



Performance of growing rabbits fed varying levels of camel blood-rumen content mixture

Mohammed G, Igwebuikwe, J. U, Alade, N. K, Adamu, S. B and Raji A. O

Department of Animal science, University of Maiduguri, P.M.B. 1069, Maiduguri, Nigeria

Abstract

A ten-week feeding trial was conducted to assess the growth and economic performance of growing rabbits fed camel blood-rumen content mixture (CBRCM). The CBRCM was included at 0, 10, 20, 30 and 40% levels in diets 1, 2, 3, 4 and 5 respectively to replace groundnut cake. The diets were fed to forty-five crossbred rabbits (Dutch × New Zealand White) between 5 to 7 weeks of age which were randomly allocated to the 5 treatments in groups of 9 and allowed unlimited access to the feed and drinking water throughout the experimental period. The daily feed intakes for T1, T2, T3, T4 and T5 were similar in all the treatments. The corresponding daily weight gains significantly ($P < 0.05$) different among the treatment being highest in T3. The feed conversion ratio was also significantly ($P < 0.05$) high in T1-T3 by the treatments. The feed cost per kg and feed cost per kg of weight gain decreased as the level of CBRCM increased in the diets. The result showed that CBRCM can be incorporated in growing rabbits ration up to 30% without deleterious effect on growth performance. At a higher level of 40% of inclusion, feed intake and growth performance were significantly depressed. Further investigation into long-term effect of feeding on the organs of the rabbit is suggested.

Key word: Camel Blood-Rumen Content Mixture, Rabbits, Nutritional Effects

Introduction

In a developing country like Nigeria, the demand for protein of animal origin far outstripped the supplies. This has resulted in a steady increase in the price of regular sources of animal protein such as beef, chicken, mutton and fish and hence put them out of the reach of average Nigerian (Oyenuga, 1982). A study of the intensive livestock industry in Nigeria indicates that shortage of animal products is due to high cost of the major energy and protein ingredients such as maize, sorghum, soya bean, oil seed meal and fish meal. Nuru (1982) noted that competition between human and animal for available grains make it difficult to meet the nutritional requirements of animals at reasonable cost. There is therefore, need to focus attention on the production of livestock whose nutritional requirements do not put much pressure on the limited food resources to which man also subscribes and utilization of non conventional feed resources. An example of such livestock is rabbit which has been described by Aduku and Olukosi (1990) as a pseudo-ruminant scavenger capable of using sundry feeds to achieve high feed efficiency.

Efforts to reduce the high cost of feed and that of livestock products have been concentrated on utilization

of animal wastes (Adeniji and Balogun, 2001). The rumen content and blood-rumen content mixture are animal wastes (abattoir by-products) which have been fed to rabbits by several workers (Dairo, 2005; Dairo et al., 2005; Mohammed et al., 2005; Adeniji, 2008). Therefore, this study was conducted to determine the effect of feeding varying levels of camel blood-rumen content mixture as replacement for groundnut cake on the performance of growing rabbits.

Materials and Methods

Camel rumen content and blood were collected from the main abattoir in Maiduguri while slaughtering of the camels was in progress. The rumen was split open with the aid of a sharp knife and the content emptied into a 70 litre plastic vat. A mixture of the material was made at a ratio of one part of blood and three parts of rumen content after which it was boiled in a drum with constant stirring. The boiling lasted for 30 minutes and this was done to reduce the microbial load of the mixture. The camel blood-rumen content mixture (CBRCM) was sun-dried on a concrete floor to about 12% moisture and all the foreign objects were removed. After sun-drying, the mixture was milled and stored for mixing with other ingredients.

Forty-five (45) crossbred (Dutch × New Zealand White) rabbits between 5 and 7 weeks of age were randomly allocated to five treatments in groups of 9 rabbits. The rabbits were housed individually in cages measuring 35 cm × 36 cm × 45 cm (width × length × height) and supplied daily with the experimental diets in mash form. Clean drinking water was also provided *ad libitum* throughout the experimental period of 10 weeks.

The experimental diets (Table 1) were compounded using maize, wheat offal, CBRCM, groundnut cake, groundnut haulms (hay), fish meal, salt and premix. The experimental diets (1, 2, 3, 4 and 5) contained 0, 10, 20, 30, and 40% CBRCM respectively. The proximate analysis of the experimental diets and CBRCM were carried out according to AOAC (1990) methods. Each diet supplied approximately 19% crude protein (CP).

The daily feed intake was obtained by subtracting the left over from total amount of feed supplied. Each rabbit was weighed at the inception of the experiment and weekly thereafter to obtain the weekly and daily weight gain throughout the experimental period. The feed conversion ratio was calculated as the dry matter feed intake per unit weight gain.

The economic implication of including CBRCM into the diets of growing rabbits was assessed by calculating the:

- i. Cost per kilogram of each diet;
- ii. Cost of feeding the rabbit on each and
- iii. Cost per kilogram weight gain

Statistical analysis

Analysis of variance (ANOVA) was carried out on the data collected (Steel and Torrie, 1980) and means separated, where applicable, using the Duncan's Multiple range test (Duncan, 1955).

Results and Discussion

The nutrient composition of CBRCM and experimental diets are presented in Table 2. The CBRCM was found to contain 91.63% dry matter, 36.40% crude protein, 22.36% crude fibre, 4.01% ether extract, 4.90% ash and 32.33% nitrogen free extract. The diets had similar CP percentage which is adequate for growing rabbits as reported by other workers (Olumeyan et al., 1995; Mohammed et al., 2005; Dairo et al., 2005). The levels of crude fibre increased with increasing levels of CBRCM in the diets. This may be due to the highly fibrous nature of the CBRCM compared to groundnut cake in the diets. However, the values obtained were adequate and within the range recommended by Cheeke et al. (1982) for weanling rabbits. Fat levels which ranged from 3.40 to 4.50% are

adequate for growing rabbit. Cheeke (1979) reported that a minimum level of 3% fat is ideal to provide essential fatty acids. The ash values (2.0 to 3.50%) and nitrogen-free extract (NFE) values (54.13 to 55.96%) were similar in all the treatments. The metabolizable energy levels of the diets were also comparable in all the treatments. The values obtained in this study were similar to the values reported earlier on by Mohammed et al. (2005).

Results of growth performance of rabbits when fed different levels of CBRCM are presented in Table 3. No significant effect ($P>0.05$) of treatment on feed intake among the levels (0, 10, 20, 30 and 40%) of inclusion was found. This is in agreement with the reports of Adeniji (2008) who observed no significant difference among the treatment means for feed intake in rabbits fed bovine rumen content mixture. Mean final body weight gain was significantly high in T3 compared to T5. The daily weight gain was significantly affected by the inclusion of CBRCM in the diets being highest in T1-T3 and lowest in T5. The variation in mean daily weight gain reported in this study could be due to different energy levels of the diets. However, the values obtained in this study are comparable to the values obtained by Mohammed et al. (2005) who fed caprine rumen content to growing rabbits. The feed conversion ratio did not differ among the groups ($P>0.05$). The poorest feed conversion ratio of 8.11 was observed in treatment 5 (40% CBRCM) while the best value of 5.81 was observed in treatment 1 (0% CBRCM). The values obtained were higher than values recorded by Dairo et al. (2005) and Adeniji (2008) who fed similar diets to growing rabbits.

The economic performance is presented in Table 4. Cost of feed per kilogram decreased with increasing level of CBRCM in the diets. This is because CBRCM is a cheap abattoir wastes that can be collected free. The only cost incurred being that of transportation and processing of the blood and camel rumen-content. It, therefore, helped to lower the cost of formulation when used as a substitute for groundnut cake in rabbit diets. The feed costs per kg of weight gain were better in the CBRCM-based diets than the control (0% CBRCM). Best economic returns was recorded in treatment 3 (20% CBRCM) since highest weight gain and lowest cost per kg gain were obtained in this group.

Conclusion

The results obtained in this study showed that CBRCM could be utilized as feed ingredient for rabbits. Inclusion of 30% CBRCM into the diets of growing rabbits had no adverse effects on growths and economic performance of rabbits. However, best economic return was obtained at 20% level of CBRCM inclusion.

Table 1: Composition of the experimental diets

Ingredient (%)	Diets/Treatments				
	T1	T2	T3	T4	T5
Maize	40.98	39.12	37.41	35.24	24.35
Wheat offal	17.00	17.00	17.00	17.00	17.00
CBRCM	0.00	10.00	20.00	30.00	40.00
Groundnut cake	23.37	15.23	6.94	2.11	0.00
Fish meal	3.00	3.00	3.00	3.00	3.00
Groundnut haulm	13.00	13.00	13.00	13.00	13.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Common Salt (NaCl)	0.50	0.50	0.50	0.50	0.50
Premix	0.15	0.15	0.15	0.15	0.15
Total	100.00	100.00	100.00	100.00	100.00

CBRCM =Camel blood-rumen content mixture

*premix (grow fast) manufacture by Animal care service consult (Nig.) Ltd. Lagos, supplying the following per kg of premix. Vit A, 500,000 Iu; Vit D3,800,000 Iu; Vit E, 12, 000Mg; Vit k, 15,000mg; Vit B₁ 1,000 mg; Vit B₂ 2,000Mg, Vit B₆ 1500mg, Niacin 12,00mg; Pantothenic acid 20.00mg; Biotin 10,000mg; Iron 15,000mg, Zinc 800.00mg, copper 400.00mg; Iodine 80.00mg; cobalt 40mg; Selenium 8.00mg

Table 2: Proximate composition of experimental diets and camel blood rumen content mixture (on dry matter basis)

Nutrient (%)	Treatments					
	T1 (0%)	T2 (10%)	T3 (20%)	T4 (30%)	T5 (40%)	CBRCM
Dry matter (DM)	92.11	91.23	92.01	92.31	92.30	91.63
Crude protein (CP)	19.20	19.01	18.94	18.63	18.24	36.40
Crude fibre (CF)	18.34	19.34	20.12	20.31	20.43	22.36
Ether extract (EE)	4.50	3.50	3.40	3.82	3.66	4.01
Total Ash	2.00	3.01	3.08	3.07	3.50	4.90
Nitrogen-free extract (NFE)	55.96	55.14	54.46	54.17	54.13	32.33
ME (Kcal/kg)	3,061.48	2,953.57	2,909.51	2,861.02	2,892.96	2,819.33

CBRCM = Camel blood-rumen content mixture; ME = Metabolizable energy calculated according to the formula of pauzerga (1985); ME = 37 X % CP + 81X% EE+35.5X% NFE.

Table 3: Evaluation of camel blood-rumen content mixture (cbrcm) on the performance of growing rabbits

	Diets/Treatments					SEM
	T1 (0%)	T2 (10%)	T3 (20%)	T4 (30%)	T5 (40%)	
Mean Initial body weight (g)	738.89	744.44	738.87	741.67	738.89	82.40 ^{NS}
Mean Final body weight (g)	1408.3 ^{ab}	1413.9 ^{ab}	1461.1 ^a	1338.9 ^{ab}	1272.2 ^b	63.62 *
Mean daily weight gain (g)	10.77 ^a	9.82 ^a	10.91 ^a	8.98 ^{ab}	7.48 ^b	0.75*
Mean daily feed intake (g)	56.95	53.33	57.87	60.35	53.87	2.79 ^{NS}
Feed conversion ratio	5.81 ^a	6.25 ^a	6.48 ^{ab}	7.01 ^{ab}	8.11 ^b	0.61*
Mortality (%)	0	0	0	0	0	

^{a,b}Different superscripts in a row differ significantly (P<0.05)

Table 4: Economic performance of rabbits fed different levels of camel blood-rumen content mixture (CBRCM)

Parameters levels of CBRCM (%)	Treatment/Diets				
	0	10	20	30	40
Cost/kg feed (₦)	42.68	39.79	37.09	33.19	28.18
Cost of feed / Kg weight gain (₦ / Kg)	227.06	215.10	197.65	222.32	204.31

Cost per kilogram of the various ingredients used in compounding the experimental diets: Camel blood-rumen content mixture, ₦5.00; maize, ₦60.00; wheat offal ₦26.00; groundnut cake; ₦27.00; groundnut haulms, ₦25.00; fish meal, ₦37.00; Bone meal, ₦20.00; salt, ₦10.00; and premix, ₦900.00.

References

Aduku, A.O. and Olukosi, J.O. 1990. *Rabbit Management in the tropics*. Living Books series. G.U. Publication, Abuja F.T.C.Pp: 23-28.

Adeniji, A.A. 2008. Replacement value of maize with enzyme supplemented decomposed bovine rumen content in the diet of weaner rabbits. *Journal of Animal and Veterinary Advaancess*, 3(2):104-108.

Adeniji, A.A. and Balogun, O.O. 2001. Evaluation of blood-rumen content mixture in the diets of starter chicks. *Nigarina J Animal Production*, 29 (1):34-39.

AOAC. 1990. *Official Methods of Analysis of Officialz Analytical Chemists*. 14th (ed.) Association of

- Official Analytical Chemists, Washington DC, USA.
- Cheeke, P.R., Patton., N.M. and Templeton, G.S. 1982. *Rabbit Production*. The interstate Publishers and printers Inc. Danville, Illinois, USA
- Dairo, F.A.S. 2005. Assessment of rumen content on the haematological parameters of growing rabbits. *Proc. Of the 10th Ann. Conf. of Anim. Sci. Assoc. of Nig. (ASAN)*, Sept. 12 – 15, 2005. Univ. of Ado – Ekiti, Nigeria Pp: 301-302.
- Dairo, F.A.S., Aina, O.O. and Asafa, A.R. 2005. Performance evaluation of growing rabbits fed varying levels of rumen content and blood rumen content mixture. *Nigerian Journal of Animal Production*, 32 (1): 67-72.
- Duncan, D.B. 1955. Multiple ranges and multiple F-tests. *Biometrics*, 11:1-42.
- Mohammed, G., Igwebuike, J.U. and Kwari, I.D. 2005. Performance of growing rabbits fed graded levels of goat rumen content. *Global Journal of Pure and Applied Science*, 11(1):39-43.
- Nuru, B. 1982. Problems and prospects of the Nigerian beef industry. *Proceeding of National Conference on Beef Production Kaduna*. July 1982. NAPRI. Zaria, P: 23.
- Olumeyan, B., Afolayan, S.B. and Bawa, G.S. 1995. Effect of graded levels of dried rumen ingesta on the performance of growing rabbits fed concentrate diets. *Paper presented at the 20th Annual Nation conference of Nigeria society for Animal Production 26th–30th March, 1995*. Federal Univ of Technology. Minna, Nigeria Pp: 24-26.
- Oyenuga, V.A. 1982. Future of the beef industry in Nigeria. *Proceeding of National Conference on Beef Production Kaduna*. Kaduna July 1982. NAPRI, Zaria Pp: 58-59.
- Pauzenga, U. 1985. Feeding parent stock. *Zootech International*. Pp. 22-25.
- Steel, R.G.D. and Torrie, J.H. 1980. *Principles and procedures of statistics. A Biometrical Approach 2nd* (ed.) McGraw Hill Book Co. New York, USA. P: 688.