

Effect of Different Feeds on Performance and Some Blood Constituents of Local Rabbits

¹K.M. Elamin, ¹M.A. Elkhairey, ¹H.B. Ahmed, ¹A.M. Musa and ²A.O. Bakhiet

¹Faculty of Animal Production, University of Gezira, P.O. Box 20, Sudan

²College of Veterinary Medicine, Sudan University of Science and Technology, P.O. Box 204, Khartoum, North Sudan

Corresponding Author: A.O. Bakhiet, College of Veterinary Medicine, Sudan University of Science and Technology, P.O. Box 204, Khartoum, North Sudan Tel: +249912347090, +249185380136

ABSTRACT

In the Sudan, rabbits are kept mainly in the backyards of houses and being reared as small-scale business. This study was conducted to investigate the nutritional potential of sweet potato vines as a new animal fodder in Sudan compared to that of conventional fodder, *Clitoria ternatea* and Barseem (Hijazi). Twenty seven weaner rabbits at 45 days old were used. Experimental animals were divided into three groups and fed three different rations Barseem, Sweet potato and *C. ternatea* for 70 days. Traits studied were final body weight, daily weight gain, daily feed intake and daily dry matter intake and feed conversion ratio. Blood traits also were studied; they include protein, globulin, albumen content, RBCS and WBCS count. The results showed significant ($p>0.05$) differences for daily feed intake between *Clitoria ternatea* and Barseem. The present study showed that, best feed conversion ratio was obtained by feeding Sweet potato to rabbit than the other rations. It was concluded that Sweet Potato meal feeding provide a good protein and energy feed for growing rabbits. For blood traits there were only significant differences for protein and globulin blood contents ($p>0.05$) between *C. ternatea* and Barseem.

Key words: Barseem, blood, body weight, *Clitoria ternatea*, Sudan, sweet potato

INTRODUCTION

Rabbit production, over the years become a common practice that increased throughout the developing countries and in many tropical countries especially Africa; in Egypt and Sudan (Oudah, 1990; Khalil *et al.*, 1995; El-Aziz, 1998; Gharib, 2004; Elamin and Yousif, 2011; Mehrez and Mousa, 2011). Being low in its cholesterol content, rabbit meat consumption is increasing rapidly. Rabbit meat is also advocated to people for good health because it does not form uric acid during metabolism (Iyeghe-Erakpotobor, 2007). Rabbits are efficient converters of feed to meat and can utilize up to 30% crude fibre as against 10% by most poultry species (Egbo *et al.*, 2001). To make rabbit rearing more viable as a small-scale business, Alawa *et al.* (1990) have advocated the development of alternative feeding materials that will be relatively cheap when compared with commercial feeds and by-products of grains (Amaefule *et al.*, 2011).

In the Sudan, rabbits were kept mainly in the backyards of houses where they contribute to the budget of those who kept them through the sale of rabbits to the market where they are normally sold live. The principal feed for local rabbits in Sudan is Barseem (*Medicago sativa*),

supplemented with kitchen remains. This is not a sufficiently nutritious diet for high levels of production and much work is needed to formulate suitable diets from local feed stuffs. The major breed is the Baladi (local type) which has low production potential (El-Amin, 1978).

Traditionally Sweet potatoes have been cultivated in the tropical countries of Latin America and the Caribbean almost exclusively for tuber production to be used for human consumption, while its foliage has always been considered as a residue. The productive potential of certain varieties of sweet potato can reach from 24 to 36 t/ha/crop of roots (Machin and Nyvold, 1991) and the foliage production can vary from 4.3 to 6.0 t/dry matter/ha/crop (Ruiz *et al.*, 1980). The sweet potato *Ipomoea batatas* L. in the Sudan is a minor crop cultivated in restricted areas by the farmers in Gezira irrigated scheme; Rahad irrigated agricultural project and the river banks. The average production is 2-2.5 ton/Fadden tuber and about 1-1.5 ton/Fadden leaves and vines. Sweet potato (*Ipomoea batatas* L.) is one of the rich vegetable in carbohydrates, Vitamin A and Vitamin C. Its green tops (stem and leaves) contains 21.7 to 31.3% protein on the weigh basis (Wang, 1982) and can be used as good protein source in addition to the high digestibility of the leaves which in turn may increase digestibility feeds (Muir and Massaete, 1996). Butterfly pea (*Clitoria ternatea*) on the other hand, is multipurpose forage legume that is palatable and generally preferred by livestock than other legumes (Gomez and Kalamani, 2003). Ashiono *et al.* (2006) stated that sweet potato vines had great potential in enhancing milk production so they advice the use of this fodder in ruminant feeding. The objectives of this study was to assess the effects of feeding Sweet potato compared to Barseem and *C. ternatea* on growth performance and some blood traits in local rabbits.

MATERIALS AND METHODS

The experiment was held out in rabbitry unit in Extension Centre for Rural Development, Faculty of Animal Production, University of Gezira, Sudan at January 2008. Twenty seven, 45 day-old, clinically healthy local Baladi rabbit weaner with an average initial weight 400-500 g were used. At age of two months they were kept in a separate pen and randomly divided into three groups each of nine rabbits and each group was further subdivided into three replicates. The animals were given 7 days for adaptation before the start of the experiment. All the cages had been equipped with feeders and drinkers.

Three rations were formulated and fed to the experimental animals; ration (A), (B) and (C) containing Barseem, Sweet Potato and *C. ternatea*, respectively. Formulation of the experimental rations and their chemical composition were shown in Table 1 and 2. Initial and final body

Table 1: Percent experimental ration composition

Ingredients	A (Barseem)	B (Sweet potato)	C (<i>C. ternatea</i>)
Sorghum	17	25	27
Wheat bran	30	21	20
Groundnut cake	9	14	10
Molasses	9	8	9
Groundnut halls	23	17	19
Barseem meal	12	-	-
Sweet potato meal	-	15	-
<i>Clitoria</i> meal	-	-	15
C.P (%)	16.06	16.07	16.06
Energy MEMcal kg ⁻¹	10.00066	10.0508	10.0418
Energy/protein ratio	00.63	0.63	0.63

Table 2: Chemical composition (dry matter basis) of experimental rations

Component	Rations		
	A (Barseem)	B (Sweet potato)	C (<i>C. ternatea</i>)
Dry matter	92.46	92.71	92.67
Ether extract	2.9	3.2	3
Crude protein	16.06	16.07	16.06
Crude fibre	23.3	19.7	21.01
Nitrogen-free extract	42.5	47.04	46.8
Ash	7.1	6.7	5.8
ME (mj kg ⁻¹)	10.00066	10.0508	10.0418
Protein/energy ratio	0.63	0.63	0.63

weights, total weight gain, daily weight gain, daily feed intake and feed conversion ratio were estimated. Blood samples were collected at slaughter in dry test tubes and serum was separated and stored at -20°C until analyzed for the concentrations of total protein, albumin and globulin.

Statistical analysis: One way analysis of variance has been applied to conduct the results. The significance of differences at $p > 0.05$ between means was compared at each time point using computer package SPSS version 10.

RESULTS AND DISCUSSION

Table 3 revealed that body weight of local rabbits in Sudan at 45 days (initial weight) and at 115 days (final weight) of age was in the range of 357.67±6.48 to 444±5.35 g and of 977.67±17.09-1090.67±27.01 g for the ages, respectively. The results for initial weight is similar to the results obtained by Iraqi *et al.* (2008) in Gabali (491 g) and V-line rabbit (471 g), by Gharib (2004), who reported 365-392 g in Red Baladi rabbits, whereas the results for final body weight agreed with the result reported by El-Faky *et al.* (2001), who found that values of body weight at 16 weeks of age in Red Baladi rabbits as 960.00 g. There were no significant differences at ($p > 0.05$) between treatments for initial and final body weights.

Table 3 also showed that daily weight gain was more than 9 g day⁻¹ which is near to the results obtained by Akinmutimi and Osuagwu (2008), when 0% of Maize was replaced by Sweet potato (9.04) but lesser than the results obtained in the same experiment when 20% of Maize was replaced by Sweet potato (10.18 g day⁻¹) and lower than the results obtained by Lakabi *et al.* (2004), who reported 27.7±6.3 as daily weight gain for Kabylie rabbits between 4 and 8 weeks of age, Anous (1999), who reported 13.3±0.9 and 27.4±1.4 as daily weight gain (g d⁻¹) between 3 and 12 weeks of age in a local and NZW breeds raised in Burundi, Gasim-Boubaker *et al.* (2007) reported a range from 27.1 to 28.5 g day⁻¹ in Tunisia, Tegbe *et al.* (2006) reported 11.35-12.63 g day⁻¹ in Nigeria.

Table 3 also showed that feed intakes were significantly different in this experiment at ($p > 0.05$), the highest intake was observed for Barseem (64.17 g day⁻¹) and the lowest intake was observed for Sweet potato and *C. ternatea* (61.30 and 56.53 g day⁻¹). These estimates are higher than the results reported by Tegbe *et al.* (2006) in rabbits fed different levels of *Ficus thonningii* leaves (49.61-59.89 g) but are lower than the estimates reported by Akinmutimi and Osuagwu (2008), who reported 65-89 g day⁻¹, Al-Dobaib *et al.* (2007), who found a range of 85-87 g day⁻¹ for V-line and 103-127 g for V-line X Saudi Gabali, Gasim-Boubaker *et al.* (2007), who reported 130-134 g as daily food consumption in Tunisia.

Table 3: Analysis of variance and average (Mean±SD). Performance values of treatment groups fed hay fodder for 70 days

Parameters	F- values [#]	A (Barseem)	B (Sweet potato)	C (<i>C. ternatea</i>)
Initial weight (g)	0.90	394.33±10.86	444.00±5.35	357.67±6.48
Final weight (g)	0.69	1090.67±27.01	1157.33±7.50	977.67±17.0
Total weight gain (g)	0.38	696.67±16.20	709.67±4.95	622.67±15.2
Daily weight gain (g)	0.18	9.93±2.30	9.73±1.21	9.00±2.26
Daily feed intake (g)	4.82*	64.17±3.82 ^a	61.30±3.04 ^{ab}	56.53±1.97 ^b
F.C.R	0.02	6.47±1.27	6.34±0.95	6.57±1.18

[#]With (3,20) degrees of freedom. *Denotes F-value significant at (p>0.05). Values are Means±SE within rows with no common letter (s) are significantly different (p<0.05)

Table 4: Analysis of variance and average (Mean±SD) blood values of treatment groups fed hay fodder for 70 days

Parameters	F- values [#]	A (Berseem)	B (Sweet potato)	C (<i>C. ternatea</i>)
Total protein (g dL ⁻¹)	7.29*	6.49±0.008 ^b	6.70±0.10 ^{ab}	6.86±0.16 ^a
Albumin (g dL ⁻¹)	8.57*	3.47±0.12 ^b	3.68±0.01 ^{ab}	3.83±0.12 ^a
Globulin (g dL ⁻¹)	0.03	3.02±0.007	3.02±0.006	3.03±0.006
Hemoglobin (g dL ⁻¹)	0.27	81.33±0.42	74.00±21.00	75.67±6.53
Red blood cell (×10 ⁶)	1.32	58.00±4.00	43.30±14.9	45.70±13.7
White blood cell (×10 ³ mm ³)	1.46	83.00±36.56	74.67±11.51	90.00±15.97

[#]With (3,20) degrees of freedom. *Denotes F-value significant at (p>0.05). Values are Means±SE. Means within rows with no common letter (s) are significantly different (p<0.05)

Table 3 also showed feed conversion ratio was almost the same for the three treatments (about 6) which is higher than the result reported by Singh *et al.* (1998), who found that the average feed conversion ratio from 5th to 13th week of age as 3.86-3.59.

Table 4 depicted that there was significant (p>0.05) difference between ration (A) and ration (C) for total protein and globulin. Other blood traits studied were all in accordance to Van Praag (2004). The results for hematological parameters assessed showed no significant difference (p>0.05), this is in agreement with Ayuk and Essien (2009), who investigate the effects of replacing maize with sweet potato in poultry.

CONCLUSION

It has been concluded from the study that Sweet Potato has the paternal to improve feed conversion ratio of local rabbit and have no effects on blood constituents.

REFERENCES

- Akinmutimi, A.H. and C.C. Osuagwu, 2008. Response of weaner rabbits fed graded levels of sweet potato meal in place of maize-based diet. Pak. J. Nutr., 7: 705-709.
- Al-Dobaib, S.N., M.H. Khalil, M. Hashad and A.M. Al-Saef, 2007. Growth, Carcass and caecal traits in V-line and crossbred rabbits fed diet containing discarded dates. World Rabbit Sci., 15: 81-90.
- Alawa, J.P., D.T.K. Botoye, F.O. Ndukwe and N.A. Berepubo, 1990. Effect of varying proportions of brewer's dried grains on the growth performance of young rabbits. J. Applied Rabbit Res., 12: 252-255.
- Amaefule, K.U., U.E. Mbonu and V. Amaka, 2011. Performance and nutrient utilization of growing rabbits fed graded levels of Raw Bambara groundnut (*Vigna subterranean* (L.) Verdc) offal diets. Pak. J. Nutr., 108: 463-469.

- Anous, M.R., 1999. Growth performance slaughter and carcass compositional traits in rabbits of a local strain and New Zealand white raised in Burundi. *World Rabbit Sci.*, 7: 139-143.
- Ashiono, G.B., J.O. Ouda, T.E. Akuja, J.K. Kitilit, R.G. Irungu and S. Gatwiku, 2006. Effect of potato vines and sorghum silage on cattle milk productivity. *Asian J. Plant Sci.*, 5: 81-84.
- Ayuk, E.A. and A. Essien, 2009. Growth and haematological responses of broiler chicks fed graded level of sweet potato (*Ipomoea batata*) meal as replacement of maize. *Int. J. Poult. Sci.*, 8: 485-488.
- Egbo, M.L., U.D. Doma and A.B. Lacdaks, 2001. Characteristics of small scale rabbit production and management in *Bauchi metropolis*. Proceedings of the 26th Annual Conference of Nigerian Society for Animal Production, March 18-21, 2001, ABU Zaria, pp: 160-162.
- El-Amin, F.M., 1978. Rabbit husbandry in the Sudan. In Provisional Report No. 4, Rabbit Husbandry, Morogoro, Tanzania.
- El-Aziz, M.M.A., 1998. Crossbreeding between Al-Gabali and New Zealand White rabbits in the north cost-belt of the Egyptian Western desert. Ph.D. Thesis, Faculty of Agriculture, Zigzag University, Banda, Egypt.
- El-Faky, F.A., M.A. Abuol-Hassan, G.E.Y. Attalah and S.S. Bata, 2001. Selection indices for improving body weight in baladi red rabbit. *Egypt. Pout. Sci.*, 21: 305-318.
- Elamin, K.M. and I.A. Yousif, 2011. Evaluation of litter traits in Sudanese rabbits. *Livest. Res. Rural Develop. Vol.*, 23.
- Gasim-Boubaker, A., H. Abdouli, M. Elhichi, K. Faiza and L. Tayachi, 2007. Feeding rapeseed meal to rabbits: Digestibility, performance and carcass characteristics. *Asian J. Anim. Vet. Adv.*, 2: 38-41.
- Gharib, M.G., 2004. A comparative study of reproductive traits and growth rates in Baladi Red and Bauscat rabbits and their crosses. M.Sc. Thesis, Faculty of Agriculture, Al-Azhar University, Egypt.
- Gomez, S.M. and A. Kalamani, 2003. Butterfly pea (*Clitoria ternatea*): A nutritive multipurpose forage legume for the tropics: An over view. *Pak. J. Nutr.*, 2: 374-379.
- Iraqi, M.M., E.A. Afifi, M. Baselga, M.H. Khalil and M.L. Garcia, 2008. Additive and Heterotic components for post-weaning growth traits in a crossing project of V-line with Gabali rabbit. Proceedings of the 9th World Rabbit Congress, June 10-13, 2008, Verona, Italy pp: 131-135.
- Iyeghe-Erakpotobor, G.T., 2007. Effect of concentrate and forage type on performance and digestibility of growing rabbits under sub-humid tropical conditions. *Asian J. Anim. Vet. Adv.*, 2: 125-132.
- Khalil, M.H., E.A. Afifi, Y.M.K. Youssef and A.F. Khadr, 1995. Heterosis, Maternal and direct genetic effects for litter performance and reproductive interval in rabbit crosses. *World Rabbit Sci.*, 338: 99-105.
- Lakabi, D., N. Zerrouki, F. Lebas and M. Berchiche, 2004. Growth performances and slaughter traits of a local Kabylie population of rabbits raised in Algeria: Effects of sex and rearing season. Proceeding of 8th World Rabbit Congress, (WRC'04), Puebla-Mexico, pp: 1396-1402.
- Machin, D. and S. Nyvold, 1991. Roots, tubers, plantains and bananas in animal feeding: Feeding of sweet potato to monogastrics by P.L. Dominguez. Proceedings of the FAO Expert Consultation, Jan. 21-25, 1991, CIAT, Cali, Colombia.
- Mehrez, A.Z. and M.R.M. Mousa, 2011. Growth performance of rabbits fed olive pulp in North Sinai. *Asian J. Anim. Sci.*, 5: 317-329.

- Muir, J.P. and E. Massaete, 1996. Seasonal growth in rabbits fed wheat and maize bran with tropical forages. *Livest. Res. Rural Dev.*, Vol. 8.
- Oudah, S.M., 1990. Studies on some rabbit breeds and their crosses. M.Sc. Thesis, Faculty of Agriculture, Mansoura University, Egypt.
- Ruiz, M.E., D. Pezo and L. Martinez, 1980. The use of sweet potato *Ipomoea batatas* L. (Lam.) in animal feeding. I. Agronomic aspects. *Trop. Anim. Prod.*, 5: 144-151.
- Singh, P., N.N. Pathak and J.C. Biswas, 1998. Performance of broiler rabbit (Soviet Chinchila X Grey Giant) fed low grain concentrates. *World Rabbit Sci.*, 6: 223-225.
- Tegbe, T.S.B., I.A. Adeyinka, K.D. Baye and J.P. Alawa, 2006. Evaluation of feeding graded levels of dried and milled *Ficus thonningii* leaves on growth performance, carcass characteristics and organs of weaner rabbits. *Pak. J. Nutr.*, 5: 548-550.
- Van Praag, E., 2004. Biochemistry reference values. <http://www.Medirabbit.com>
- Wang, H., 1982. The Breeding of Sweet Potato for Human Consumption. In: Sweet Potato, Villareal, R.L. and T.D. Griggs (Eds.). Asian Vegetable Research and Development Center, Taiwan, pp: 297-311.