CFI (g)	1655.33^{a}	1657.33^{a}	1649.00^{a}	1647.33^{a}	1611.66^{b}	5.78	0.000^{**}
FCR	1.59^{c}	1.68^{b}	1.71^{a}	1.70^{a}	1.60^{c}	0.004	0.000^{**}
Week -5							
LBW (g)	1574.66^{a}	1518.66^{c}	1502.33^{c}	1504.00^{c}	1536.33^{b}	5.54	0.000^{**}
CBWG (g)	1534.66^{a}	1478.66^{c}	1462.33^{c}	1464.00^{c}	1496.33^{b}	5.54	0.000^{**}
CFI (g)	2763.33^{a}	2692.33^{b}	2663.00^{b}	2663.33^{b}	2687.66^{b}	11.68	0.000^{**}
FCR	1.79^{b}	1.81^{a}	1.82^{a}	1.81^{a}	1.79^{b}	0.007	0.041^{*}
Week -6							
LBW (g)	2075.66^{a}	2017.33^{b}	1998.33^{c}	2012.00^{b}	2023.66^{b}	4.08	0.000^{**}
CBWG (g)	2035.66^{a}	1977.33^{b}	1958.33^{c}	1972.00^{b}	1983.66^{b}	4.08	0.000^{**}
CFI (g)	3840.66^{bc}	3852.00^{b}	3851.33^{b}	3826.00^{c}	3891.33^{a}	6.72	0.000^{**}
FCR	1.89^{b}	1.95^{a}	1.96^{a}	1.94^{a}	1.96^{a}	0.004	0.000^{**}

** $P \leq 0.01$,* $P \leq 0.05$, Means with different superscripts (a,b,c,d) in a row differ significantly, SD-saw dust, RH-rice husk

Table 2. Table depicts the carcass characteristics (mean values) of broiler chicken at 42 days of age

	42nd Day						
Attributes	**Group-I (100% SD)**	**Group-II (100% RH)**	**Group-III (75% SD +25% RH)**	**Group-IV (50% SD +50%RH)**	**Group-V (25% SD +75% RH)**	**Pooled SEM**	**P-Value**
Live wt. (g)	2075.67[a]	2017.33[b]	1998.33[c]	2012.00[b]	2023.67[b]	1.82	0.000**
Eviscerated wt. (g)	1387.67[a]	1342.67[c]	1365.00[b]	1347.00[c]	1348.33[c]	1.84	0.000**
Dressing %	67.18	67.36	67.44	67.28	67.04	0.11	0.499
Giblet %	5.67	5.67	5.64	5.65	6.69	0.05	0.998
Neck %	4.42	4.45	4.51	4.71	4.96	0.10	0.445
Wing %	8.69	8.79	8.48	8.57	8.64	0.03	0.107
Back %	24.35[a]	24.60[a]	23.48[b]	23.70[b]	23.25[b]	0.04	0.000**
Breast %	28.65	27.49	26.68	26.69	27.66	0.05	0.641
Thigh %	15.27	15.25	15.19	15.47	15.03	0.15	0.917
Drum Stick %	12.75	12.05	13.13	12.77	13.04	0.05	0.099

** $P \leq 0.01$- Means with different superscripts (a,b,c etc) in a row differ significantly, SD saw dust, RH-rice husk

(2012) and Mahmoud *et al*. (2014) who found significant ($P<0.05$) difference in feed conversion ratio of birds during different growth intervals under different litter types. But the result of the present study is not in agreement with the findings of Sharma and Sharma (2014) who reported that there was no significant difference in feed conversion ratio of birds reared on different types of litter materials at all age groups.

The weight of carcass was significantly affected by litter material on which the birds were raised. But most of the carcass characteristics of broiler chicken (except back percentage) were not affected by litter material used. This result is in accordance with the findings of Onu *et al*. (2011).

The results of the present study suggests that although litter materials have no significant effect on the growth performance of broiler chicken in starter phase, but during growing and finishing stages (from 3 to 6 weeks) it has significant role and comparatively better performance was noticed in birds those were raised on saw dust. Therefore saw dust may be used as a litter material for better growth performance which is cheaper in price and easily available also.

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