



Original Research

Use of Combination of Different Litter Materials on the Performance of Broilers

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Abstract

A trial was conducted to evaluate the effect of combinations of three types of litter materials on the performance of broilers. 420 day-old broiler chicks of Cobb 400 strain were randomly allocated into seven groups of 60 birds each with each group having four replicates of 15 birds each for a period of five weeks. The three litter materials soybean husk (SH), jowar husk (JH) and groundnut hulls (GH) were used as Group A having only rice husk (RH) litter as control, Group B reared on RH 50% + SH at 50%, Group C reared on RH 25% + SH at 75%, Group D reared on RH 50% + JH at 50%, Group E reared on RH 25% + JH at 75%, Group F reared on RH 50% + GH at 50% and group G reared on RH 25% + GH at 75%. Group B recorded better live weights, significantly better gain in weights, better feed conversion ratio and better profit margin as compared to the birds reared only on rice husk. Further, group D recorded better productive performance and profit margins as compared to the control group. Moreover, group E recorded significantly better live weights and gain in weights along with comparable feed conversion ratio as compared to the birds from control group. Group E also recorded better profit margins as compared to the birds from control group and other treatment groups. However, group F, G and group C recorded poor production performance as well as poor profit margins compared to the birds from control group. Thus, the overall results of the study indicated that SH and JH can be used as litter materials by replacing RH upto 50 and 75% levels, respectively. Moreover, the replacement of RH by JH upto 75% level was found to be more beneficial for obtaining better performance and higher profit margins from broilers.

Key words: Broilers, Combination of Litter Materials, Rice Husk, Jowar Husk, Groundnut Hulls, Soybean Husk.

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Introduction

The common types of litter used in poultry houses throughout the world are sawdust, rice husk, sugarcane pulp, sugarcane bagasse, chopped straw, paper mill byproducts, sand, wood shavings, corn cobs, oat hulls, dried leaves and coffee husk (Monira *et al.*, 2003). The use of these materials depends on their availability in a particular locality and/or other factors of economic advantage including their post-bedding usage (Adebayo *et al.*, 2009). Lesser supplies, high cost and unavailability of suitable litter materials have encouraged the search for alternative litter materials for rearing broilers (El-Deek *et al.*, 2011). In many parts of India, poultry farmers find it increasingly difficult to get rice husk to be used as a litter material at reasonable price and the rice husk availability is also limited in certain region / area. Hence, it was decided to undertake a study to evaluate the effect of combination of different litter materials on the productive performance and economics of production of broilers.

Materials and Methods

The trial was conducted on 420 day-old broiler chicks of 'Cobb 400' strain for a period of five weeks. The day-old chicks were divided into seven equal groups of 60 birds each. The groups were further divided into four replicates of 15 birds each. Each group was subjected to one of the following treatment as Group A having only rice husk (RH) litter as control, Group B reared on RH 50% + soybean husk (SH) at 50%, Group C reared on RH 25% + SH at 75%. Group D reared on RH 50% + jowar husk (JH) at 50%. Group E reared on RH 25% + JH at 75%. Group F reared on RH 50% + groundnut hulls (GH) at 50% and group G reared on RH 25% + GH at 75%. RH required to obtain a layer of two inch thickness was calculated as 10 kg in each replicate of group A as control. Accordingly, the requirement combination of litter for various groups was calculated and the litter was accordingly provided. All these birds were reared under uniform standard management, feeding, medication and vaccination. The daily records for feed consumption and mortality were maintained. Weekly records of live weight, gain in weight, feed consumption, feed conversion ratio and mortality were maintained. The economics of production was calculated at the end of the trial considering the cost of various litter materials used for the trial. All the data obtained were subjected to statistical analysis as per Snedecor and Cochran (1998) by using randomized block design.

Results and Discussion

Live Weights

The birds from group E recorded the highest live weights followed by the birds reared from groups B, D, A, F, G and C. The statistical analysis of data revealed that, the birds from group E recorded significantly higher ($P \leq 0.01$) live weights than the birds in the control group. The differences in the live weights of birds from all other treatment groups and the birds reared on the rice husk (control) were statistically non-

significant. Thus, it may be concluded that, the use of JH to replace RH up to 75% as litter material is beneficial in obtaining better live weights from the birds. The finding of the present study are in agreement with the finding of El-Deek *et al.* (2011) and Monira *et al.* (2003) who concluded that the broilers grown on shaving wood plus barley straw and shaving wood plus newspaper had significantly higher body weights, the birds reared on sawdust, rice husk, sugarcane bagasse and wheat straw the birds from sawdust recorded increased live weight respectively. Ranade and Rajmane (1990) also reported highest live weights of birds reared on wood shavings as compared to rice husk. These scientists also recorded better live weights of birds reared on different litter materials. However, Willis *et al.* (1997) recorded pine wood shavings (control), a mix of 50% pine wood shavings and 50% leaves, and leaves litter materials had no significant ($P \geq 0.05$) influence on live weight. These observations do not corroborate with the present study.

Gain in Weights

The birds from group E recorded the highest gain in weights than all other groups, followed by the birds from groups B, D, A, F, G and C. Group C recorded the lowest gain in weights among all the treatment groups including control. The statistical analysis of the data revealed that, the birds from group B and group E recorded significantly higher ($P \leq 0.01$) gain in weights than the birds from control group. The differences in the gain in weights of birds from all other treatment groups and the birds reared on the RH (control) were statistically non-significant. Thus, it may be concluded that, the use of SH to replace RH up to 50% and JH to replace RH up to 75% as litter material is beneficial in obtaining better gain in weights from the birds. Adebayo *et al.* (2009) concluded that birds reared on rice husk were significantly affected ($P < 0.05$) in weight gain in the first two weeks of the experiment compared to those birds reared on wood shavings, saw dust, sand and grass. Further, El-Deek *et al.* (2011) and Shinde *et al.* (2007) also reported results are similar to the results obtained in the current study wherein the birds reared on different litter materials recorded significantly higher gain in weights. However, Hafeez *et al.* (2009) and Navneet *et al.* (2012) recorded differences in average weight gain for sawdust, sand, wheat straw and birds reared on paddy husk, paddy straw and un-chopped paddy straw were found to be non-significant ($P > 0.05$). These observations do not corroborate with the present study as different litter materials used did not show any significant effect on gain in body weights of the birds.

Feed Consumption

The birds from group E recorded the highest feed consumption and were sequentially followed by the birds from groups D, B, A, C, G and F. The birds from group F recorded the lowest feed consumption. It is noted that as the quantity of SH replacing RH was increased, it had a negative effect on feed consumption of birds. However, in case of JH, as the percentage replacing RH by JH was increased it resulted in better feed

consumption of the birds. Further, the use of GH to replace RH as litter material at both levels resulted in recording lower feed consumption as compared to control group. The various treatments had significant ($P \leq 0.01$) effect on average weekly feed consumption of the birds. The birds from group D and E recorded significantly higher feed consumption than the birds in the control group. The differences in the feed consumption of birds from all other treatment groups and the birds reared on RH (control) were statistically non-significant. Thus, it may be concluded that, the use of JH to replace RH up to 50 and 75% as litter material is beneficial in obtaining better feed consumption from the birds. The findings of the present study are in agreement with the findings of El-Deek *et al.* (2011) this does not corroborate with the findings of the present study as the replacement of rice husk with groundnut hulls at 50 and 75% levels resulted in recording marginally lesser feed consumption as compared to the birds reared only on rice husk. Further, Hafeez *et al.* (2009) recorded that the differences in feed consumption for sawdust, sand and wheat straw were found to be non-significant ($P > 0.05$).

Feed Conversion Ratio

The birds from group F recorded better feed conversion ratio than all groups including control, followed by birds from groups B, A, E, D, G and C. The statistical analysis of data revealed that, the differences in the feed conversion ratio for the birds from different groups were statistically non-significant. The birds from the groups B, E and F respectively, recorded marginally better feed conversion ratios as compared to the birds from control group. However, the birds from the group C, D and G respectively, recorded marginally poor feed conversion ratios as compared to control group. Monira *et al.* (2003) observed that the birds reared on sawdust, rice husk, sugarcane bagasse and wheat straw recorded statistically similar feed conversion ratio. Further, Hafeez *et al.* (2009) recorded non-significant ($P > 0.05$) differences in feed conversion ratio which is similar to the findings of the current study. However, El-Deek *et al.* (2011) narrated that broiler chickens raised on combinations of different litter materials recorded significantly better feed conversion ratio these observations do not corroborate with the findings of the present study.

Mortality

It was noticed that the mortality in different treatment groups was within the limit of poultry industry standards. The findings of present study are in agreement with the findings of Hafeez *et al.* (2009) wherein average mortality for birds reared on different litter materials viz., sawdust, sand and wheat straw were found to be non-significant ($P > 0.05$). Further, El-Lethey & Zaki (2005) reported mortality of birds reared on different litter material like wheat straw tended to be numerically higher than that of wood shavings and mixture of 50% wood shavings and 50% wheat straw.

Economics of Production

The litter materials used in this study were purchased from the market and the prices for the same are RH @ Rs. 5.55 per kg, SH @ Rs.1.00 per kg, JH @ Rs.0.50 per kg and GH @ Rs. 5.00 per kg. The birds from group E recorded the highest cost of production, followed by the birds from groups D, B, A, G, F and C. It is observed that the birds from group E recorded the highest net profit per kg live body weight. However, the group G recorded the lowest net profit per kg live weight. The higher profit was recorded by the birds from the group E was due to higher live weights recorded by birds from the same group and also the cost of litter material per bird for group E was the least.

Overall Performance

The birds from group B recorded comparable live weight, significantly better gain in weight and marginally better feed consumption and feed conversion ratio as well as better profit margin compared to control group.

Table 1: Overall performance of broilers during five weeks

Parameters	Gr. A	Gr. B	Gr. C	Gr. D	Gr. E	Gr. F	Gr. G
	Rice husk	50% rice husk replaced by soybean husk	75% rice husk replaced by soybean husk	50% rice husk replaced by jowar husk	75% rice husk replaced by jowar husk	50% rice husk replaced by groundnut hulls	75% rice husk replaced by groundnut hulls
Initial weight (g)	38.47	39.07	39.3	38.2	39.13	38.57	38.03
Final weight (g)	1832.16 ^{bc}	1909.43 ^{ab}	1777.37 ^c	1896.20 ^{ab}	1940.51 ^a	1810.85 ^c	1794.83 ^c
Total gain in weight (g)	1793.69 ^{bc}	1870.36 ^a	1738.07 ^c	1858.00 ^{ab}	1901.38 ^a	1772.28 ^c	1756.79 ^c
Total feed consumption (g)	2609.55 ^{bc}	2688.59 ^{bc}	2594.18 ^c	2710.19 ^a	2749.75 ^a	2533.66 ^c	2592.62 ^c
Cumulative FCR	1.45	1.44	1.49	1.46	1.45	1.43	1.48
Mortality (%)	3.33	0	0	0	6.66	3.33	0
Cost of litter material/bird (Rs.)	3.67	2.17	1.42	2	1.17	3.17	3.42
Net Cost/ bird (Rs.)	110.35	110.82	107.71	111.19	111.35	107.95	109.68
Return on sale @ Rs. 65/ kg	119.09	124.11	115.53	123.25	126.13	117.7	116.66
Net profit/bird (Rs.)	8.74	13.29	7.81	12.06	14.78	9.75	6.99
Net profit/ kg (Rs.)	4.77	6.96	4.4	6.36	7.62	5.39	3.89

Those means with at least one common superscript in a row do not differ significantly.

Further, the birds from group E recorded better performance with respect to live weight and gain in weight with higher feed consumption and comparable feed conversion ratio and also recorded higher returns on

sale and thereby higher profit margins. However, the combinations of litter materials by using litter with RH replaced with GH as well as SH, recorded marginally lower production performance and also the profits. Hence, it can be concluded that 50% SH can be used to replace RH and JH can be used up to 75% levels to replace RH for better performance and higher economic returns in broilers.

Conclusion

It is concluded that, the use of litter material having 50% RH replaced with SH is beneficial in recording marginally better production performance and profit margins. Further, use of 75% JH and 25% RH combination as litter material is beneficial to record significantly ($P \leq 0.01$) higher live weight, higher gain in weight and higher feed consumption as compared to birds reared only on RH along with comparable feed conversion ratio. Hence, the combination of 50% rice husk with 50% soybean husk or 75% jowar husk and 25% rice husk can be used for rearing of broilers to increase production performance and profit margin.

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