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Research Paper

Growth performance of starter broilers fed diets containing red sandalwood *(Pterocarpus santolinoides)* leaf meal

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ABSTRACT

This study was designed to assess growth performance of starter broilers fed diets containing *Pterocarpus santolinoides. A total* of 120 starter broiler chicks used for the study were assigned to four treatment diets corresponding to 0, 5, 10 and 15% and three replicates per treatment with ten birds in each replicate group. The study lasted for 28 days. Five (5) birds per replicate were used for data collection. Results indicated that there were no significant difference ($p>0.05$) in average initial weight and in daily weight gain. Significant differences ($p<0.05$) were obtained on average final weight, average daily feed intake and in average daily weight gain respectively.

Key words: Growth performance, starter broilers, *Pterocarpus santolinoides, Feed conversion ratio.*

INTRODUCTION

Prices of plant protein ingredients for livestock feeds have been on the increase in Nigeria. This has resulted in the increasing cost of livestock production and consequent increase in the cost of livestock products. The need to find alternative and cheaper ingredients to replace the expensive ones is inevitable since cost of feed accounts for 70-80% (Ahaotu et al., 2013).

Pterocarpus santolinoides a tropical legume has been reported to be able to grow in moderately humid to dry areas and on a variety of soils including poor or sandy soils. Being a vigorous legume, it gives high seed yields (Ayo-Enwerem et al., 2017). In addition to these agronomic potentials, the leaves have been reported to have the potential of being utilized as a livestock feed ingredient (Offor et al., 2015). *Pterocarpus santalinoides*, commonly called red sandal wood in English, “uturukpa” in Igbo. It is classified under the kingdom Plantae, Order (fabales), family (*faboideae*), Genus (*Pterocarpus)* and Species (*santalinoides*) (Prado, 2000). Various morphological parts of *Pterocarpus santalinoides* are used in ethno-medicine ailments. The ethno-medical use of leaves of *Pterocarpus santalinoides* in the treatment of diarrhea and other gastrointestinal disorders has been scientifically proven with its triglyceride and glucose lowering properties (Turner, 2000). *Pterocarpus santalinoides* leaves are among the commonly consumed leafy vegetables in Africa especially in Nigeria (Figure 1).

Pterocarpus species belong to the family *fabaceae* and they occur through- out the tropics, the Nigerian species are trees with bright yellow flowers and usually have

Figure 1. *Pterocarpus santalinoides.*

alternate leaflets (Osuagwu *et al*., 2007). The fruit pod has an usual irregular shape, (Adetunji, 2007). It is a shade tree commonly found along riverine forest in Africa and tropical South America (Okwu and Ekere, 2003). The plant can also help in erosion control because of the type of root system as well as nitrogen fixation (Okwu, 2004).

In Nigeria many indigenous plants including *Pterocarpus Santalinoides are* used as food or medicine. The tender leaves are used as vegetables in soup making while the stem bark is used in making pepper soup. Plants are used in treating rheumatism, diarrhea dysentery, cough, asthma, diabetes, malaria, elephantiasis, cold and others (Okwu, and Ekeke, 2003). This study was designed to assess growth performance of starter broilers fed diets containing *Pterocarpus santolinoides*

MATERIALS AND METHODS

The project was conducted at the Teaching and Research Farm of Imo State Polytechnic Poultry unit, Umuagwo – Nigeria. The site is situated between longitudes 7o 01 0611E and 7° 03^{1} 00^{11} and latitudes 5° 28^{1} 00^{11}N and 5° 30^{1} 00^{11}N in the humid tropical West Africa (IMLS, 2009).

Pterocarpus Santalinoides leaf meals used for this study were obtained from the Forestry Research Farms, Imo State Polytechnic Umuagwo, Nigeria. The leaves were spread on mat and concrete floor to be dried at room temperature. On drying, the samples were milled. The *Pterocarpus Santalinoides leaf* meals were subjected to proximate analysis (Tables 1 and 2) at the Science Technology Laboratory, Imo State Polytechnic Umuagwo, Nigeria, using standard methods (AOAC, 2001). All chemicals and reagents were of analytical standard. Fresh leaves of *Pterocarpus santalinoides* were obtained from the Forestry Research Farms, Imo State Polytechnic Umuagwo, Nigeria.

Experimental birds and brooding

One hundred and twenty (120) day old chickens (Anak 2000 broilers) brooded in the brooder house of the Imo State Polytechnic Umuagwo, Owerri, Nigeria were used for the study. The birds were fed nutrient composition for one week to stabilize the birds before the feeding trial. Out of the lot, 120 one week broiler chickens were on basis of good health, apparent viability and good conformation assigned to four dietary treatments.

Table 1. Chemical composition of PSLM (Pterocarpus santalinoides) Leaf Meal.

Moisture content	24.77
Dry matter	89.26
Ash	7.83
Crude fibre	9.46
Crude protein	51.87
Ether extracts	4.25
Carbohydrate	13.40
Metabolisable Energy	836.33 Kcal/100g

Table 2. Phytochemical Composition of PSLM (Pterocarpus santalinoides) Leaf Meal Mg/100g.

Flavonoid	0.05
Tannin	Not Detected
Saponin	6.46
Glycoside	6.13
Alkaloid	1.12
Oxalate	0.88
Phytate	7.27
Cyanate	0.05
Phenolic	31.45

Formulation of the experimental diets

Four experimental diets were formulated containing 0.00%, 5.00%, 10.00% and 15.00% PSLM (*Pterocarpus santalinoides*) Leaf Meal representing treatments 1, 2, 3 and 4 respectively in which 0% PSLM was the control (Table 3). The ingredients were thoroughly mixed to ensure homogeneity before grinding in a hammer mill. Experimental birds were randomly allocated to the four dietary groups containing 0.00%, 5.00%, 10.00% and 15.00% PSLM for treatments 1, 2, 3 and 4 and were replicated thrice in a completely randomized design. One week old birds were reared on deep litter floor each pen measuring 3.5 m x3.5 m. Each pen was equipped with feeding troughs and drinkers. Electric bulbs and kerosene lanterns alternated as sources of light. Treatment diets and water were administered *ad libitum*. Routine management practices such as vaccination, drug administration and scrupulous cleanliness of the pens and equipment were carefully applied.

Data collection

Initial weights were determined at the start of the experiment with the aid of salter weighing balance and thereafter at weekly intervals. The final weight was also

Table 3. Ingredient composition of broiler starter diets.

Ingredients	Varying Levels of Replacement			
	T_1	T_2	T_3	T_4
Maize	40.00	40.00	40.00	40.00
Fish Meal	3.00	3.00	3.00	3.00
Groundnut Cake	15.00	10.00	5.00	0.00
PSLM	0.00	5.00	10.00	15.00
Palm Kernel Cake	10.00	10.00	10.00	10.00
Rice Bran	10.00	10.00	10.00	10.00
Bone Meal	5.00	5.00	5.00	5.00
Spent Grain	17.00	17.00	17.00	17.00
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Common salt	0.25	0.25	0.25	0.25
*Premix (Broiler)	0.25	0.25	0.25	0.25
TOTAL	100.00	100.00	100.00	100.00
Calculated C.P (%)	20.21	20.40	20.60	20.79
Ether Extract (%)	4.87	5.18	5.49	5.81
Crude Fiber (%)	9.54	9.65	9.75	9.65
M.E (Cal/kg)	3444.07	3444.26	3444.45	3444.65
Av. Phosphorus	0.873	0.843	0.7233	0.7240
Av. Lysine	0.933	1.012	1.033	1.038
Calcium	9.37	10.70	10.94	10.99

*2.5kg Premix/tonne contain; Vitamin A 10,000 I.U; Vitamin D3 2000,000 I.U, Vitamin E 12,000 I.U. Vitamin K 2.5 gm, Thiamine 1.5 g, Riboflavin 5g, Pyriboflavin (B6) 1.5g, Vitamin B12 10mg, Biotin 2 mg.

Table 4. Performance characteristics of broiler starter birds fed varying replacement levels of PSLM (*Pterocarpus santalinoides*) leaf meal for groundnut cake.

Parameters	T_1	T_2	T_3	T_4	SEM
Initial Live Weight (g) at 1st week	120	123	120	121	0.04^{ns}
Final Live Weight (g) at 4th week	498^a	482^b	448^c	419^d	2.06*
Daily Weight Gain (g)	22	21	19	18	0.02^{ns}
Daily Feed Intake (g)	150^a	150^a	146^b	137^c	0.72*
Feed Conversion Ratio	2.01	2.11	3.17	3.19	-
Cost of 1 kg of feed (#)	175^a	155^b	130^c	105^d	0.68*
Mortality	1.00^a	1.00^a	1.00^a	4.00^b	0.04*

Abcd means within the same row, having different superscripts are significantly different ($P<0.05$).

taken by weighing the birds in each replicate on the last day of the experiment using the same weighing balance. The weight gains were calculated by subtracting the initial weight from the final weight. In addition, the feed intake was calculated by subtracting the feed remaining from the total feed supplied each day before serving fresh one. The feed conversion ratio was also calculated by dividing feed intake by weight gain. The feed cost was determined as the sum of the cost of all ingredients included in the diet.

Data analysis

All data generated were subjected to one way analysis of variance (Steel and Torrie, 1980), while significant differences in means were determined using Duncan's Multiple Range Test (Gordon and Gordon, 2004).

RESULTS AND DISCUSSION

Table 4 showed that final weight of the experimental birds varied significantly ($p<0.05$) between treatments. Birds on 0% PSLM were significantly ($p<0.05$) heavier than those on 5.00% and 10.00%, which were also significantly heavier than birds on 15.00% PSLM. Daily weight gain followed the same trend. However feed conversion ratio for birds on the control diet T_1 and T_2 were most efficient and were better than T_3 and T_4. Initial weights of the birds were similar ($p>0.05$) between treatments. Though PSLM is highly nutritious, the high levels of *phenolic*, *phytate, saponin* and *glycoside* (Agiang *et al.*2016) caused the reduction in weight gain as higher levels of PSLM were

included in the diets. The observation that increasing levels of PSLM made birds consume more feed is explained by their quest to eat enough to meet their body nutritional requirement (Eze *et al*., 2012; Opara and Esukpa, 2012).

Conclusion

PSLM (*Pterocarpus santalinoides*) leaf meal can replace groundnut cake in starter broiler rations without deleterious effect. The results on final weight, weight gain and cost per kg feed suggest that 10% PSLM is the optimum replacement level for groundnut cake for starter broiler production. The cost of broiler production considerably reduced with increasing levels of PSLM in the diet thus, showing the potentials for broiler production at reduced cost when PSLM is used in the formulation of starter broiler diets.

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