2017 Scienceline Publication

Online Journal of Animal and Feed Research

Volume 7, Issue 2: 38-42; Mar 25, 2017

ISSN 2228-7701

EFFECT OF GRADED LEVELS OF BROWSE FORAGE (*Balanites aegyptiaca*) LEAVES INCLUSION IN THE DIETS OF GROWING RABBITS

Akomka ANDREW JOHN[1], Aminu NASIRU[1], Ayuba DAUDA[2] and Rose YAKUBU NENROTMWA[3]

[1] *Department of Animal Science Bayero University P.M.B 3011 Kano, Nigeria*
[2] *Department of Animal Science University of Calabar P.M.B 1115 Calabar Cross River, Nigeria*
[3] *Department of Animal Production Plateau State College of Agriculture P.M.B 001 Garkawa, Nigeria*
Email: ayubadauda87@gmail.com

ABSTRACT: Thirty mixed sex cross breeds (*chinchilla x California x New Zealand*) weaner rabbits aged 4 weeks old were used to evaluate the effect of graded levels of browse forage (*Balanites aegyptiaca*) leaves inclusion in the diets of growing rabbits on growth performance and nutrient digestibility of weaner rabbits. Five diets were formulated, treatment 1 (control), 2 3 4 and 5 in which Groundnut haulm was replaced with *Balanites aegyptiaca* at 0%, 5%, 10%, 15%, and 20% respectively. The rabbits were allotted to the five treatments (T1, T2, T3, T4, and T5) with two rabbits per replicate and six rabbits per treatment in a randomized complete block design. The rabbits were fed with the experimental diets and clean drinking water *ad libitum* for experimental period of eight weeks (56 days). All the parameters under observation showed significant (P<0.05) difference among the treatment groups. In conclusion *Balanites aegyptiaca* leave meal can replace groundnut haulm without adverse effect on the rabbits.

Keywords: Rabbit, *Balanite aegyptiaca* and Groundnut Haulm

ORIGINAL ARTICLE
pii: S222877011700007-7
Received 28 Jan. 2017
Accepted 18 Mar. 2017

INTRODUCTION

There is global awareness on the shortage of animal protein supply in the tropics (Adekunle and Ajani, 1999). The production of ruminants such as cattle, sheep and goats have not been able to bridge the gap because of their long production intervals, feed shortage, poor genetic make – up and disease incidence among other factors. Ayinde and Aromolaran (1998) reported that there has been continuous rise in the cost of production of cattle, sheep, goats and poultry and implored researchers to explore the potentiality of alternative feeds for livestock feeding. Now, there has been rising awareness on the virtues of rabbit production in developing countries as a means of alleviating world's animal protein shortage. Taiwo et al. (2005) attributed this to several advantages of rabbit over other livestock in the tropics and advocated its increased production in Nigeria. However, Ayinde and Aromolaran (1998) showed that feed accounted for 65.75% of the total cost of rabbit production and recommended research into alternative and cheaper feeds for rabbits in Nigeria.

Rabbits are highly prolific and have short generation intervals (Cheeke, 1999). Rabbit meat has high biological value and contains with crude protein (21%), fat (10%), low cholesterol, low sodium (0.25 mg/g) and higher proportion of linoleic and linolenic fatty acids (Cheeke, 1999). Rabbit grow rapidly and their growth rate is comparable to that of broiler chicken (Rao, 1999). Despite these attributes of rabbits, their production has not received the desired attention in the tropics. However, the adoption of proper nutritional strategies will greatly enhance the productivity of rabbits.

Browses are important in providing nutrient to grazing ruminants in arid and semi-arid environments where inadequate feeds are a major constraint for livestock production (Aganga and Tshwenyane, 2003). Tree fodders maintain higher protein and mineral contents during growth than grasses, which decline rapidly in quality with maturity (Shelton, 2004). Tree fodders are important source of nourishment for grazing ruminants and as

To cite this paper: Andrew John A, Nasiru A, Dauda A and Yakubu Nenrotmwa R. 2017. Effect of graded levels of browse forage (*Balanites aegyptiaca*) leaves inclusion in the diets of growing rabbits. *Online J. Anim. Feed Res*., 7(2): 38-42.
Scienceline/Journal homepages: www.science-line.com; www.ojafr.ir

supplements to improve the productivity of herbivores fed on low quality feeds. Browse forages form part of the complex interactions between plants, animals and crops (Aganga and Tshwenyane, 2003), the positive aspect of which is to help balance a plant-animal-soil ecosystem from which there is sustainable source of feeds (Devendra, 1994).

Balanites aegyptiaca is a species of tree growing in different ecological conditions. It can thrive well in areas with 100 to 1000 mm annual rainfall and mostly distributed in semi arid and arid zones of tropical Africa (Von Maydell, 1983). This specie of tree is available in the Northern part of Nigeria with highest number in the Northeastern Nigeria. *Balanites aegyptiaca* have been reported to have anti-inflammatory and analgesic, anthelmintic, antioxidant, antidiabetic, antinoceptic, hepatoprotective, antibacterial and larvicidal activities in animals (Dubey et al., 2011). *Balanites aegyptiaca* like Acacia Senegal (Diallo, 1997) and *A.* nilotica (Tybirk, 1989) shows a synchronization between male (internal stamina cycle) and female phase (Ndoye et al., 2004). *Balanite saegyptiaca* being a browse plant have been reported to improve the feeding potential of ruminant animals in the semi arid (Njidda and Ikhimioya, 2010). Therefore, the objectives of this Research is to evaluate the growth performance and nutrient digestibility of weaner rabbits fed graded levels of inclusion of *Balanites aegvptiaca* as a replace for ground haulm in the diets

MATERIALS AND METHODS

The study was carried out at the Rabbitry unit of the Department of Animal science, Faculty of Agriculture, Bayero University Kano, Nigeria. Thirty healthy (Chinchilla) weaner rabbits were purchased locally from the local market. Rabbit were randomly allotted to five dietary treatment groups with six rabbits per treatment and three replications per treatment in a completely randomized design. *Balanites aegyptiaca* leaf meal was fed at 0, 5, 10, 15, and 20% levels in the ration for treatment 1 (control), 2, 3, 4 and 5 respectively. The experimental diets and clean drinking water were provided *ad libitum*. The experiment lasted for eight weeks (56 days) in a randomized complete block design (RCBD). The ingredient composition of the experimental diets is presented in Table 1 and proximate composition of the experimental diets in Table 2. All data collected were subjected to analysis of variance (ANOVA) of completely randomized design. Significant difference ($P<0.05$) among treatment means were determined by the least significant difference (LSD) as outlined by Steel and Torrie (1980).

RESULTS AND DISCUSSION

Proximate composition of the experimental diet of weaner rabbit fed graded level of *Balanites aegyptiaca* leaves is showed in table 2. The values of crude fibre (CF), acid detergent fibre (ADF), neutral detergent fibre (NDF) and dry matter (DM) digestibility were higher in treatment 3. The ether extract (EE) levels (4.49 to 6.35%) increased with increase in level of *Balanites aegyptiaca* leaves in the diets. The EE indicates the fat contents of the experimental diets. The crude protein content (CP) ranged from (16.28-17.86%) treatment 1 (control) showed the highest and followed by treatment 5 (20%) inclusion level of test ingredients. The value obtained for CP in this study is adequate for growing rabbits (Saleh et al., 2014). This is also similar to work of Njidda and Isidahomen (2010). The crude fibre levels of the diets ranges (28.42 - 30.09%) were higher than the 25% recommended by Irbeck (2001) for growing rabbits though higher levels in this study. The fat component of the diets as ether extract values were lower than the range (20-25%) fat levels recommended for young rabbits by Irlbeck (2001). The dry matter content of the diet was observed to be higher in all the treatments with the highest value in T3 (90.75%). The ADL values ranged from (5.16 to 6.26%). The values were much lower than those reported by Okoli et al. (2003) for southeastern browses of Nigeria. The values for NDF were observed to be higher in T3. The NDF values are however lower compared to the values reported by Njidda (2011) for semi arid browse forages. The Growth Performance and nutrient digestibility of rabbit fed the experimental diets are showed in table 3. Reduced growth performance was observed in diet B (5%, *Balanite aegyptiaca* leaves) and this may be due to decrease in dietary fibre as reported also by Osakwe et al. (2008) who used cassava peel as replacement for maize. The mean weight gain recorded in this study showed significant ($P<0.05$) difference among the treatment groups. The result obtained from this study can be compared favourably with the reports of Agunbiade et al. (1999) and Schiere (1999). The increased mean weight gain of rabbits fed diet C (10%), D (15%), and E (20%) over those fed diet A (0%) and B (5%) respectively, could be attributed to the favorable effect of fibre, termed a "ballast" effect (Colin et al., 1976). DMI in this study showed significant ($P<0.05$) difference among the treatment groups. The value ranges from 64.40 to 83.03 g/day is higher than the findings of Abubakar et al. (2006) who reported a DMI range of 60.95 to 70.22 g/day for weaner rabbit fed varying levels of spent sorghum residue in diets. The variation may be as a result of the different test ingredients used for the studies. The crude protein digestibility (CPD) showed significant ($P<0.05$) difference among the treatment groups. Treatment C and D were generally higher (77.28 to 79.92%) further confirming the assertion

To cite this paper: Andrew John A, Nasiru A, Dauda A and Yakubu Nenrotmwa R. 2017. Effect of graded levels of browse forage (*Balanites aegyptiaca*) leaves inclusion in the diets of growing rabbits. *Online J. Anim. Feed Res*., 7(2): 38-42.
Scienceline/Journal homepages: www.science-line.com; www.ojafr.ir

that protein in concentrate diet (De Blas et al., 1981) and in forage, Cheeke et al. (1987) are efficiently utilized by rabbits. Onifade et al. (1993) made similar observation. The crude fibre digestibility (CFD) indicates significant (P<0.05) difference among the treatment groups. Treatment B showed the higher value .the values (64.75 - 75.02%) is higher than the value (56.13 to 68.15%) reported by Jegede et al. (2008) for growing rabbits fed diets containing malted sorghum sprout but higher than the result (25.48 to 26.19%) recorded by Murin et al. (2002) when maize was replaced with sorghum in the diets of growing rabbits. The variation is attributed to the test ingredients. Ether extract (EE), ash, acid detergent fibre (ADF), neutral detergent fibre (NDF) and Acid detergent lignin (ADL) all showed significant (P<0.05) difference among treatment groups. The EE, ADF, NDF and ADL showed higher value in treatment C (10%) inclusion level of test ingredients. This indicates that inclusion level at 10% favour digestibility of the parameters mentioned above and it could be due to fact that digestibility of feed is influenced not only by its own composition but also by the composition of other feed consumed with it which is in line with the findings of Mc Donald et al. (1995).

Table 1 - Percentage composition of the experimental diet.

Parameters \ Diets	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
White maize	37.35	37.35	37.35	37.35	37.35
Groundnut cake	15.00	15.00	15.00	15.00	15.00
Ground haulm	20.00	15.00	10.00	5.00	0.00
Maize bran	10.00	10.00	10.00	10.00	10.00
Fish meal	5.00	5.00	5.00	5.00	5.00
Balanite aegyptiaca	0.00	5.00	10.00	15.00	20.00
Wheat offal	10.00	10.00	10.00	10.00	10.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Salt	0.50	0.50	0.50	0.50	0.50
Premix*	0.15	0.15	0.15	0.15	0.15

Premix* (grow fast) Manufactured by Animal Care Service Consults Nigeria Ltd., Lagos, supplying the following per kg of premix; vitamin A = 32,000,00 IU, vitamin B3 = 640,000 IU, vitamin E = 2,000 IU, vitamin K = 800 mg, thiamine (B1) = 600 mg, riboflavin (B2) = 1600 mg, pyridoxine (B6) = 600 mg, vitamin B12 = 4 mg, pantothenic acid = 2000 mg, folic acid = 200 mg, biotin = 8 mg, choline = 80 mg, antioxidant = 50 g, managanese = 32 g, zinc = 20 g, iron = 8 g, copper = 2 g, iodine = 0.48 mg, selenium = 80 mg and cobalt = 80 mg.

Table 2 - Proximate composition of the experimental diet of weaner rabbit fed graded level of *Balanites aegyptiaca* leaves.

Parameters (%) \ Treatments	A (0%)	B (5%)	C (10%)	D (15%)	E (20%)
Dry matter	89.86	88.96	90.75	91.23	89.62
Ash	7.68	8.11	7.92	8.23	8.10
Crude protein	17.86	16.93	16.28	16.75	17.80
Ether Extract	4.49	5.62	5.87	6.18	6.35
Crude fibre	28.42	29.16	30.09	29.62	28.76
ADF	33.11	34.24	36.12	35.26	33.40
NDF	41.64	43.16	45.11	44.23	42.18
ADL	6.11	5.16	5.43	5.76	6.26

ADF-Acid detergent fibre, NDF-Neutral detergent fibre, ADL-Acid detergent lignin

Table 3 - Performance characteristics and Nutrient digestibility of weaner rabbit fed graded level of *Balanites aegyptiaca* leaves.

Parameters \ Treatments	A (0%)	B (5%)	C (10%)	D (15%)	E (20%)	SEM
Initial weight g/day	833.30	900.00	791.70	828.30	800.00	35.77
Final weight g/day	900.00^{c}	858.30^{cd}	1016.70^{b}	1266.70^{a}	1000.00	43.11*
Total weight gain (g)	66.70^{c}	-41.70^{d}	225.00^{b}	438.30^{a}	200.00^{b}	36.49**
Daily weight gain (g)	0.0529^{d}	-0.033^{e}	0.1786^{b}	0.3470^{a}	0.1587^{c}	0.029*
DMI g/day	72.98^{ab}	64.40^{b}	75.62^{ab}	83.03^{a}	82.27^{a}	7.089**
Nutrient Digestibility						
Dry matter	90.50^{a}	65.22^{c}	91.43^{a}	91.22^{a}	90.11^{b}	0.972*
Ash	81.48^{a}	73.52	79.82^{b}	81.72^{a}	76.82^{c}	0.713*
Crude protein	74.17^{c}	70.40^{d}	77.28^{b}	79.92^{a}	74.03^{c}	0.811*
Ether Extract	94.59^{b}	93.81^{c}	96.84^{a}	96.95^{a}	94.97^{b}	0.154*
Crude fibre	73.13^{b}	75.02^{a}	69.12^{c}	64.75^{d}	65.25^{d}	1.017*
ADF	64.79^{b}	54.94^{d}	63.11^{c}	69.64^{a}	57.41^{e}	1.261*
NDF	63.47^{c}	55.33^{e}	65.88^{b}	70.28^{a}	58.31^{d}	1.239*
ADL	64.36^{b}	54.28^{d}	59.79^{c}	67.93^{a}	54.81^{d}	1.302*

$^{a, b, c, d}$ and ^{e} Means along the same row with different superscript arse significantly different (p<0.05) difference. ADF-Acid detergent fibre, NDF-Neutral detergent fibre, ADL-Acid detergent lignin and SE-Standard error, ** mean highly significance and *mean significance

To cite this paper: Andrew John A, Nasiru A, Dauda A and Yakubu Nenrotmwa R. 2017. Effect of graded levels of browse forage (*Balanites aegyptiaca*) leaves inclusion in the diets of growing rabbits. *Online J. Anim. Feed Res*., 7(2): 38-42.
Scienceline/Journal homepages: www.science-line.com; www.ojafr.ir

CONCLUSION

Based on this study Balanites *aegyptiaca,* showed potentials to replace ground haulm without adverse effect on the rabbits performance and nutrient digestibility. I recommend that research should be carry out on physiology of rabbit fed *Balanite aegyptiaca.*

Competing interests

The authors declare that they have no competing interests.

REFERENCES

Abubakar M, Doma UD, Kalla DJU, Ngele MB and Augustine CLD (2006). Effects of dietary replacement of maize with malted or unmalted sorghum on the performance of weaner rabbits. Livestock Research for Rural Development. 5: 24 – 30.

Adekunle OA and Ajani O (1999). Economics of beef marketing in Bodija market in Ibadan, Oyo state. Nigeria Tropical Journal of Animal Science, 1: 93 – 100.

Aganga AA and Tshwenyane SO (2003). Feeding values and Anti-nutritive factors of forage tree legumes. Pakistan Journal Nutrition, 3: 170-177.

Agunbiade JA, Adeyemi OA, Fasina OE, Ashorobi BO, Adebanjo MO and Waide OA (1999). Cassava peels and leaves meal as the diet of rabbits: Effect on performance and carcass characteristics. Nigeria Journal of Animal Science Production, 26:29-34

Ayinde IA and Aromolaran O (1998). Economic of Rabbit Production in Abeokuta South Local Government Area of Ogun State, Nigeria. Nigerian Journal of Animal Production, 1: 100 – 105.

Ayinde IA and Aromolaran O (1998). Economic of Rabbit Production in Abeokuta South Local Government Area of Ogun State, Nigeria. Nigerian Journal of Animal Production, 1: 100 – 105.

Cheeke PR (1987). *Rabbit feeding and Nutrition*. Academic press Inc. Orlando, Florida, USA. 375pp.

Cheeke PR (1992). Feeding systems for tropical rabbit production. Emphasizing roots, tubers and bananas. In: Roots, Tubers, Plantains and Bananas in Animal Feeding. David, M. and Solveig, N. (eds). Proceedings of the January, 1991, FAO Animal Production and Health paper No. 95 FAO Expert Consultation, held in CIAT, Cali, Columbia, 21st – 25th Jan., 1991, FAO, Rome, Italy, pp. 235 – 249

Cheeke PR (1999). Editorial: The potential role of Rabbit in meeting World Food Need. Journal of Applied Rabbit Research, 36: 3 – 5

De Blas JS, Perez E, Fraga MJ, Rodriquez JM and Galvez JF (1981). Effect of diet on feed intake and growth of rabbits from weaning to slaughter at different ages and weight. Journal of Animal Science, 52: 1225 - 1232.

Devendra C (1994). Composition and nutritive value of browse legumes, pp. In: Forage tree legumes in tropical agricultures, 1:49-65.

Diallo I (1997). Biologiefloraleetpollinisation chez Acacia Senegal (L.) Wild. Acta bot. Gallica, 1:73 – 82.

Dubey PK, Yogi M, Bharadwaj A, Soni ML, Singh A and Sachan AKR (2011). Balanites aegytiaca (L.) Del., a semi arid forest Tree: A Review. Academic Journals of `Plant Scioence, 4: 12 – 18.

Iribeck NA (2001). How to feed the rabbit (*Oryctolagus cuniculus*) gastrointestinal tract. *Journal of Animal Science*, 79:343-346.

Jegede AV, Fafiolu AO, Falaye OJ and Oduguwa OO (2008). Utilization of diets containing malted sorghum sprout by growing rabbits. ASET International Journal, 8:110 – 117.

Murin PA, Njoka EN, Tuitoek JK and Nanua JN (2002). Evaluation of sorghum as replacement for maize in the diet of growing rabbits. Swedish Journal of Animal Science, 15: 565 – 569.

Ndoye M, Diallo I and Gassama/Dia YK (2004).Reproductive Biology in Balanites aegytiaca (L.) Del., a semi arid forest tree. African Journal of Biotechnology, 3:40 – 46.

Njidda AA and Isidahomen CE (2011). Hematological parameters and carcass characteristics ofweanling rabbits fed sesame seed meal (Sesamumindicum) in a semi-arid region. Pakistan Veterinary Journal, 31: 35-39.

Njidda AA, Ikhimioya I and Muhhamad IR (2010). Chemical Composition and its Relationship to *in vitro* dry matter degradability of leaves of semi- arid browse species forages. Proc. 35th Conf., Nig. Soc. For Anim. Prod. 14th-17th March. Univ. of Ibadan, Nigeria.

Njidda AA (2011). Evaluation of the potential nutritive value of browse forages of semi-arid region of Nigeria. Ph D Thesis, Department of Animal Science, Ambrose Alli University, Ekpoma Nigeria. 219pp.

Okoli IC, Maureen O, Anunobi O, Obua BE and Enemuo V (2003). Studies on selected browses of southeastern Nigeria with particular reference to their proximate and some endogenous anti-nutritional constituents. *Livestock Resource.* Rural Development, 15: 3-7.

Onifade AA and Tewe OO (1993). Alternative tropical energy feed resources in rabbit diets: growth performance, diet digestibility and blood composition. World Rabbit Science, 1: 17-24.

Osakwe II and Nwose RN (2008). Feed intake and nutrient digestibility of weaner rabbits fed cassava peel as replacement for maize. *Animal Research International*, 5: 770-773.

Rao DR (1999). Comparative performance of rabbits and broiler chickens. Nutrition Reports International, 16:133 – 135.

Saleh JL, Njidda AA, Adeniji AA and Lawan GB (2014). Haematological and Biochemical Indices of Rabbits Fed Graded Levels Browse Forage (*Balanites aegyptiaca*) in Semi Arid Environment. Global Journal of Science Frontier Research (D) Volume XIV.

Schiere JB (1999). Backyard rabbit farming in the tropics. Third Edition, Agrodok publications, wageningen, 70 pp.

Shelton HM (2004). The importance of silvopastroal systems in rural livelihoods to provide ecosystem services. Proc. Of the 12th International Symposium on Silvopastoal Systems. In: 't. Marnietje, L., Ramirez, L., Ibrahim, M, Sandoval, C. Ojeda, N and Ku, J. (eds). Universidad Antronoma de Yucatan, Merida, Yucatan, Mexico, 2004. pp. 158-174.

Steet RGD and Torrie JH (1980). Principles and Procedure of Statistics. A biometrical approach. 2nd edn. McGraw-Hill Book Co., New York, USA. Pp. 633

Taiwo AA, Adejuyigbe AO, Adebowale AE, Oshatan JS and David OO (2005). Performance and nutrient digestibility of weaned rabbits fed forage supplemented with concentrate. Nigerian Journal of Animal Production, 32: 74 – 78.

Tybrik K (1989). Acacianilotica in Kenya: aspects of flowering, pollination, seed production and regeneration. Special reports Botanisk Institute, 75p

Von Maydell HJ (1983). Arbresetarbustes du sahel: leurscaractéristiques et leurs utilizations. Eschborn: GTZ, 531p.

To cite this paper: Andrew John A, Nasiru A, Dauda A and Yakubu Nenrotmwa R. 2017. Effect of graded levels of browse forage (*Balanites aegyptiaca*) leaves inclusion in the diets of growing rabbits. *Online J. Anim. Feed Res*., 7(2): 38-42.
Scienceline/Journal homepages: www.science-line.com; www.ojafr.ir