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Original Article

Paddy Straw as an Alternate Bedding Material for Broiler Chicks

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ABSTRACT

Burning of agricultural residues especially paddy straw is now recognized as a major source of environmental concern in India. Burning of huge quantities of paddy straw annually leads to emission of obnoxious gases thus causing adverse impacts on, health of human, animal and bird population. This practice can be discouraged through its utilization as an alternate litter material to commonly used paddy husk which is now available at costly prices because of its use in different industries thus raising the cost of broiler production. This was evaluated through the experiment during winter season conducted on broiler chicks. Broiler chicks (n=144) were distributed into three treatment groups, each having 4 replicates of 12 chicks with equal sex and ratio and average group weight, and reared up to 42 days of age under similar conditions of housing and management except the variation in litter material. Paddy husk (PH), un-chopped paddy straw (UPS) and chopped paddy straw (CPS) were used as different litter materials. The growth parameters tested in the experiment were body weight, weight gain, FCR, PER, EER and carcass characteristics (viz. evisceration rate and proportion of cut-up parts). The litter type had no significant effect on body weight, weight gain, FCR, PER and EER among all the treatments. The average body weight at 42 days of age was 1939, 1947 and 1960 g, respectively in PH, CPS, UCPS groups. The bedding type had no significant effect and no influence on the carcass characteristics viz. evisceration rate and proportion of cut-up parts of the carcass, so it was concluded that paddy straw can be used as good bedding material for broiler chicks.

Key words: bedding material, FCR, carcass characteristics, PER, Paddy husk, paddy straw.

INTRODUCTION

The deep litter system is the most popular system of housing in poultry production throughout the world. Poultry industry consumes large quantities of processed solid wood residues and other materials for bedding like paddy husk saw dust, ground nut and peanut hulls (Grimes, 2004) sand, wood shavings (Asaniyan et al., 2007) and (Shields et al., 2005) pine shavings (Macklin et al., 2006) or other soft woods, shredded papers (Griffith, 1993), recycled papers (Lien et al., 1992). etc. The quality of litter material directly affects the performance, health, carcass quality and welfare of poultry (Malone and Chaloupka, 1983). Birds do not perform to their maximum genetic potential in a poor environment. To obtain maximum production potential, management of the poultry house environment is essential.

In the recent past, paddy husk has become an extensively used material by many other industries due to its potential as a fuel. Consequently, in many parts of the country, poultry farmers find it increasingly difficult to get paddy husk for use as a litter material at reasonable price. It is therefore important to find out suitable and cheap alternate bedding materials to curtail the cost of poultry production. Approximately 22 million tons of paddy straw is produced alone in the state of Punjab which is freely available in the fields and the burning of which is a major cause of environmental concern. The paddy straw seems to possess most of the qualities of a good litter material for chicks like dry, soft, compressible, absorbent and buoyant so the use of paddy straw as an alternate litter material could go a long way in reducing the cost of broiler production besides saving the environment.

MATERIALS AND METHODS

1. Management:

1.1 Broiler chicks

This experiment was conducted on the broiler chicks to compare the effects of paddy husk (PH), chopped paddy straw (CPS) and unchopped paddy straw (UCPS) as litter materials on the growth performance and carcass yield during summer season.
144, sexed day-old healthy 'VENCOB' broiler chicks hatched on January 9, 2009, procured from M/s Venky's (India) Ltd. were randomly divided into 12

groups. Each group had 12 numbers of chicks with similar body weight range, sex ratio and average group weight. The paddy straw and paddy husk were procured from the local areas. The broiler rations were computed using various ingredients procured from the local market. The broiler starter ration was fed to all groups of chicks during the first two weeks. During the 3rd and 4th weeks, the grower ration was fed and then the finisher ration was fed during 5th and 6th weeks of age. Daily feeding record was maintained separately for each group of chicks. Feed and water were made available *ad libitum* all the times. The treatments consisted of paddy husk as the control (To), chopped (T_1) and unchopped (T_2) paddy straw as litter materials. Every treatment was tested on quadruplicate groups. The chicks were reared from day1 till 42 days of age.

2. Experimental recording

2.1 Body weight and Feed intake

Body weight: The body weight of individual chicks was recorded at weekly intervals up to six weeks of age. All chicks were weighed in the morning prior to feeding. The average body weight and body weight gain were then calculated for each experimental group.

Feed Intake: The daily feeding records were maintained for each group of chicks. The residual feed was weighed on the day of recording body weight. The average feed intake for each group was calculated by dividing the total feed intake by the number of birds taking into account mortality/culling, if any, in the particular pen.

2.2 Feed Conversion Ratio (FCR): The FCR was calculated as the amount of feed consumed per unit gain in body weight. FCR = Average feed intake (g) / Average body weight gain (g)

2.3 Protein Efficiency Ratio (PER): The PER was calculated as grams of body weight gain per gram protein consumed.

PER = Body weight gain (g)/ Protein consumed (g)

2.4 Energy Efficiency Ratio (EER): The EER was calculated as grams of energy consumed per grams of body weight gain. EER = Energy consumed (g) / Body weight gain (g)

2.5 Carcass characteristics:

On the 42nd day of experiment four chicks from each treatment were randomly sacrificed in all the experiments. They were bled completely, scalded at 53°C for 75 seconds and de-feathered by hand picking. The head was removed by cutting through the joint between head and first vertebrae avoiding the bone. Then shanks were removed by making a cut through the hock joint starting on the inside joint surface. The oil glands were removed, cutting drop into the tail vertebrae and the following motion. After that, abdomen was cut open and the viscera were removed. The dressed carcass was portioned into different cut up parts viz., wings, neck, breast, back, thigh and drumsticks. The weight of inedible parts, i.e. blood, feather and offal was recorded. The giblet weight (heart, liver and gizzard) and eviscerated yield were recorded. The data were expressed on percent of total meat yield basis for comparison of various treatments.

1.3 Statistical analysis: The data were analyzed by using one way analysis of variance (Snedecor and Cochran, 1980) for the statistical means. Overall means of all the parameter compare using Duncan's multiple range test (Duncan, 1995).

RESULTS AND DISCUSSION

The results of the experiment conducted have been presented and discussed below.

Growth performance: The weekly data recorded on various parameters viz. body weight gain, feed intake, FCR, PER and EER in the experiment have been presented in Tables 1-4.

1) **Body weight:** The weekly body weight data (Table 1) indicated that the average body weight increased with the age as expected, in all the treatments of this experiment. There was no significant difference in the body weight of chicks at different weeks, between the treatments. However, the chicks in T_2 had higher body weight than those of T_0 and T_1 at the end of the experiment, and T_1 had higher body weight than T_0. The weekly data obtained on body weight in this experiment have been shown diagrammatically in Fig.1
2) **Body weight gain:** The data on weekly body weight gain of chicks (Table 2) indicated that there were slight numerical differences in the weight gain of the chicks in different weeks but the difference between the treatments was not significant in any of the weeks. The highest weight gain was obtained during 5th week of age in all the treatment groups in this experiment also.
3) **Feed intake:** The data on the weekly feed intake of the chicks (Table 3) indicated that there was progressive increase in feed intake per bird with the advancement of age up to 5th week and a slight decline during the 6th week in all the treatment groups. Little variations were observed in the feed intake of chicks during different weeks of age between the treatments; however, the differences were not significant at any stage. The average feed intake was highest in the 5th week of age in all the treatments.
4) **Feed conversion ratio (FCR):** The data (Table 4) indicated that the FCR widened with the increase in age in all the treatments. The weekly feed conversion ratio in various treatments indicated small variations between the treatments were at different weeks but the difference was not significant among the treatments. These data have been presented diagrammatically in Fig 2.
5) **Protein efficiency ratio (PER):** The weekly PER data recorded in this experiment (Table 5) indicated slight variations in the PER between T_0, T_1 and T_2 during different weeks of age but the differences remained non significant during the entire experiment. There was decline in PER with the advancement of age in all the treatment groups.

Table 1. Average weekly body weight of broiler chicks in various treatments

Age (weeks)	Body weight (g/ bird)		
	Paddy husk T_0	Chopped paddy straw T_1	Unchopped paddy straw T_2
1	107 ± 0.48	107 ± 1.08	107 ± 0.91
2	257 ± 5.01	252 ± 3.43	255 ± 4.70
3	546 ± 4.14	543 ± 1.60	556 ± 4.80
4	959 ± 6.46	944 ± 0.71	958 ± 5.81
5	1468 ± 6.75	1474 ± 5.61	1473 ± 8.55
6	1939 ± 19.50	1947 ± 6.30	1960 ± 4.94

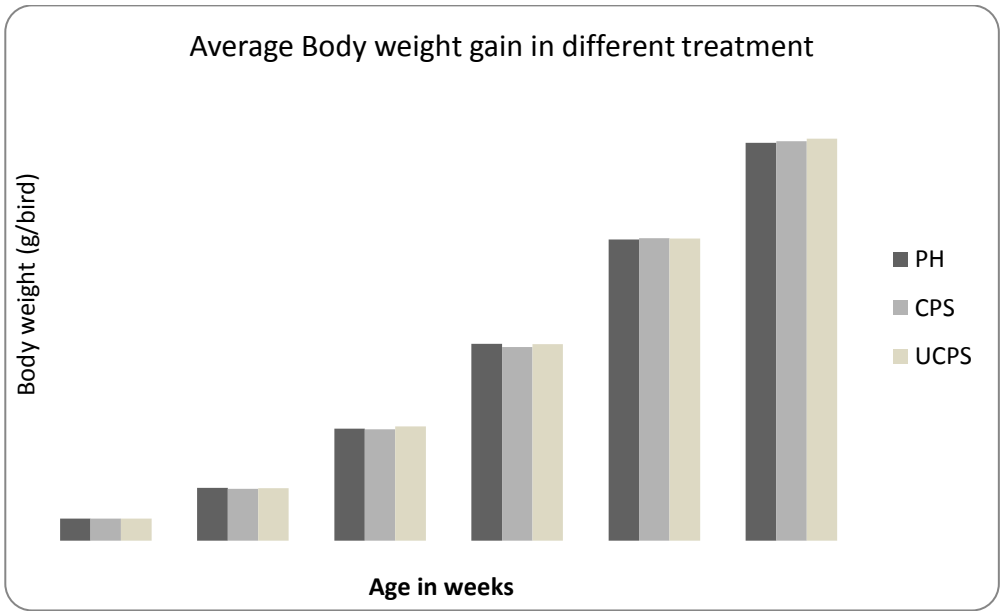

Fig. 1. Bar diagram showing variation in body weight in different treatments at different weeks of age

Table 2. Average weekly body weight gain of chicks in various treatments

Age (weeks)	Body weight gain (g/ bird)		
	Paddy husk T_0	Chopped paddy straw T_1	Unchopped paddy straw T_2
1	64 ± 1.44	63 ± 0.25	65 ± 1.03
2	143 ± 2.14	144 ± 1.71	148 ± 5.12
3	299 ± 2.18	288 ± 6.80	300 ± 3.20
4	401 ± 1.35	413 ± 4.63	404 ± 2.70
5	531 ± 5.52	522 ± 5.80	515 ± 8.30
6	465 ± 22.93	467 ± 11.29	487 ± 6.10

Table 3. Average weekly feed intake of broiler chicks in different treatments

Age (weeks)	Weekly feed intake (g/ bird)		
	Paddy husk T_0	Chopped paddy straw T_1	Unchopped paddy straw T_2
1	93 ± 2.64	100 ± 3.27	96 ± 2.00
2	246 ± 5.20	246 ± 3.60	237 ± 12.07
3	539 ± 30.98	535 ± 31.21	576 ± 8.00
4	772 ± 9.72	787 ± 10.66	774 ± 9.52
5	975 ± 7.19	983 ± 13.78	983 ± 11.42
6	942 ± 25.61	959 ± 10.66	972 ± 6.18

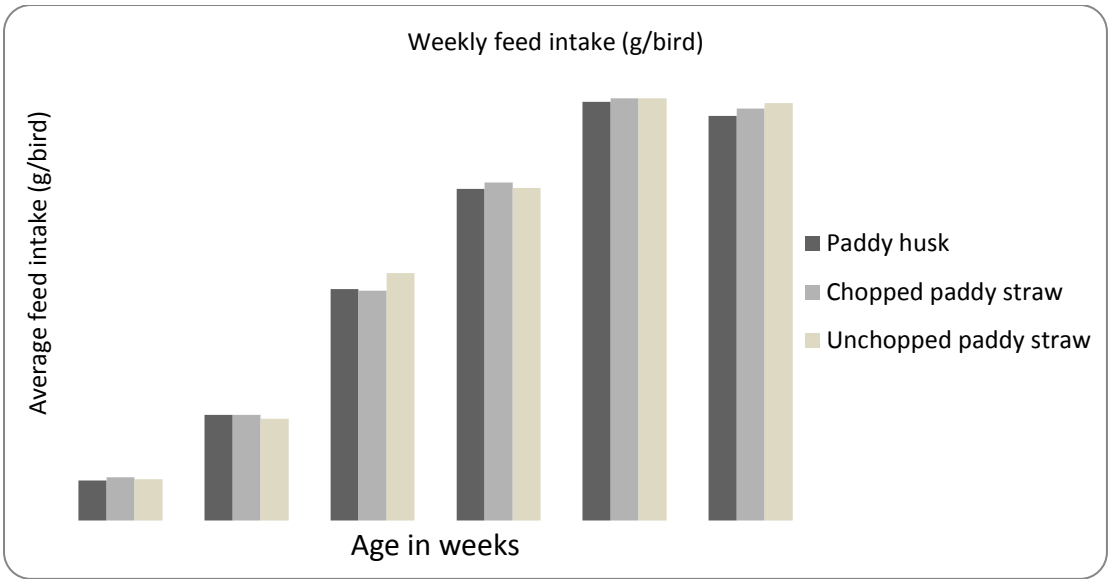

Fig 2. Bar diagram showing weekly feed intake by birds in different treatment groups

Table 4. Weekly feed conversion ratio (FCR) in different treatments

Age (weeks)	Feed conversion ratio (FCR)		
	Paddy husk T_0	Chopped paddy straw T_1	Unchopped paddy straw T_2
1	1.45 ± 0.02	1.59 ± 0.04	1.48 ± 0.03
2	1.72 ± 0.04	1.71 ± 0.04	1.61 ± 0.07
3	1.85 ± 0.11	1.84 ± 0.08	1.92 ± 0.03
4	1.93 ± 0.03	1.91 ± 0.04	1.92 ± 0.01
5	1.84 ± 0.01	1.89 ± 0.03	1.91 ± 0.03
6	2.03 ± 0.05	2.05 ± 0.05	1.99 ± 0.02

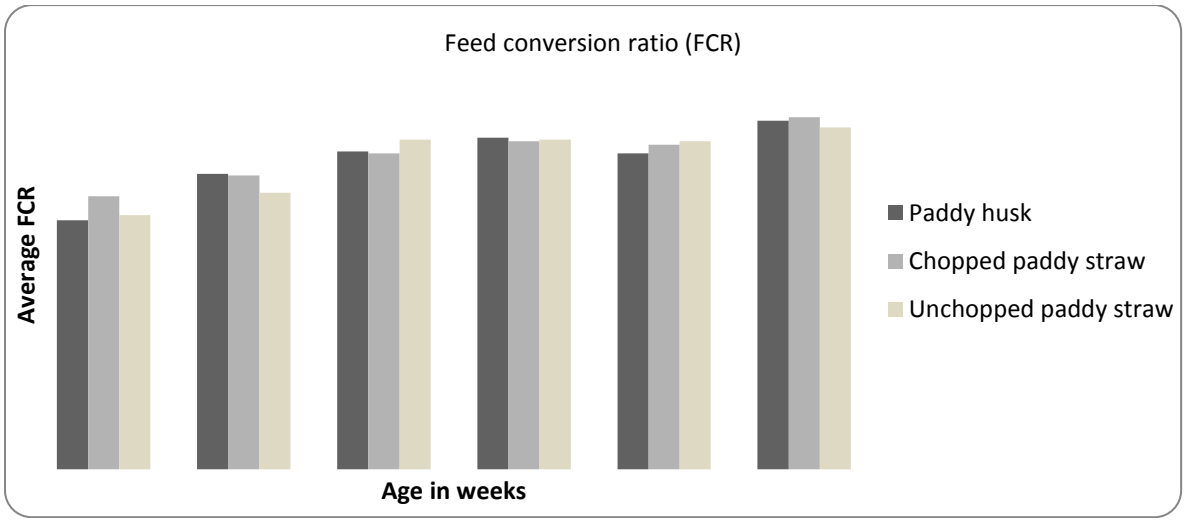

Fig 3. Bar diagram showing variation in FCR in different treatments at different weeks of age

Table 5. Weekly protein efficiency ratio (PER) data in different treatments

Age (weeks)	Protein efficiency ratio (PER)		
	Paddy husk T_0	Chopped paddy straw T_1	Unchopped paddy straw T_2
1	6.82 ± 0.16	5.68 ± 0.02	6.28 ± 0.10
2	2.64 ± 0.06	2.65 ± 0.07	2.84 ± 0.13
3	2.70 ± 0.18	2.69 ± 0.12	2.57 ± 0.05
4	2.57 ± 0.04	2.59 ± 0.56	2.58 ± 0.02
5	3.01 ± 0.02	2.94 ± 0.04	2.90 ± 0.05
6	2.73 ± 0.06	2.70 ± 0.06	2.77 ± 6.03

Table 6. Effect of litter type on evisceration rate and proportion of premium parts of the carcass

Parameters	Carcass characteristics		
	(T_0)	(T_1)	(T_2)
Eviscerated wt[1]., (%)	61.87 ± 0.11	62.27 ± 0.55	61.52 ± 0.70
Breast[2], (%)	27.29 ± 0.32	28.09 ± 0.28	27.45 ± 0.39
Thigh[2], (%)	17.75 ± 0.45	17.50 ± 0.07	16.93 ± 0.26
Drumstick[2], (%)	15.54 ± 0.24	14.87 ± 0.37	15.15 ± 0.29
Giblet, (%)	4.74 ± 0.16	4.47 ± 0.02	4.70 ± 0.07

Note: expressed as ([1]) per cent of body weight, ([2]) per cent of eviscerated weight.

Energy efficiency ratio (EER): The data on the weekly EER in this experiment have been given in (Table 6). These data indicated variations in the EER between treatments at different weeks of age. However, the EER did not indicate any significant difference among the treatments in any week during the experimental period.

Carcass Characteristics: The eviscerated weight indicated slight numerical differences in different treatments in the experiment. The T_1 chicks had highest eviscerated weight. Whereas, the T_0 chicks had the lowest eviscerated weight in the experiment. However, there was no significant difference in the eviscerated weight of chicks among different treatments. The T_1 chicks in experiment had highest and T_0 chicks had the lowest yield of breast meat. However, there was no significant difference in breast meat yield among all the treatments. The yield of thigh meat was higher in T_0 and lower in T_2. However there was no significant difference in the thigh meat yield of chicks among all the treatments. The drumstick meat yield in T_0 was higher, whereas, T_1 had lowest drumstick meat yield. However, there was no significant difference in drumstick yield of chicks among all the treatments. The proportions of giblets in T_0 group in experiment were higher. Whereas, T_1 group in were having lower proportions of giblet. There was, however, no significant difference between the treatments. These data indicated that the bedding type had no influence on the carcass characteristics viz. evisceration rate and proportion of cut-up parts of the carcass. Grimes (2004), Lacy (2007) and Atapattu and Wickramasinghe (2007) did not find any significant effect of the type of litter on the carcass characteristics. Whereas, Huang et al., (2009) had shown effect of bedding types and different nutrient densities on growth performance and visceral organ weight in broiler chickens.

All the litter materials performed well w.r.t. growth performance and carcass characteristics of broiler chicks. Efficiencies for feed, protein and energy conversions were not at all affected using these litter materials. The bedding type had no influence on the carcass characteristics viz. evisceration rate and proportion of cut-up parts of the carcass. Chopped paddy straw (PS) and unchopped paddy straw (UPS) can offer good and cheap alternates to rice husk (RH) for rearing broiler chicks.

CONCLUSION

The present experiment conducted on broiler chicks to evaluate paddy straw as alternate bedding material shows no significant difference in growth rate, feed intake, FCR, PER and EER in all the experiments. All the litter materials performed well w.r.t. growth performance of broiler chicks. Efficiencies for feed, protein and energy conversions were not at all affected using these litter materials. No case of health abnormalities or abnormal behavior was observed in birds confirming the comfort of the birds. Larvae growth was seen in T_1 and T_2 group of litter material in the experiment which could be due to high moisture and humidity. By adding Paddy husk to Chopped paddy straw (CPS) and unchopped paddy straw (UCPS) i;e 50:50 can reduce the moisture content in litter material. Chopped paddy straw (CPS) and unchopped paddy straw (UCPS) can offer good and cheap alternates to rice husk (RH) for rearing broiler chicks.

REFERENCES

Asaniyan EK, Agbede JO and Laseinde EAO. 2006. Comparative influence of sand and wood shavings litters replacement frequency on performance of broiler chicks. Journal of Animal and Veterinary advances 5 (12):1080-87

Asaniyan EK, Agbede JO and Laseinde EAO. 2007. Impact assessment of different litter depths on the performance of broiler chickens raised on sand and wood shaving litters. World Journal of Zoology 2:67-72.

Atapattu NSBM and Wickramasinghe. 2007. The use of refused tea as liter material for broiler chickens. Poultry Science 86:968-72.

Duncan DB. 1955. Multiple range and multiple "F" tests. Biometrics 11: 1-42.

Griffith DLV. 1993. Shredded paper for litter. Broiler growth in Barbados are trying shredded paper as litter instead of sugar-cane bagasse. Poultry Science 32: 70-72.

Grimes J. 2004. Alternative litter material for growing Poultry. North Carolina Poultry Industry Newsletter page 1-4.

Huang Y, Yoo JS, Kim HJ, Wang Y, Chen YJ, Cho JH and Kim IH. 2009. Effect of bedding types and different nutrient densities on growth performance, visceral organ weight, and blood characteristics in broiler chickens. Journal of Applied Poultry Research 18: 1-7.

Lacy MP. 2002. Litter quality and broiler performance. The University of Georgia College of Agricultural and Environmental Sciences. Cooperatives Extension service. Leaflet 426.

Lien RJ, Conner CO and Bilgili JF. 1992. The use of recycled paper chips as litter material for rearing broiler chickens. Poultry Science 71: 81-87.

Malone GW and Chaloupka GW. 1983. Influence of litter type and size on broiler performance. 2. Processed newspaper litter particle size and management. Poultry Science 62: 1747-50.

Shields SJ, Garner JP and Mench JA. 2005. Effect of sand and wood-shavings bedding on the behavior of broiler chickens. Poultry Science 84:1816-24.