Effect of Litter Materials on Broiler Performance and Evaluation of Manureal Value of Used Litter in Late Autumn

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ABSTRACT : A total of 168 seven days-old Arbor Acres chicks were reared in late-autumn on 4 types of litters; sawdust, rice husk, sugarcane bagasse or wheat straw up to 49 days of age to compare the growth performance, evaluate the manureal value and Coccidial oocyst population in used litter. Sadust, rice husk, sugarcane bagasse and wheat straw did not differ statistically for live weight, feed consumption, feed conversion ratio and survivability ($p>0.05$). However, live weight and survivability tended to increase on sawdust. The highest moisture content of used litter was found in sugarcane bagasse followed by sawdust, rice husk and wheat straw ($p<0.05$). Rice husk contained the highest amount of of nitrogen, phosphurus and potassium followed by sawdust, sugarcane bagasse and wheat straw ($p<0.01$). Oocyst content of all treatment groups increased suddenly up to 5 weeks of age and thereafter suddenly declined up to 7 weeks of age. Litter materials did not differ at 35 and 42 days of age for oocyst content, but significantly differed at 49 days of age ($p<0.01$). So, the above findings reveal that sawdust may be suitable litter followed by rice husk, sugarcane bagasse and wheat straw in late-autumn in Bangladesh in respect of broiler growth performance. ***(Asian-Aust. J. Anim. Sci. 2003. Vol 16, No. 4 : 555-557)***

Key Words : Litter Materials, Broiler, Manure, Oocyst and Season

INTRODUCTION

Broilers are generally reared on littered floor. The purpose of using litter on floor is to absorb moisture from birds, dropping to keep floor reasonably dry and to ensure comfortable condition for birds. It also gives birds a suitable medium on which feeding, watering and other management practices are carried out.

Various types of litter materials are used in different countries. The common types of litter used in poultry houses throughout the world are sawdust, rice husk, sugarcane pulp, sugarcane bagasse, chopped straw, paper mill by products, sand, wood shavings, corn cobs, oat hulls, dried leaves, coffee husk. Among these litter materials, Sugarcane bagasse is the best on account of its softness and quick absorbing moisture, and it does not fall in to feeder and waterer. It should be preferred to others, wherever available at reasonable prices. Sawdust is good but costly (Rao, 1986).

Wet and caked litter emits foul smell and affect the chicken with diseases like coryza, coccidiosis, fungal infections and intestinal parasites. Defective ventilation and air movement, over stocking apart from loose droppings and faulty watering system may result wet litter.

Decomposed poultry manure contains about 2% N_2, 2% P (P_2O_5), 1.5 % K (K_2O), a few mineral and vit-B complex (Rao, 1986). Litter manure is used as fertilizer in the crop field. Indian Council of Agriculture Research suggested that one ton deep litter manure is enough for 0.4 ha of Maize, Wheat, and Paddy, 0.2 ha of vegetables and 0.1 ha of Sugarcane (Stephenson, 1990).

In Bangladesh, different types of litter such as sawdust, sugarcane bagasse, rice husk, wheat straw, sand and ash are used as poultry bedding. There are a few research work on the depth of rice husk litter in Bangladesh which showed the non significant differences between depths (2.0, 3.0, 4.0 and 5.0 cm) for broiler production (Haque and Chowdhury, 1994; Mizu et al., 1998; Anisuzzaman and Chowdhury, 1996). Research work has not been done using various types of litter materials in different seasons on layer and broiler. With those idea in view, the present study was aimed at to find out the suitable litter material for broiler rearing which may enhance the profitability in broiler farming.

MATERIALS AND METHODS

The experiment was carried out at Bangladesh Agricultural University (BAU) poultry farm in late-autumn in Bangladesh. One hundred sixty eight 7 days old Arbor Acres broiler chicks were reared up to 7 weeks of age on saw dust, rice husk, sugarcane bagasse and wheat straw considering as treatments comprising 3 replications having 14 chicks each.The birds were fed *ad libitum* broiler starter diet (1-4 weeks) containing 23% CP, 2,918 kcalME/kg and Finisher diet (5-7 weeks) containing 20% CP and 2,910 kcalME/kg. Birds were kept in a stocking density of 900 cm^2/bird, and exposed to continuous lighting of 23 h and 30 min per day. They were vaccinated against New Castle Disease and Gumboro during the experimental

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period. One (80 cm×8 cm×5 cm) linear feeder and one round waterer with a capacity of 3 litters provided for 14 birds in each replication.

Laboratory analysis for manureal value were performed in the Department of Agricultural Chemistry and Parasitology at BAU, Mymensingh. Nitrogen content of litter was estimated by Kjeldahl method and phosphorus was determined by Spectrophotometer from prepared extract and by developing blue colour of the phosphomolydate complex. Potassium content was determined with the help of flame emission Spectrophotometer in the Laboratory of Agricultural Chemistry, BAU, Mymensingh. Coccidial Oocyst was counted by following method of Karim et al. (1994) in the Laboratory of Parasitology Department, BAU, Bangladesh.

Initial body weight, and at the end of each week body weight and feed intake were recorded replication wise. No. of dead birds when occurred, moisture content of litters at 49 days of age and daily two times temperature and relative humidity were recorded. Moisture, nitrogen, phosphorus, potassium and oocyst content of different litter materials at the end of experiment were recorded replication wise.

Data were analyzed using Completely Randomized Design (CRD) with the help of computer SPSS package programme.

RESULTS AND DISCUSSION

Growth performance

Birds reared on different litter materials showed non-significant differences for live weight, feed intake, feed conversion ratio (FCR) and livability at 49 days of age (Table 1). However, it was found that birds reared on Sawdust gained the highest body weight followed by those on wheat straw, sugarcane bagasse and rice husk. The body weight of birds reared on Rice husk and Sugarcane bagasse was very close to each other. Feed intake of the birds reared on different litter materials was more or less similar ($p>0.05$), although birds on sawdust consumed the highest amount of feed. The data showed that the feed conversion efficiency was almost similar among litter materials ($p>0.05$). However, birds reared on rice husk had the highest feed conversion efficiency, followed by sugarcane bagasse, saw dust and wheat straw.

Though the survivability was statistically similar ($p>0.05$) on 4 litter treatment groups, it was tended to be higher on saw dust and rice husk (100%) than on sugarcane bagasse and wheat straw (95%).

Body weight tended to increase on sawdust treatment group but it was very closed to rice husk and sugarcane bagasse and wheat straw treatment groups. It is in agreement with Davasgaium et al. (1997). They found the highest body weight on Sawdust than on Sugarcane bagasse, wood shavings and mixture of bagasse and wood shavings. But it was contradictory with Shakila and Naidu (1998), they got the lowest body weight on Saw dust compared to groundnut hulls, rice husk, chopped straw litters. Feed consumption in all the treatment groups was similar ($p>0.05$), but feed consumption tended to increase on sawdust treatment group during the experimental period, supported by Hussain et al. (1996). This findings contradicted with Anisuzzaman and Chowdhury (1996), who found the significantly higher feed consumption on rice husk followed by saw dust, chopped wheat straw and sand respectively.

The result on feed conversion efficiency was statistically similar in birds reared on different types of litter was in agreement with Hussain et al. (1996), and Malone et al. (1991). It was tended to improve on rice husk followed by sugarcane bagasse, sawdust and wheat straw, which was contradicted with Anisuzzaman and Chowdhury (1996), who found the lowest feed conversion efficiency on rice husk than those on sawdust, chopped wheat straw and sand.

The non-significant difference for livability was obtained that was not attributable to the influences of litter materials. However, the better livability was found on sawdust and rice husk (100%) which was supported by Hussain et al. (1996) and Kassid and Coleman (1990).

The average recorded temperature and Relative humidity were 27.85°C and 76.73% respectively during experimental period.

Manureal value of used litter (N, P and K content)

Sugarcane bagasse contained the highest percentage of moisture followed by sawdust, rice husk and wheat straw ($p<0.05$) (Table 2). The significant difference was found for

Table 1. Performance of broilers reared on four types of litters up to 49 days of age

Parameters	Types of litter					Level of significance
	Sawdust	Rice husk	Sugarcane bagasse	Wheat straw	SED values	
Live weight (g/bird)	1,709.00	1,602.00	1,610.00	1,628.00	29.42	NS
Feed consumption (g/bird)	4,373.00	4,031.00	4,081.00	4,169.00	90.18	NS
Feed conversion ratio (feed:gain)	2.56	2.52	2.53	2.56	0.05	NS
Livability (%)	100.00	100.00	95.00	95.00	2.38	NS

NS, $p>0.05$.

Table 2. Manureal value of used litter

Parameter	Types of litter				Level of significance
	Sawdust	Rice husk	Sugarcane bagasse	Wheat straw	
Moisture content (%)	25.54[ab]	21.60[b]	30.24[a]	20.87[b]	*
Nitrogen (%)	3.04[b]	3.55[a]	2.52[c]	2.35[c]	**
Phosphorus (%)	1.07[b]	1.25[a]	1.02[c]	0.90[d]	**
Potassium (%)	0.18[b]	0.21[a]	0.14[c]	0.14[c]	**

* p<0.05; ** p<0.01.
[a,b,c,d] Values with different superscripts in same row are significantly different.

Table 3. Oocyst content per treatment of used litter

Age in days	Types of litter				Level of significance
	Sawdust	Rice husk	Sugarcane bagasse	Wheat straw	
21	138.5[b]	137.8[b]	193.5[a]	175.2[ab]	*
28	2457[b]	2161[c]	2849[a]	2035[c]	**
35	2161[c]	2457[b]	2849[a]	2035[c]	NS
42	305.9[bc]	350[a]	296.4[c]	338.1[ab]	NS
49	608.4[a]	558.5[a]	252.8[b]	567.0[a]	***

NS, p>0.05; * p<0.05; ** p<0.01; *** p<0.001.
[a,b,c] Values with different superscripts in same row are significantly different.

nitrogen, phosphorus and potassium content among different types of used litter (p<0.01).

The nitrogen, phosphorus and potassium contents of the used litter differed significantly, data were higher than the findings of Babu et al. (1993) who found 2.50% N, 0.98% P and 0.75% K respectively. In this study used rice husk appeared to be best manure in respect of nitrogen, phosphorus and potassium content.

Oocyst content of used litter

Oocyst content of used litter gradually increased and reached a peak between 4 and 5 weeks of age, declined rapidly to a very minimum at 7 weeks of age (Table 3). At 7 weeks of age, oocyst content was highest in saw dust followed by wheat straw, rice husk and sugarcane bagasse.

The oocyst population was found to be peak at 4 and 5 weeks of age, and declined at 7 weeks of age. In this period it was found to be highest in sugarcane bagasse, intermediate in rice husk and the lowest in wheat straw and sawdust which was consistent with Long et al. (1975), Karim et al. (1994) and Mizu et al. (1998). They found the higher oocyst population at 4-6 weeks of age.

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