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Performance Evaluation of Broiler Chicks Reared on Alternative Litter Materials

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Abstract
The study determines the impact of four litter materials; wood shavings (WS), orange peel (OP), cassava peel (CP) and palm fruit shaft (PS) on the performance of broiler chickens. Two hundred (200) day-old broiler chicks of Arbor-acrebreed were randomly allotted to four litter materials, each with five replicates (10 chicks per replicate) and reared 8 weeks on the same starter and finisher diet. Weight gains (WG), feed intake (FI), feed conversion ratio (FCR) were measured as performance parameters. The result showed that at 1-10 days of age chicks reared on PS had the higher WG (116.60 g/bird) compared to those reared on the WS and other test litters (106.60-109.40 g/bird) with numerical improvement of FCR (1.72 versus 1.75-1.76). at starter age, birds on WS had the least WG (380.50 g/bird) similar ($p>0.05$) to those reared on OP and CP but lower ($P<0.05$) than 426.00 g/bird in those reared on PS. Overall, the birds reared on alternative litter materials compared favourably and in most cases surpassed those reared on WS with reference to WG and better FCR. This thus suggest that broiler chickens could be reared up to 56 days of age using any of the tested litter materials without any adverse effect on the weight changes and feed consumption.

Keywords: Performance, broiler chickens, litter materials

Introduction

The poultry industry has in recent years occupied a leading position among agricultural industries in many parts of the world. This may be due to the attractive attributes of poultry which include the ability to adapt easily, high economic value, rapid generation time and a high rate of growththat can result in the production of meat within 8 weeks and first egg within eighteen weeks (Smith, 2002).Of all poultry production technologies, none has received attention and interest of animal scientists as nutrition especially the utilization of non-conventional feed (NCF) sources for the feeding of poultry (Babatunde, 1998). However, with the increasing concentration of poultry in Nigeria, it has become essential to appreciate the influence of litter materials on which these birds are reared.

In Nigeria, broilers and cockerels are mostly reared on the floor spread with litter materials. Litter material is any dry material used on the floor of chicken houses on which chicken dropping will fall. It is known as litter material because it combines with the droppings and undergoes a bacterial breakdown process, thus preventing a smelly and unsanitary condition (Demirulus, 2006).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 (Rao, 1986).

In Southwestern Nigeria, wood shavings are easily obtained from sawmills at little or no cost and used as litter. The use of thismaterial has been hinged purely on their availability and price, without any consideration for the comfort of the birds.Few available reports on the effect of litter on the performance of birds are contradictory and showed a need for validation (Oliveira *et al*., 1974). According to Awojobi (1999), types of litter had no significant effect on birds' performance. Whereas Popolizio *et al*. (1979), Poyraz *et al.* (1990) and Anisuzzaman and Chowdhury (1996) reported that rice husk was the best litter for broiler chickens. Based on these premise, it becomes imperative to evaluate wood shaving and other locally available litter materials in Nigeria such as palm fruit shaft, cassava peel and citrus peel on the performance of broiler chickens.

This study therefore, determined the impact of four litter materials; wood shavings, orange peel, cassava peel and palm fruit shaft on the performance of broiler chickens.

Materials and Methods

This study was carried out at the Poultry Unit of the Teaching and Research Farm and Animal Microbiology laboratory of the department of Animal Production and Health (APH), Federal University of Technology, Akure (FUTA) located Latitude 7° 18' and longitude 5° 10'E (Aro *et al.,* 2008) upon ethical approval by the Research Ethics Committee of the APH, FUTA.

The wood shavings were collected from wood workshops and saw mills around Akure metropolis while the citrus peels were collected from the sweet orange sellers along the streets and along major roads of Akure and the environs where they are dumped. Also, cassava peels were collected from cassava starch and garri processing industries around Akure, while the palm fruit shafts were collected from oil palm processing unit of crop section of the Teaching and Research Farm, FUTA. They were all sundried and stored before used.

Two hundred (200) day-old chicksof Arbor-acrebreed were reared on four different types of litter materials (wood shavings, citrus peels, cassava peels and palm fruit shaft) for 56 days. 50 birds of 5 replicates at 10 birds per replicate were assigned to each litter material in a completely randomized design. Feeding and other management practices were the same for all experimental treatments. Chicken weight, weight gain, feed intake and feed conversion ratio were evaluated as performance parameters. All data generated were subjected to one-way analysis of variance (ANOVA) using SPSS version 20 package and where significant differences occurred, Duncan multiple range test of the same package was engaged to separate the means

Results andDiscussion

The performance characteristics of broiler chicks on wood shaving (WS), orange peel (OP), cassava peel (CP) and palm fruit shaft (PS) at 10 days of age (Table 1) showed significant ($p<0.05$) differences in the birds' final weight (FWT), weight gain (WG) and feed consumed (FC). The highest FWT was observed in birds reared on palm fruit shaft (158.78 g/bird) and those reared on orange peels had the lowest (148.40 g/bird). The same trend was noticed for the WG with birds reared on Palm fruit Shaft which recorded the highest WG of 116.60 g/bird while birds on Orange Peel recorded the least at 106.60g. However, the birds reared on wood shaving) recorded the least feed intake (186.3 g/bird) while those on palm fruit shaft (200.30g) had the highest feed intake. The feed conversion ratios were similar for all the treatments, however the chicks on Palm fruit shaft had the best numerical feed conversion ratio value. Other researchers have reported similar findings regarding the influence of various litter material on broiler chicks' performance (Grimes *et al*., 2006; Atapattu and Wickramasinghe, 2007).

The performance of broiler starter chicks during the period of 1-21 days (Table 2) indicated that the FWT was influenced significantly ($p<0.05$) by the litter materials used in this study. Birds reared on palm fruit shaft had the highest FWT (468.20 g/bird) while those reared on wood shaving had the lowest FWT (422.60 g/bird). Weight gain also followed the same trend as the FWT as birds reared on palm fruit shaft had the highest weight gain (426.00 g/bird) while birds reared on wood shaving had the least (380.50 g/bird). However, the feed consumed was least in birds reared on the wood shavings (717.20 g/bird) and highest in birds reared on palm fruit shaft (777.70 g/bird)..

Table 1: Performance of broiler chicks on different litter materials at age 1-10 days

Parameters	Wood Shavings	Orange Peels	Cassava Peels	Palm Fruit Shaft	±SEM	P-value
Initial weight (g/bird)	42.14	41.72	41.57	42.19	0.20	0.14
Final weight (g/bird)	149.30^{b}	148.40^{b}	151.00^{b}	158.78^{a}	2.04	0.02
Weight gain (g/bird)	107.20^{b}	106.60^{b}	109.44^{b}	116.60^{a}	2.02	0.02
Feed consumed (g/bird)	186.30^{a}	186.90^{a}	192.55^{b}	200.30^{c}	2.50	0.01
Feed conversion ratio	1.75	1.76	1.76	1.72	0.03	0.12

a'b' c represent means with different superscripts in the same row are significantly ($p< 0.05$) different

Table 2: Performance of broiler starter chicks on different litter materials at age 1-21 days

Parameters	Wood Shavings	Orange Peels	Cassava Peels	Palm Fruit Shaft	±SEM	P-value
Initial weight (g/bird)	42.14	41.72	41.57	42.19	0.20	0.14
Final weight (g/bird)	422.60^{b}	447.50^{ab}	434.10^{ab}	468.20^{a}	6.69	0.01
Weight gain (g/bird)	380.5^{b}	405.8^{ab}	392.5^{ab}	426.00^{a}	6.67	0.01
Feed consumed (g/bird)	717.20^{b}	738.10^{ab}	734.30^{ab}	777.70^{a}	9.84	0.03
Feed conversion ratio	1.89	1.82	1.87	1.82	0.01	0.22

a'b' c represent means with different superscripts in the same row are significantly ($p< 0.05$) different.

Feed conversion ratio was not significantly ($p>0.05$) different across treatments with palm fruit shaft and orange peel having the best numerical feed conversion ratio value of (1.82), while those reared on cassava peels

and wood shavings had 1.87 and 1.89 respectively. All the performance characteristics of broiler chickens measured were not significantly affected with exception of feed conversion ratio (Table 3) at the end of 56 days. However, the feed conversion ratio was significantly ($p<0.05$) different among the treatments, with the birds reared on orange peel having the best feed conversion ratio (orange peel, 2.39; wood shaving, 2.88; cassava peel, 2.58; palm fruit shaft 2.62). The present findings agreed with the findings of some researchers which opined that type of litter materials have no effect on performance of birds (Awojobi, 1999; Grimes *et al.,* 2006; de Avila *et al.,* 2008) except the feed conversion ratio.Palmfruit shaft, orange peel and cassava peel used in this study have not been globally tested due tothe unavailability of these by-products in different regions of the world. However, at finisher stage, birds on orange peel had the best FCR followed by cassava peels, palm fruit shaft and wood shavings suggesting the potentials of these litter materials in broiler chickens rearing in the region where they are abundant. The poor FCR of the birds reared on the other highly indigestible fibrous materials (palm fruit shaft and wood shavings) could not be unconnected with the reduction in nutrient digestibility due to materials picked from the litter by the birds (Anisuzzaman and Chowdhury, 1996; Awojobi*et al*., 1999).

Table 3: Performance of broiler chicken on different litter materials at age 1-56 days

Parameters	Wood Shavings	Orange Peels	Cassava Peels	Palm Fruit Shaft	±SEM	P-value
Initial weight (g)	42.14	41.72	41.57	42.19	0.20	0.14
Final weight (kg/bird)	1.98	2.07	2.10	2.14	0.01	0.11
Weight gain (kg/bird)	1.94	2.03	2.06	2.10	0.01	0.11
Feed consumed (kg/bird)	5.49	4.84	5.29	5.57	0.02	0.21
Feed conversion ratio	2.88^{b}	2.39^{a}	2.58^{ab}	2.62^{ab}	0.06	0.02

a'b'c represent means with different superscripts in the same row are significantly ($p< 0.05$) different.

Conclusion

The overall performance obtained in the present study at age 56 days tends to indicate that the alternative materials tested are suitable for litter without any adverse effect on the performance of broiler chickens. However, varied effects of these litter materials could be seen on the performance of the birds at 1-10 days and 1-21 days of age.

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