LINEAR BODY MEASUREMENTS OF GROWER RABBITS FED SHEA BUTTER NUT MEAL IN NORTH CENTRAL NIGERIA

†*Idahor K. O., ††Osaiyuwu O. H. and †Yakubu A.
†Department of Animal Science, Nasarawa State University, Keffi, Shabu-Lafia Campus, P.M.B. 135 Lafia, 950101, Nigeria. *E-mail: omokingida@yahoo.com
††Animal Science Department, Faculty of Agriculture and Forestry, University of Ibadan, Ibadan.

Abstract
There is a high demand for rabbit either as meat, pet or laboratory animal. However, its production is still at subsistence level in Nigeria. This could be due to the rising competition between man and livestock for conventional feedstuffs. This study was aimed at investigating the suitability of shea butter nut meal (SBNM) as an unconventional feedstuff in rabbit diets. A total of 36 rabbits weighing about 1.2kg at 7wks old, were fed 0.0% (T_a), 2.0% (T_b) and 6.0% (T_c) SBNM for eight weeks. The results indicated significant differences ($P<0.05$) among the treatments. Body weight gain values ranged from 0.03g to 0.26g. The hind limb length varied from 0.13 – 0.38cm, hair length (0.07 – 0.16cm) and the chest circumference value varied from 0.1 – 0.33cm. Although, it was observed that the values of growth indices monitored did not follow a definite trend among the treatments. There was an increase in value of all the parameters measured throughout the study period. Thus, SBNM may probably be a suitable feedstuff at 6.0% inclusion in rabbit grower diets.

Keywords: Growth indices, grower rabbits, shea.

Introduction

Rabbit production could be a veritable way of alleviating animal protein deficiency in Nigeria due to its high growth rate. Rabbit also has high efficiency in converting forage to meat, short generation interval, very prolific with relatively low cost of production (Cheeke, 1986). The meat is of high quality due to its low cholesterol level hence, it is cherished by many people (Ajala and Balogun, 2004; Belenguar *et al.*, 2000). According to Omole (1982), rabbit can thrive well on non-conventional feedstuff, inexpensive and renewable resources like kitchen, garden and agricultural waste such as SBNM. However, shea butter nut tree and its products contain phenolics, tannins, saponins as well as alkaloid (theobromine) which irritate the digestive tract of animals (Oddoye *et al.*, 2012).

Gohl (1982) reported that ruminants can tolerate more shea butter nut meal than monogastrics but inclusion rates higher than 30% affected the digestibility of other feeds in the ration. In pigs, up to 20% boiled SBNM could be fed (Rhule, 1999) but a higher inclusion rate was discovered poisonous. Shea butter nut meal has a low nutritive value for poultry, due to its low protein content and toxicity. Thus, the maximum recommended inclusion level of SBNM in broiler diets was reported to be 2.5% (Pousga *et al.*, 2007). The tree grows everywhere in Nasarawa State, Nigeria and the products are readily available yet, there is little or no literature on the utilization of SBNM in rabbits diets. Thus, this investigation was aimed at evaluating the effect of SBNM on rabbit growth parameters.

Materials and Methods

Experimental design

The study was conducted at the Rabbitry Unit, Livestock Teaching and Research Farm, Nasarawa State University, Shabu – Lafia Campus. Lafia is located on latitude 08° 33′N and longitude 08° 32′E with average annual rainfall of 1,179mm. A total of 36 rabbits of New Zealand and Flemish Giant origin, weighing 0.97 – 1.2kg at about 7 weeks old were procured from National Veterinary Research Institute, Vom, Plateau State. The rabbits were randomly allotted to three treatments (T_a: 0.0% SBNM; T_b: 2.0% SBNM; T_c: 6.0% SBNM). Each treatment had 12 rabbits that were paired in six hutches (each measuring 64 x 62 x 48cm^3).

Animals and experimental diets

Antistress, antibiotics including dewormer was administered and the hutches, pens as well as the surroundings were regularly cleaned to maintain good hygiene. Lighting system was supplied at night throughout the experimental period to provide warmth and enhance feeding. The animals were acclimatized for 2weeks before the commencement of the feeding trial that lasted for 8 weeks. Shea butter nut meal was procured from Kwandare, Nasarawa State, and the premix as well as soya bean meal were obtained from Jos, Plateau State while, other feedstuffs were sourced from Shabu, Nasarawa State. All the feedstuffs were used in compounding the experimental diets according to Lang (1981). The nutritional value was calculated using Aduku (1993) feedstuff table

and the proximate composition was determined following AOAC (2012) procedure. The compounded feed (see Table 1) and clean drinking water were offered to the experimental animals *ad libitum*.

Data collection and statistical analysis

The rabbits were weighed using table scale to obtain the body weight gain value and the distance between the neck and the tail-base was taken as the body length. The hind limb, ear, tail, hair and head length values were obtained using measuring tape. Also, the girth, chest, neck and head circumference values were recorded using measuring tape. All the sets of data were collected weekly and were analyzed according to analysis of variance of GenStat (2005) statistical package and the mean values were separated using least significant difference of the same software package.

Results and Discussion

The effect of SBNM on growth parameters in grower rabbits is shown in Table 2. There were no significant differences ($P>0.05$) in the body weight gain values except in weeks 4 and 8 where T_a values were superior to the treated rabbits values. The least value (0.03g) was recorded in T_c in week 4 and the highest value (0.26g) was observed in T_a in week 8. Although, it was observed that the values in all the parameters measured did not follow a particular trend among the treatments, they were similar to the reported values of Stony *et al.* (1992).

There were significant differences ($P<0.05$) in body length (weeks 2, 3, 4, and 6), hind limb length (weeks 3, 5, and 6), girth circumference (weeks 4 and 5) ear length (weeks 1, 4, 6, 7, and 8) as well as tail length values in weeks 1 and 8. The body length values ranged from 0.16cm in T_c (week 4) to 0.41cm in T_a (week 3), hind limb length (0.13 – 0.38cm), girth circumference (0.14 – 0.34cm), ear length (0.08 – 0.42cm) and the tail length value was least (0.09cm) in T_a and highest (0.25cm) in T_b. The hair length, chest circumference, neck circumference, head length and head circumference values varied from 0.07 – 0.16cm, 0.1 – 0.33cm, 0.1 – 0.35cm, 0.1 – 0.3cm and 0.12 – 0.25cm respectively.

It was observed that there was no particular pattern of value supremacy over the others among the treatments and all the linear body measurement values were similar to reported values in growing rabbits (Akanno and Ibe, 2006; Arijeniwa *et al.*, 2000; Afifi *et al.*, 1990).

Conclusion

It was revealed from the results that all the growth parameters investigated increased in all the treatments throughout the study period thus, SBNM may be a suitable feed resource when included in grower rabbits diets up to 6.0%.

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Table 2: Linear body measurements of grower rabbits fed shea butter nut meal (cm)

Week	Trt	BWG	BL	HLL	GC	EL	TL	HL	CC	NC	HL	HC
1	T_a	0.19	0.30	0.20	0.21	0.09^c	0.09^b	0.14	0.2^b	0.19	0.17	0.18
	T_b	0.21	0.24	0.20	0.24	0.13^b	0.12^b	0.10	0.18^b	0.25	0.13	0.24
	T_c	0.15	0.35	0.33	0.25	0.18^a	0.15^a	0.15	0.29^a	0.21	0.16	0.25
	SEM	0.007	0.01	0.015	0.009	0.011	0.002	0.008	0.004	0.017	0.009	0.039
2	T_a	0.10	0.37^a	0.28	0.27	0.16	0.20	0.13	0.33^a	0.18	0.15	0.14
	T_b	0.13	0.24^b	0.24	0.23	0.19	0.19	0.12	0.24^b	0.14	0.14	0.14
	T_c	0.08	0.28^b	0.23	0.25	0.17	0.21	0.16	0.21^b	0.18	0.13	0.13
	SEM	0.002	0.011	0.011	0.016	0.003	0.005	0.004	0.028	0.003	0.008	0.002
3	T_a	0.10	0.41^a	0.38^a	0.21	0.15	0.18	0.15^a	0.28^a	0.22^a	0.13	0.17
	T_b	0.06	0.26^b	0.25^b	0.23	0.22	0.14	0.09^b	0.24^a	0.13^b	0.14	0.15
	T_c	0.09	0.24^b	0.16^c	0.2	0.21	0.16	0.13^a	0.15^b	0.2^a	0.13	0.14
	SEM	0.033	0.015	0.03	0.01	0.018	0.005	0.002	0.019	0.011	0.002	0.004
4	T_a	0.21^a	0.35^a	0.22	0.28^a	0.18^a	0.11	0.12^a	0.28^a	0.2^a	0.16	0.17
	T_b	0.08^b	0.28^b	0.25	0.19^b	0.13^b	0.12	0.07^b	0.22^a	0.15^b	0.12	0.19
	T_c	0.03^c	0.16^c	0.23	0.15^b	0.08^c	0.1	0.08^b	0.1^b	0.1^c	0.13	0.17
	SEM	0.031	0.02	0.012	0.013	0.003	0.002	0.001	0.015	0.015	0.006	0.007
5	T_a	0.10	0.28	0.13^b	0.14^b	0.11	0.15	0.12^a	0.18	0.16	0.16^a	0.17
	T_b	0.12	0.23	0.29^a	0.25^a	0.11	0.1	0.08^b	0.23	0.18	0.13^{ab}	0.16
	T_c	0.11	0.21	0.22^a	0.18^b	0.10	0.13	0.08^b	0.2	0.12	0.10^b	0.15
	SEM	0.005	0.016	0.006	0.008	0.001	0.007	0.001	0.009	0.05	0.002	0.009
6	T_a	0.1	0.33^a	0.28^a	0.20	0.23^a	0.22	0.11	0.29	0.24	0.2	0.2^a
	T_b	0.08	0.21^b	0.23^a	0.18	0.14^b	0.18	0.08	0.22	0.18	0.16	0.13^b
	T_c	0.1	0.24^b	0.17^b	0.22	0.10^b	0.11	0.11	0.25	0.17	0.16	0.12^b
	SEM	0.001	0.016	0.013	0.009	0.008	0.008	0.003	0.021	0.011	0.11	0.012
7	T_a	0.1	0.24	0.22	0.19^b	0.18^b	0.13	0.1	0.15^b	0.21^b	0.16	0.17
	T_b	0.1	0.27	0.25	0.27^a	0.14^b	0.15	0.12	0.24^a	0.28^a	0.13	0.14
	T_c	0.12	0.29	0.21	0.23^{ab}	0.25^a	0.18	0.09	0.15^b	0.17^b	0.18	0.15
	SEM	0.004	0.028	0.027	0.008	0.029	0.007	0.007	0.007	0.021	0.008	0.008
8	T_a	0.26^a	0.29	0.35	0.27	0.29^b	0.17^b	0.11	0.29	0.2^b	0.16^b	0.25
	T_b	0.12^b	0.28	0.30	0.34	0.42^a	0.25^a	0.1	0.30	0.22^b	0.3^a	0.16
	T_c	0.13^b	0.22	0.32	0.26	0.23^b	0.16^b	0.1	0.22	0.35^a	0.15^b	0.23
	SEM	0.045	0.008	0.032	0.026	0.049	0.011	0.001	0.018	0.025	0.014	0.02

^{a,b,c}: Means along the same column per week with differe nt superscripts differ significantly at $P<0.05$;
^{SEM}: Standard error of means; Trt: Treatment; BWG: Body weight gain; BL: Body length; HLL: Hind limb length; GC: Girth circumference; EL: Ear length; TL: Tail length; HL: Hair length; CC: Chest circumference; NC: Neck circumference; HL: Head length; HC: Head circumference; Ta:0.0% SBNM; Tb:2.0% SBNM; Tc:6.0% SBNM; SBNM: Shea butter nut meal.