

Article

Performance of broiler using rice husk and sawdust as litter materials during summer

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Abstract: An experiment was carried out with 80 straight run broiler chicks (cobb-500) reared on rice husk and sawdust to know the production efficiency at 5 weeks during summer. A total 80 straight run broiler chicks (cobb-500) were divided into 4 groups and were assigned to 2 treatments i.e. T1 and T2 in which T1 was used rice husk and T2 was used sawdust. Number of birds per replication were 10. Live weight of birds reared on rice husk and sawdust differed significantly at 5th weeks of age ($P<0.05$). Feed consumption of broiler was significantly higher on sawdust litter than rice husk. Feed conversion ratio and survivability percentages of broiler were statistically non-significant ($P>0.05$) between the sawdust and rice husk. The cost of litter per bird and cost of litter per kg live weight gain were 14.07% and 20.10% higher in rice husk than sawdust respectively. It is evident from the study that sawdust was more economic than rice husk. Considering all the facts and findings of the study, it can be concluded that live weight and feed consumption of broiler was better in sawdust litter materials than rice husk. Sawdust was also cheaper than rice husk. Therefore, using sawdust as a litter material can lead to better production efficiency and cost savings for broiler farmers during summer.

Keywords: rice husk; sawdust; performance; broiler; summer

1. Introduction

One of the most lucrative, biggest, and quickly expanding agro-based sectors in the world is the poultry sector. It can address the issues of underemployment and unemployment in rural regions, especially for small and marginal farmers, in an efficient manner. In the production of broilers, emphasis has traditionally been devoted to the quality of the chicks, feed, and water to be utilized, but not to the quality of the litter materials used to rear them. This attitude has been called regrettable and suggested that in a bad environment, broilers would not perform to their genetic potentials. This is due to the fact that trash quality has a significant impact on environmental quality. Broilers are prone to eating litter, which exposes them to ingesting litter materials and potentially harmful microorganisms that might render broiler meat unfit for human consumption.

Currently, there are primarily three broiler raising techniques used in practice across the globe. These include battery, slat, and floor raising methods. Although it is practicable to raise broilers in batteries or on slates in many nations, floor rearing is still prevalent in South East Asian commercial broiler farms, notably in Bangladesh, India, and Pakistan. Litter is essential to a floor management system's ability to produce broilers successfully. Litter is a type of bedding material that is used in chicken coops to keep the birds happy. It also serves to give birds a suitable surface for feeding, watering, and other management procedures. It also serves to

absorb moisture from bird droppings, keep the floor dry, and offer some degree of foot insulation (Dunlop *et al.*, 2015).

It must be mold-free, made of non-toxic materials, and able to absorb and release moisture without caking. These materials are evaluated based on their costs, accessibility, transport capabilities, decomposition potential, and worth as salvaged trash. Chopped straw, rice husk, sugarcane pulp, oat hulls, corncobs, pulverized corncobs, peat moss, paper mill by-products, wood shavings, sand, and rice husk are typical forms of litter used in broiler houses across the world. In Bangladesh, items including sawdust, chopped straw, sand, and rice husk are utilized as litter. In Bangladesh, sawdust and rice husk are frequently utilized as litter materials, particularly for raising chicks and broilers. Currently, Bangladesh has an abundance of sugarcane pulp and rice straw, and its byproducts, including dried sugarcane pulp, rice straw, and wheat straw, are utilized as litter there. Sawdust was the most suitable litter among the types studied followed by rice husk, sugarcane pulp and wheat straw in rainy season under Bangladesh condition (Hossain *et al.*, 2010).

Bangladesh has six distinct seasons, each of which alters the temperature and humidity, affecting the performance of poultry. In light of the aforementioned facts, the current investigation was designed to examine the impact of various litter materials on broiler performance in order to replace more expensive conventional litter materials with less expensive and unconventional ones in order to increase the viability of the commercial production of broilers. The present study was therefore undertaken to evaluate the production performance of broiler farm and to ensure the use of litter materials with economic importance.

2. Materials and Methods

2.1. Ethical approval

The experiment was carried out in accordance with the guidelines for Animal Experiments at the Department of Poultry Science, Sylhet Agricultural University, Sylhet, Bangladesh.

2.2. Experimental design and housing

An experiment was carried out to determine the impact of various forms of litter materials on the production efficiency of broilers in the Hobiganj for a period of 5 weeks between April 6, 2022, and May 10, 2022. Straight run broiler (cobb-500) chicks were used in the experiment. A total 80 straight run broiler chicks were divided into 4 groups and were assigned to 2 treatments i.e. T1 and T2 in which T1 and T2 was used rice husk and sawdust respectively. Number of birds per replication were 10. Before start the research, the experimental housing was cleaned with pressured water from a hose pipe, a disinfectant solution (phenyl mixed water), and losan (3 ml/liter water). Using wood and wire net, the experimental shed was separated into 24 pens of identical size (10.8 sq ft). Each enclosure had an 85 cm height and a stocking density of 0.9 square feet per bird. At a depth of 6 cm, rice husk and sawdust were employed as litter materials. Before the arrival of the chicks, all feeders, waterers, and other essential equipment was also thoroughly cleaned, washed, and disinfected. Each pen had an electric bulb to help brooding.

2.3. Litter management

Rice husk was purchased from local rice mill and sawdust was from saw mill. Processing of litter Rice husk and sawdust were properly set on the pen. Allotment of litters placement of different litters on different experimental pens was made randomly at a depth of about 6 cm. The measurement of moisture content was done using a fraction of the combined samples.

2.4. Experimental diets

Day old chicks were supplied broiler starter feed for the first 10 days, broiler grower for 11-21 days and the rest of the days (22-35) with broiler finisher feed. All feeds were procured from Paragon Feed Limited which was in the form of crumble and pellet respectively. After the third week of a bird's life, the surface level of the litter was cleansed of droppings, but no new litter was introduced. Instead, each week, the litter was broken out with a belcha to reduce its compactness and maintain the right degree of wetness. The feeders and waterers were positioned so that the birds could easily get feed and water. Birds had free access to feed and water throughout the entire experimental period.

The experimental meal was provided on liner feeders during the first week, and waterers were employed to provide drinking water in each pen. Lighting at first, it was intended to subject birds to 24 hours of nonstop lighting (23 hours and 30 minutes) and a 30-minute period of darkness at midnight. The amount of light was between 20 and 25 lux. This timetable was kept, with the exception of power outages that happened during the day.

The birds were immunized against Gumboro and Newcastle diseases administering BCRDV (against Newcastle) at 2 and 18 days old and 228 E (against Gumboro) at 10 and 21 day old of the birds. Temperature and relative humidity of the experimental house were recorded every day during the experiment.

All data were collected, recorded, and computed replication-wise for each treatment during the raising period in the following ways: a) Body weight: the average live weight of day-old broilers was calculated at the start and end of the week, respectively. b) Feed intake: the amount of experimental feed that was given to the birds each week was determined by subtracting the amount of leftover food that was daily collected for a week in each replication. c) FCR: the average FCR of broilers was calculated at every week in each replication. d) Bird mortality was tracked daily, replication-by-replication, for each treatment.

2.5. Statistical analysis

The collected data were entered in the Microsoft Excel work sheet and organized for further analysis. Descriptive statistics were performed to find out the comparison of performance of rice husk and sawdust using as litter materials on broiler. The data was analyzed by SPSS.

3. Results and Discussion

Live weight of broilers in 1st week and 3rd weeks of age, there is similar between rice husk and sawdust. In 4th and 5th week of age, sawdust gives good performance than rice husk. It was found that live weight of birds reared on rice husk and sawdust as litter materials differed significantly in 2nd, 4th and 5th weeks of age ($P < 0.05$) (Table 1). However, live weight and survivability tended to increase on sawdust. So, the above findings reveal that sawdust may be suitable litter than rice husk during late autumn in Bangladesh. Toghgyani (2010) found that there were four replicates for each of the following five litter treatments: litter, wood shaving, sand, rice hulls and recycled paper roll. Results showed broilers reared on rice hulls had significantly lower body weight, feed intake and antibody titer ($P < 0.05$). These results indicate that broilers reared on floor (no litter), sand and paper roll performed as well as those reared on wood shavings and when given a choice, broilers spent a greater proportion of their total time in sand and performed a greater proportion of their behaviors on sand.

Chakma *et al.* (2012) stated that different types of litter materials had no effect on moisture content and survivability, but body weight on sawdust was significantly higher than other treatment groups. Broilers were not be affected by breast blister or leg abnormalities if reared on rice husk, sawdust, wood shaving and tea leaves litter.

Table 1. Effect of using rice husk and sawdust of litter on live weight (g/bird) of broiler birds at different ages.

Treatment	Body weight (g/bird)				
	1 st week	2 nd week	3 rd week	4 th week	5 th week
T1 (rice husk)	182.83±3.55	409.75±4.68 ^d	753.28±5.5	1293.76±4.28 ^d	1963.4±42.52 ^d
T2 (sawdust)	183.87±2.72	416.71±11.52 ^c	754.07±20.03	1346.46±23.36 ^c	2087.63±74.67 ^c
Level of significance	NS	*	NS	*	*

Note: SD = Standard deviation, NS=Non significant, *= Significant at 5% level of probability ($P < 0.05$) different among live body weight in case of rice husk and sawdust.

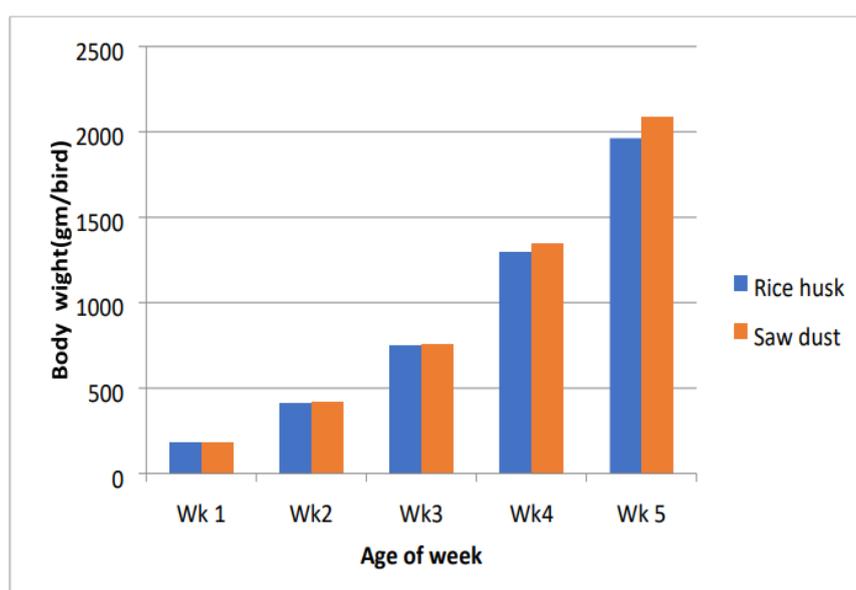
3.1. Feed consumption

Feed consumption of broiler increased with the advancement of age at all stages (Table 2). Feed consumption of broiler birds using rice husk and sawdust was statistically significant in all stage except 1st week (Figure 1). Feed consumption of broiler showed significantly higher on reared on sawdust litter than rice husk. The data showed that feed intake increased in 2nd week and 4th week reared in rice husk than sawdust. In 3rd and 5th week, increased feed consumption was observed in sawdust than rice husk. In 2nd week and 5th week feed intake differs significantly ($P < 0.05$). Anisuzzaman and Chowdhury (1996) found that birds reared on rice husk litter showed the best feed intake and scored highest in production number. Survivability was also highest with rice husk group (94.4%) but differences in this variable were not thought to be attributable to types of litter.

Table 2. Effect of rice husk and sawdust litter on feed consumption (g/bird) of broiler birds at different ages.

Treatment	Feed consumption (g/bird)				
	1 st week	2 nd week	3 rd week	4 th week	5 th week
T1 (rice husk)	123.75±1.71	397±12.9 ^c	544.25±9.54 ^d	861±13.71 ^c	1117.75±22.07 ^c
T2 (sawdust)	123±0.82	375.75±7.08 ^d	556.25±10.9 ^c	855.75±12.7 ^d	1076.5±30.64 ^c
Level of significance	NS	*	*	*	*

Note: SD = Standard deviation, NS=Non significant, *= Significant at 5% level of probability ($P < 0.05$) different among live body weight in case of rice husk and sawdust.

**Figure 1. Feed consumption of broiler on rice husk and sawdust.**

3.2. Feed conversion ratio (FCR)

The FCR in rice husk was highest in week 1st, 2nd, 4th and 5th and lowest in 3rd week (Figure 2). Sigroha (2017) stated that the result showed that feed conversion ratio was significantly different ($P < 0.05$) among litter type selected during 3rd and 4th week of experiment and other parameters were non-significant during the growing interval of broilers. The preset study investigated that the effect of different litter materials on broiler chicken performance may be viable or use of unconventional litter materials for broilers. Onu *et al.* (2011) reported that at the FCR of the birds on rice husks was significantly ($P < 0.05$) improved compared with those on the other litter materials. FCR is better in rice husk than other types of litter. Monira *et al.* (2003) stated that sawdust, rice husk, sugarcane bagasse and wheat straw did not differ statistically for live weight, feed consumption, feed conversion ratio ($P > 0.05$). However, live weight and survivability tended to increase on sawdust. The study of contradictory to Hafeez *et al.* (2009) found non-significant effect on feed conversion ratio of birds reared on different depth of rice husk litter.

3.3. Survivability

In all stages of survivability of birds varied from 87-95% between the treatment group during 1st week to 5th week of age (Table 3). There were no significant differences found between the treatment at all stages of age of birds. This non-significant supported by Hussain *et al.* (1996). Kassid and Coleman (1990) they found that survivability was not attributable to types of litter but those result dissimilar to the findings of the study by Anisuzzaman and Chowdhury (1996). They found that significantly higher livability was on rice husk followed by sawdust, sand and chopped straw.

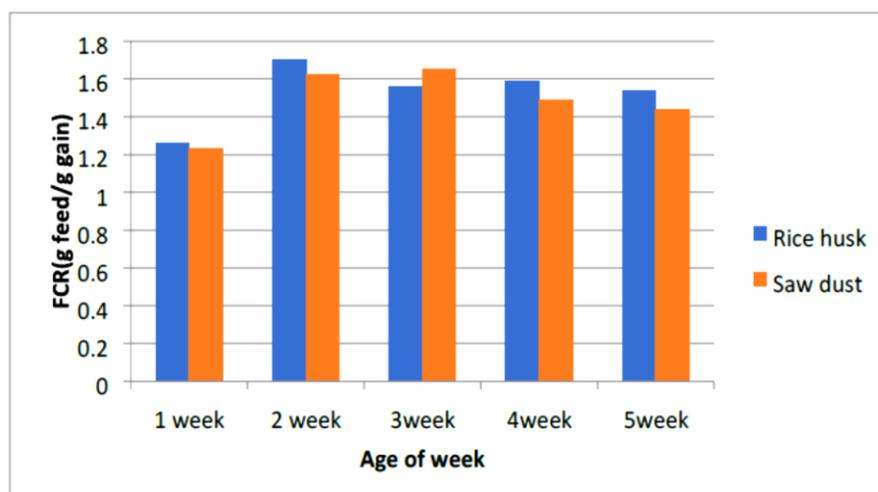


Figure 2. Feed conversion ratio of rice husk and sawdust.

Table 3. Effect of rice husk and sawdust litter on survivability of broiler birds.

Parameter	T1 (rice husk)	T2 (sawdust)	Level of significance
Survivability	87.5±9.57 ^b	94±4.33 ^a	*

The cost of litter per bird and litter cost/kg live weight gain was highest on sawdust than rice husk. Monira *et al.* (2003) has reported that the price of wheat straw is higher than the sugarcane bagasse and sawdust.

4. Conclusions

The present study conducted that live weight and feed consumption of broilers were better in sawdust litter than rice husk. The best FCR found in sawdust litter. Sawdust was also more economic than rice husk.

Data availability

Data are contained within the article.

Conflict of interest

None to declare.

Authors' contribution

Jhulan Rani Baishnab: assisted in data collection and gathering information; A. S. M. Mahbub: supervised and revised the final manuscript; Mohammad Yousuf Miah: designed the experiment, analyzed the data, and wrote the draft of this manuscript. All authors have read and approved the final manuscript.

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