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Performance of Broiler reared on Different Litter materials in Late Autumn Season under Bangladesh condition

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Abstracts

A total of 168 (7-days-old) straight-run Arber Acres chicks were reared on 4 litter materials *i.e.* saw dust, rice husk, sugarcane bagasse and wheat straw up to 49 days of age to compare growth performance. Average body weight gain and feed conversion ratio at 49 days of age were 1708g, 1601g, 1628g, 1610g and 2.55, 2.51, 2.55, 2.53 on sawdust, rice husk, sugarcane bagasse and wheat straw respectively. The birds reared on sawdust in late-autumn season gained highest body weight, best feed-conversion efficiency had on rice husk litter. Feed consumption and survivability were more or less similar in all treatment groups. Litter cost per kg live weight was tended to be higher on wheat straw than other litters. So, it may be concluded that sawdust was the most suitable litter followed by rice husk, sugarcane bagasse and wheat straw in late-autumn season under Bangladesh condition.

Keywords: Performance, Broiler, Litter, Season and Cost

Introduction

Litter is used in the poultry houses for maintaining comfort for birds, to absorb moisture from droppings and to keep floor reasonably dry to provide a certain amount of insulation under foot and it also give birds a suitable medium on which feeding, watering and other management. The material that is used as litter should be absorbent, soft, quick drying, non-cake forming, free from offensive odors and non-toxic to poultry. It should be devoid of sharp object and dust. Availability and type of litter varies from country to country. Most common litter materials used in the world are chopped straw, paper mill by products, saw dust, wood shavings, sand, rice husk, sugar can pulp, sugarcane bagasse, oat hulls, corn cobs, ground corn cobs, dried leaves, coffee husk, peat moss etc. (Oliveira *et al.*, 1975; Ghany *et al.*, 1977). In Bangladesh, litters like rice husk, sawdust, chopped straw, sand ash etc. are used conventionally. There are other materials; sugarcane pulp, sugarcane bagasse, wheat straw, paper mill by product etc which could be also used as litters. Rao (1986) stated that chopped rice straw, dried leaves, coffee husk though not good can be used in places where other good materials are not available. It is therefore, appropriate that important information on litter and its management on broiler rearing is made available to the general poultry men so that it may benefit them. So, that the present research work was undertaken to achieve the following objectives:

i) To compare the performance of commercial broilers reared on different types of litter.
ii) To recommended a suitable litter for broiler production in "Late-autumn" season of Bangladesh.

Materials and Methods

This experiment was carried out for a period of 42 days (October 25, 1999 to December 12, 1999) to compare the growth, feed intake, feed conversion and survivability of broilers reared on different litter in 'Late-autumn' under Bangladesh condition. A total of the 168 (7-day old) Arbor Acres chicks of approximately uniform size were reared up to 49 days. These broiler chicks were fed *adlibitum* on a starter diet contained ME 2918.80 Kcal/kg DM and 23.09% CP up to 28 days of age and finisher diet contained ME 2910.61 Kcal/Kg DM and 20.29% CP up to 49 days of age.

The selected chicks were randomly divided into four-treatment group (42 chicks in each group). Types of litters, replication and number of birds are shown in the following-

Treatment / Replication	Litter			
	Saw Dust	Rice husk	Sugarcane bagasse	Wheat straw
R_1	14	14	14	14
R_2	14	14	14	14
R_3	14	14	14	14
Total	42	42	42	42

At first the experimental house including ceiling, walls and floor were thoroughly cleaned by spray using detergent and diluted phenyl solution. After drying, the experimental house was divided into several pens by using disinfected bamboo materials and wire net. Then litters were allotted on different experimental pens randomly at 5 cm depth.

Two experimental diets (broiler-starter and broiler-finisher) were formulated according to Bangladesh Standard Testing Institute (BSTI) standard with locally available feed ingredients (Table 1). Broiler-starter diet was provided between 7 and 28 days and finisher diet was provided between 29 and 49 days of age. Rations of identical composition were supplied to the birds of all treatment groups.

During the whole experimental period the following management procedures were followed-

Litter management: Leakage of water from drinker was carefully prevented. The litter materials were stirred once a week in first 4 weeks, then twice a week up to six weeks of age and in every alternate day in the 7^{th} week. Stirring was done to minimize dampness and cake formation of the feces mixed litter materials. Floor space per bird was 900 cm^2 and 12 birds were placed on a pen of 120 x 90 cm size.

Brooding: The chicks were brooded in respective pens using 100-watt bulb. Piece board was used as chick guard. The chicks were provided with a temperature 32°C at second week of age, decreasing gradually at the rate of 2.7°C per week up to two weeks by increasing height of the bulb from the floor level. Due to high environmental temperature brooding period was very short. No additional temperature was needed after 3 weeks since the temperature inside pens was favorable about 27°C.

Lighting: Birds were always exposed to continuous lighting of 23 hours and 30 minutes in each 24 hours. Electric bulbs were used at night to provide necessary light in addition to natural daylight.

Table 1. Broiler ration

Ingredient	Amount (kg)	
	Starter	Finisher
Yellow corn	47.00	50.00
Rice polish	18.50	18.50
Sesame oil cake	11.00	11.00
Soybean meal	12.00	9.00
Fish meal	-	3.00
Meat bone meal	4.00	3.00
DCM	7.00	5.00
Common salt	0.50	0.50
Total	100.00	100.00
Nutrient content (%)		
Dry matter	90.60	90.57
Crude protein	23.00	20.00
Calcium	1	1
Available phosphorus	1	1
Lysine	1	1
Tryptophen	.25	.25
Rhodivit B.S.	0.25	0.25
DOT (Coccidiostat)	0.05	0.05

Feeding and Watering: One (80 cm x 8 cm x 5 cm) linear feeder and one round waterer with a capacity of three liters were provided for 14 birds in each replicate group. The feeders and waterers were placed in such a way so that the birds were able to eat and drink conveniently. Feed and water were supplied *adlibitum* to the birds throughout the experimental period.

Recording of temperature and relative humidity: During the experimental period, the temperature of the experimental house was recorded twice a day (7 a.m. and 7 p.m.). The relative humidity was recorded with the help of a dry and wet bulb thermometer.

Vaccination: The birds were vaccinated according to the schedule of Table 2

Table 2. Vaccination schedule of broiler

Age of experimental birds (days)	Name and types of vaccine	Route of administration and dose
5	BCRDV + IB-inactivated	One drop in each eye
10	Gumboro vaccine NOBILIS Strains- 228E live vaccine	One drop in each eye
21	Gumboro vaccine NOBILIS Strains- 78 live vaccine	One drop in each eye
29	ND elone-30	Through skim milk mixed water

Sanitation: Waterers were cleaned twice daily. Feeders were cleaned and dried once a week. Strict sanitary measures were taken during the experimental period. Moreover, free movement of persons; predator animals were restricted to the experimental house.

Postmortem examination of birds: Postmortem examination of dead birds was carried out at the Pathology Laboratory, Bangladesh Agricultural University, Mymensingh.

The records kept during the seven weeks period were on

- Body weight
- Feed consumption
- Mortality and
- Temperature and humidity

while calculated data were

- Weight gain
- Feed consumption
- Feed conversion ratio (FCR) and
- Survivability

All the recorded data were analysed for ANOVA (Steel and Torrie, 1980) using a Completely Randomized Design (CRD) with the help of a computer package program. Data for different variables were subjected to analysis of variance. The difference among treatment means was accepted as real when probability would be 0.05 or better. If the treatment effects are significant, the Least Significant Difference (LSD) values will be calculated to compare treatment means.

Results and Discussion

Live weight at different ages on different types of litter were statistically similar ($p>0.05$) up to 21 days of age (Table 3). The live weight on all type of litter increased linearly with the advance of age. Finally, it was found that the birds reared on sawdust gained slightly higher ($p>0.05$) than is other treatment groups (Table 3). Davasgainum *et al.* (1997) reported highest body weight gain on sawdust than bagasse, wood shavings and mixture of bagasse and wood shavings, which supports the current result. On the other hand, the findings of Shakila and Naidu (1998) demonstrated that body weight gain on sawdust was significantly lower than other types (ground nut hulls, rice husk, chopped straw) of litter which contradicts the findings of Anisuzzaman and Chowdhury (1996) and Popolizio *et al.* (1979) who reported that body weight gain was highest on rice husk followed by sawdust, chopped straw and sand respectively. They found that rice husk was the best litter followed by maize cobs, bagasse and wood shavings. This variation in results might be due to variations in the seasons of the year. It seems that in late-autumn season sawdust is better than other litter with respect to less heat and cake formation. The present findings also indicated that comparatively lower weight over those reared on rice husk followed by sugarcane bagasse and wheat straw might be due to different fermentative heat production of litters. The results of body weight on different types of litter is dissimilar to the findings of AL Homidan *et al.* (1997), Hussain *et al.* (1996), Anonymous (1992), Ghany *et al.* (1977) and Oliveira *et al.* (1975) who found that types of litter material had no effect on body weight gain.

Table 3. Growth performance of broilers at different ages rare on different types of litter

Variable	Age Days	Type of litter					
		Sawdust	Rice husk	Sugarcane bagasse	Wheat straw	SED of mean	Statistical result
Live weight (g/bird)	14	80.83	72.17	83.17	84.59	5.76	NS
	21	253.97	263.50	222.18	235.12	20.81	NS
	28	523.02	555.50	461.47	503.46	32.89	NS
	35	787.31	766.22	764.13	779.37	25.56	NS
	42	1207.54	1232.88	1169.53	1168.57	38.35	NS
	49	1708.78	1601.93	1610.19	1628.27	53.62	NS
Feed consumption (g/bird)	14	212.37	180.35	208.09	222.78	23.98	NS
	21	650.94	650.95	553.106	603.96	56.66	NS
	28	1310.46	1388.56	1163.47	1345.99	85.44	NS
	35	1969.74	1929.28	1950.37	2050.10	78.27	NS
	42	3075.93	3109.63	2949.51	3040.44	138.72	NS
	49	4373.31	4031.3	4081.65	4169.67	158.01	NS
Feed conversion ratio (feed/ gain)	14	2.63	2.49	2.49	2.63	0.18	NS
	21	2.56	2.46	2.48	2.55	0.06	NS
	28	2.50	2.49	2.52	2.67	0.06	NS
	35	2.50	2.51	2.55	2.63	0.06	NS
	42	2.55	2.52	2.52	2.59	0.06	NS
	49	2.55	2.51	2.53	2.55	0.04	NS
Survivability (%)	14	100	100	100	100	2.38	NS
	21	100	100	95	95	2.37	NS
	28	100	100	95	95	2.38	NS
	35	100	100	95	95	2.38	NS
	42	100	100	95	95	2.38	NS
	49	100	100	95	95	2.38	NS

NS, P>0.05

Feed intake at different ages of birds reared on different types of litter were more or less similar ($p>0.05$) although bird on sawdust consumed highest feed (Table 3).This differences in feed consumption is supported by Hussain *et al.* (1996) and Anonymous (1992) but contradicts the findings of Anisuzzaman and Chowdhury (1996) who recorded significantly higher feed consumption for bird on rice husk followed by sawdust, chopped straw and sand respectively. Although non-significant, the feed intake was lowest (4031 g/bird) on rice husk group (Table 4) and the variation with other groups was greater. This was due to the fact that one of the experimental birds on rice husk showed exceptionally lower weight (1602 g/bird) because of poor feed intake.

Table 4. Cost of litter in different treatment

Type of litter	Cost (Tk/kg fresh litter)	Cost (Tk/birds)	Cost (Tk/kg live weight gain)
Saw dust	3	1.09	0.69
Rice husk	3	0.83	0.58
Sugar cane bagasse	4	2.02	1.42
Chopped wheat straw	5	2.13	1.56

Feed Conversion (FC) was positively correlated with weight gain. Birds reared on sawdust were better than sugarcane bagasse, wheat straw and rice husk (Table 3). This difference of FC among various litter treatments were agreed by Davasgaium *et al.* (1997) who recorded better feed conversion on sawdust (49 days old-2.14) than on bagasse (2.22). However, this result contradicts the findings of Anisuzzaman and Chowdhury (1996) and Popolizio *et al.* (1979) who concluded that FC on rice husk was highest than those on sawdust, chopped wheat straw and sand. This variation might be due to season of the year. The present findings also disagreed with the findings of Shakila and Naidu (1998), Hussain *et al.* (1996), Anonymous (1992) and Malone *et al.* (1991). These authors found statistically similar FC on all types of litter. In the present study FC were lowest on rice husk and sugarcane bagasse. These low FC values might be due to lower body weight gain on rice husk and sugarcane bagasse.

Survivability was statistically similar ($p>0.05$) on 4 treatment groups (Table 3) throughout the experimental period. Survivability tended to be higher on saw dust and rice husk than on sugarcane bagasse and wheat straw. This non-significant difference is supported by Hussain *et al.* (1996), Anonymous (1992), Kassid and Coleman (1990) and Al-Zubaidy *et al.* (1986) who observed that survivability were not attributable to types of litter but those results dissimilar to the findings of the study by Anisuzzaman and Chowdhury (1996). They found significantly higher livability on rice husk followed by sawdust, sand and chopped straw. A few numbers of birds showed some symptoms of leg abnormalities that might be due to vitamin-mineral deficiencies, which was immediately brought under control by supplying multivitamin solution (Zoosol Lisovit). The birds suffered from vitamin-mineral deficiencies may be due to improper mixing of it with the ration. Between 14 and 21 days of age, four birds died two on sugarcane baggase (T_3) and two on wheat straw (T_4) group. From the external symptoms and pathological tests, it was detected that the reason for mortality was found to be due to Fowl cholera and hot humid temperature. The non-significant result indicates that differences of survivability obtained were not attributable to the influences of litter materials.

Calculated litter costs per bird and per kg live weight gain in different treatment groups are shown in Table 4. The litter cost/bird and litter cost/kg live weight gain was highest for the birds reared on wheat straw followed by sugarcane bagasse, sawdust and rice husk.

At 49 days of age body weight gain was slightly higher on saw dust followed by wheat straw, sugarcane bagasse and rice husk. Feed intake and feed conversion efficiency did not significantly among different treatment groups. The survivability percentage was also statistically similar on different types of litter. Litter cost per kg live weight was tended to be higher on wheat straw than other litters. So, from the above findings on the basis of overall performance of broiler it may be concluded that saw dust was the most suitable litter among all types studied followed by rice husk, sugarcane bagasse and wheat straw in Late-autumn season under Bangladesh condition.

References

AL Homidan, A; Robertson, J.F. and Petchey, A.M. (1997). Effects of temperature, litter and lighting intensity on ammonia and dust production and broiler performance. British Poultry Science, 38: 65.

Al-Zubaidy, S.S.; Mossa, R.K. and Nasir, I.K. (1986). Chopped dried papyrus as a litter for broiler chickens. Indian Journal of Poultry Science, 21(3): 165-169.

Anisuzzaman, M. and Chowdhury, S.D. (1996). Use of four types of litter for rearing broilers. British Poultry Science, 37: 541-545.

Anonymous (1992). Effect of litter on broilers. Poultry International, March: 40.

Davasgaium, M.M.; Boodoo, A.A.; Labuette, J.A.; Bachraz D.Y.; Sukurdeep, N. and Seebaluck, B.D.(1997). Use of bagasse as a potential source of litter materials for broiler production. Proceeding of Second Annual Meeting of Agricultural Scientists, Reduit, Mauritius, 139-145.

Ghany, M.A.; Kheireldin, M.A. and Ahia, F.M. (1977). The effect of different types of litter on body weights, feed efficiency and viability of chicks. Poultry Abstracts, 3: 57-58.

Hussain, S.A.; Zahid, S.; Akhter, S. and Salam, K. (1996). Effect of different types of litter materials on the performance of broilers. Pakistan Journal of Zoology. 28(2): 181-182.

Kassid , I.F.H. and Coleman, T.H.(1990). The effects of using anaphase (D.P.W.) or shavings as litter. Poultry Abstracts, 16:54.

Malone, G.W.; Tilmon, H.D. and Taylor, R.W. (1991). Evaluation of kenaf core for broiler litter. Poultry Science, 69(12): 2064-2067.

Oliveira, S.C.; Cavalheiro, A.C.L.; Trindade, D.S. and Lopez, J. (1975). Comparison between types of litter in broiler production in Rio Grande do Sal, Brazil. World's Poultry Science Association, 341-344.

Popolizio, E.R.; Ricci, H.R.; Castellote, H.F. and Pailhe, L.A. (1979). Use of different materials for poultry litter Agronomia Y Zootecnia 75 :14.

Rao, V.S.R. (1986). Litter- its management and utility in Broiler. Poultry Adviser, 19(7-12): 31-40.

Shakila, S. and Naidu, M.A. (1998). A study on the performance of the broiler on different litter materials. Indian Veterinary Journal, 75(8): 705-707.

Steel, R.G.D. and Torrie, T.H. (1980). Principle and Procedures of Statistics. McGraw Hill Book Company, Inc. New York.