PERFORMANCE AND NUTRIENT DIGESTIBILITY OF WEANER RABBITS FED DIETS CONTAINING GRADED LEVELS OF SHADE-DRIED *Leptadenia hastata* LEAF MEAL

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ABSTRACT
A twelve-week feeding study was conducted to investigate the effect of feeding graded levels of Shade – dried *Leptadenia hastata* Leaf Meal (SLLM) on the performance of cross-bred (Chinchilla x New Zealand), weaner rabbits. Thirty (30) rabbits were randomly allocated to five dietary treatments with 6 rabbits per treatment in a completely randomized design (CRD) experiment. The SLLM was incorporated at 0, 5, 10, 15 and 20% levels in diets 1, 2, 3, 4 and 5 respectively. The result revealed that final weight, average daily feed intake, average weight gain and feed conversion ratio were significantly ($P<0.05$) affected. In addition, digestibility of crude protein, crude fibre, either extract and ash were also significantly ($P<0.05$) affected. The study indicated that SLLM can be included in rabbit diet up to 15% inclusion level without adverse effect on performance and nutrient digestibility.
Keywords: *Leptadenia hastata* leaf meal, performance, nutrient digestibility

INTRODUCTION
In an attempt to combat the challenges of feed cost in the developing countries of the world, animal nutritionists have resolved to search for cheaper, locally available and nutritionally viable 'alternative feedstuffs (Jegede *et al.*, 2006). One of such alternatives is *Leptadenia hastata*. The plant *Leptadenia hastata* called 'Yadiya' in Hausa language belongs to the family *Asclepiadace*, a twiner with a corky bark on the older stem. It has a well developed, half succulent and persistent petiole leaves with a thick greenish sap. The leaves are abundant and fresh throughout the year (Aliero *et al.*, 2001). A study conducted by Yakubu and Wafar (2014) revealed Shade-dried leaves of *Leptadenia hastata* (SLLM) contain 13.50% crude protein, 10.50% crude fibre, 6.50% ether extracts. It is also rich in Ca (417mg), P (9¾mg), and K (0.49mg) and an appreciable amount of Ascorbic acid, (78mg) and Niacin 1.9mg (Hassan *et al.*, 2007). *Leptadenia hastata* leaf has complementary nutrient composition that could be harnessed in rabbit production but at the moment there is little information on the use of *Leptadenia hastata* leaf meal for rabbit feeding. The objective of the study was to determine the effect of feeding varying levels of shade dried *L. hastata* leaves meal on the performance and nutrient digestibility of weaner rabbits.

MATERIALS AND METHODS
Experimental site
The study was conducted at the Modibbo Adama University of Technology, Teaching and Research Livestock Farms, Yola. Yola is located at latitude 7° 11' North and longitude 11° 14' east and at an elevation of 364m above sea level in the Northeastern part of Nigeria (Adebayo, 1999).

Collection and preparation of *L. hastata* leaves
The leaves of *L. hastata* were harvested from the uncultivated land of Modibbo Adama University farm. They were spread under the shade daily from 10.00am – 5.00pm until practical dryness was achieved. The dried leaves were crumbled into small size or particles in order to obtain Shade dried *Leptadenia hastata* leaf meal (SLLM).

Management of experimental animals
A total of 30 cross-bred (Chinchilla x New Zealand) weaner rabbits of mixed sexes with an average weight of 625.10g were used for the experiment. The experimental design was a completely randomized design consisting of five treatments with each treatment replicated three times with two rabbits per replicate. The diets consisted of *L.hastata* at graded levels of 0, 5, 10, 15 and 20% with the dietary treatments designated as T_1, T_2, T_3 T_4 and T_5 respectively (Table 1). The five treatment groups were assigned one of the five experimental diets. The animals were kept individually in cages equipped with feeders and drinkers. Feed was supplied daily and water administered *ad lib.* Before the commencement of the experiment, 0.2ml subcutaneous Ivomec injection/rabbit was

administered against internal and external parasites. Coccidiosis was routinely controlled using Embazin forte.

Data collection

Feed intake, weight gain, feed conversion efficiency were monitored. At the end of the feeding trial three rabbits per treatment with a rabbit per replicate were randomly selected and transferred to metabolic cages for digestibility study. A two-day adjustment period was allowed before commencing the study. Faeces were collected during a 5 day-period, bulked and proximate analysis carried out using AOAC (2006) methods.

Data analysis

Parameters collected were subjected to analysis of variance (ANOVA) using SAS (2002). Test of significance and difference between means among the dietary treatments were separated using Duncan multiple range test.

RESULTS AND DISCUSSIONS

The result of the proximate analysis of the experimental diets and shade- dried *L.hastata* leaves is presented in Table 2. The crude protein (CP) content of SLLM (13.50%) was lower than 14- 25% reported by Simbaya, 2002 for most browse plants in the tropics. The crude fiber (CF) content (13.50%5) was comparable to 13.5 – 17% reported by Morton, 1987 for browse forage plants. Similarly the ash content was higher than 10.2 – 11.7% range reported by Morton, 1987 for tropical browse plants, indicating high mineral content of SLLM. The CP (18.32-20.3%) and the CF (5.52-10.45%) of experimental diets respectively were within the range reported for recommended for growing rabbits (Aduku and Olukosi, 1999). The result of Average daily feed intake (ADFI) (Table 4) shows a significant ($p < 0.05$) difference with increase in the level of SLLM inclusion in the experimental diets. Treatment three with 10% SLLM inclusion had the highest ADFI (66.07g). There is however a significant ($p < 0.05$) difference in the final weight, as the level of SLLM inclusion increases. T4 and T3 had the higher final weight (1495.00 and 1470.00g) respectively, which are higher than T1 (1350.00g) and T2 (1420.00g), which were similar, while T5 had the least (1390.00g). The high weight gain recorded in T3 and T4 may be attributed to the increase feed intake, which subsequently affects the performance of rabbits fed on treatment with high level of SLLM inclusion. Final weight gain was significantly different ($p < 0.05$), with T2 (683.3g) having the highest, followed by T4 (869.00) and the least value was observed in T1 (724.90). These values are higher than (715.51 and 603.48) reported by Omole *et al.*, 2006, when they fed rabbits with sole *Stylosanthes guianensis*, *Lablab purpureus* and sun flower forage meals. Feed conversion ratio was superior in T4 (3.94) and inferior in T5 (5.15). The result of nutrient digestibility of rabbits fed SLLM is shown in Table 3. The nutrient digestibility were significantly ($P<0.05$) different between the treatments. The CP digestibility ranged from 75.26-83.61% while CF and EE digestibility ranged from 54.19-9.81% and 86.10-93.11% respectively. Ash digestibility was significantly ($P<0.05$) higher in T4 (93.90%).Though there were significant differences ($P<0.05$) in nutrient digestibility across the treatments for all the nutrients evaluated, it did not follow a particular pattern. The values for CP, EE and Ash obtained in this study were however similar to the values reported by Ajayi *et al.*, 2007. However, the digestibility of Crude fibre was lower in all the treatments compare to other nutrients, this could be attributed to the fact that rabbits are less efficient in digesting fibre than sheep and cattle (Adegola *et al* ., 2002) and also lower CF digestibility could attributed to the type of fibre in the diet, since fibre from different source could vary in their digestibility depending on the proportion of cellulose, hemicelluloses and lignin.

Conclusion

It can be concluded that the inclusion of SLLM up to 15% level in the diets of weaner rabbits has no adverse effect on their growth performance and nutrient digestibility.

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Table1: Ingredients and composition of experimental diets.

	Dietary inclusion level				
Ingredients	**T_1 (0%)**	**T_2 (5%)**	**T_3 (10%)**	**T_4 (15%)**	**T_5 (20%)**
Maize	43.00	33.00	23.00	13.00	3.00
SLLM	0.00	10.00	20.00	30.00	40.00
Groundnut cake	20.00	20.00	20.00	20.00	20.00
Maize offal	30.00	30.00	30.00	30.00	30.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Fish meal	4.00	4.00	4.00	4.00	4.00
Salt	0.50	0.50	0.50	0.50	0.50
Premix*	0.50	0.50	0.50	0.50	0.50
TOTAL	**100**	**100**	**100**	**100**	**100**
Calculated analysis					
Crude protein	18.77	19.22	19.67	20.12	20.57
Crude fibre	6.37	7.31	8.26	9.21	10.16

*Premix manufactured by Dizpharm (Nig), Lagos supplying the following per kg: Vitamin A, 6,5200.000 IU; Vitamin D31,250,000 IU; Vitamin E, 15,000 IU; Vitamin K, 1250 mg; riboflavin, 3,000 mg; pantothenic acid 5,000 mg; pyridoxine 1,750 mg; Vitamin B_1 1,000 mg; niacin 15,000 mg; Vitamin B_{12} 10 mg; biotin 25 mg; folic acid 500 mg; choline chloride 150 g; antioxidant 62.5g; iron 50g; manganese 50g; zinc 50g; iodine 0.78g; cobalt 0.25g; copper 5.0g; selenium 0.05. **Metabolizable Energy = ME (kcal/kg) = 37 x % CP + 81 x % EE + 35.5 x % NFE calculated according to the formula of Pauzenga (1985).

Table 2. Proximate composition of experiment diets and shade-dried *Leptadenia hastata* leaves.

	Dietary inclusion level					
Parameters	**T_1 (0%)**	**T_2 (5%)**	**T_3 (10%)**	**T_4 (15%)**	**T_5 (20%)**	**SLLM**
Dry matter	95.33	95.07	95.37	95.03	96.97	93.00
Crude Protein	18.32	18.69	19.00	20.32	20.63	13.50
Crude fibre	5.52	6.70	8.09	9.31	10.45	10.50

Ether extracts	6.72	5.51	5.42	4.51	4.10	6.50
Ash	2.56	2.01	3.02	3.97	5.80	14.52
NFE	66.88	67.10	64.47	61.89	59.02	54.98

SLLM= Shade-dried *Leptadenia hastata* meal.

Table3. Nutrient Digestibility of Weaner Rabbits Fed on four Levels of Shade-dried *L.hastata* Leaf Meal (%)

	Dietary inclusion level					
Parameters	**T_1 (0%)**	**T_2 (5%)**	**T_3 (10%)**	**T_4 (15%)**	**T_5 (20%)**	**SEM**
Crude protein digestibility	75.26^{e}	75.80^{d}	76.83^{c}	83.61^{a}	80.01^{b}	0.30^{*}
Crude fibre digestibility	54.19^{e}	65.10^{c}	66.71^{b}	69.81^{a}	66.81^{b}	0.24^{*}
Ether extract digestibility	86.10^{c}	91.97^{b}	93.10^{a}	90.75^{b}	93.11^{a}	0.14^{*}
Ash digestibility	90.40^{b}	80.83^{d}	85.12^{c}	93.90^{a}	85.00^{c}	1.05^{*}

*=significant (P<0.05), SEM= Standard Error Mean,

Table 4.Performance Characteristics of Weaner Rabbits Fed on four Levels of Shade-dried *L.hastata* Leaf Meal.

	Dietary inclusion level					
Parameters	**T_1 (0%)**	**T_2 (5%)**	**T_3 (10%)**	**T_4 (15%)**	**T_5 (20%)**	**SEM**
Initial weight (g)	625.10	621.00	623.00	626.00	624.00	-
Final weight (g)	1350.00^{b}	1420.00^{b}	1470.00^{a}	1495.00^{a}	1390.00^{c}	2.14^{*}
Final weight gain (g)	724.90	799.00	847.00	869.00	766.00	9.79^{*}
ADFI (g)	56.30^{e}	58.03^{d}	66.07^{a}	61.30^{c}	63.03^{b}	0.31^{*}
ADWG (g)	12.94^{c}	14.24^{b}	15.13^{a}	15.51^{a}	12.23^{a}	0.17^{*}
FCR	4.34^{b}	4.06^{bc}	3.97^{c}	3.94^{c}	5.15^{a}	0.33^{*}

*=significant (P<0.05),SEM= Standard Error Mean, ADWG =Average daily weight again ADFI = Average daily feed intake, FCR= Feed conversion ratio