ISSN 2348-313X (Print)
International Journal of Life Sciences Research ISSN 2348-3148 (online)
Vol. 8, Issue 1, pp: (52-56), Month: January - March 2020, Available at: www.researchpublish.com

EFFECTS OF VARYING LEVELS OF *GMELINA ARBOREA* BARK SUPPLEMENTED WITH *AFZELIA AFRICANA* LEAVES ON CARCASS CHARCTERISTIC OF GOATS

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Abstract: **The study was conducted to determine the effects of varying levels of Gmelina arborea bark supplementation with Afzelia Africana leaves on carcass characteristic of goats. Twenty five (25) bucks with body weight of 18.25-19.00 kg, were used for the study. The bucks were weighed and divided into five (5) groups. Each group of five (5) bucks were randomly assigned to one of the 5 treatments in a completely randomized design (CRD). Fresh Afzelia Africana leaves was fed as basal diet. The basal diet was fed ad libitum, while Gmelina bark was fed as supplement at the levels of 0, 100, 150,200 and 250 g/head/day for T1 (control), T2, T3, T4 and T5, respectively. Clean drinking water and mineral salt lick were provided ad libitum throughout the experimental period. Data were collected on carcass characteristic, offals and organs weight. Significantly (P<0.05) different were observed among treatments groups on carcass measurement. The result of the offals and organ weights also differ significantly (P<0.05) between treatments except head, skin and omasum which did not differ significantly (P>0.05) among the treatments. Treatment 3, 4 and 5 recorded the highest fasting weight, slaughter weight, dresses weight, weight of neck and hind limb while T1, T2 T3 recorded the highest dressing percentage. T4 and T5 recorded the highest loin and fore limb weight while T1 and T2 recorded the lowest. Treatments T4 and T5 recorded the highest abdominal fat while T3, T4 and T5 recorded the highest weight of liver, heart and spleen. Treatment (3) recorded the lowest weight of abomasum.**

Keywords: **Buck, Gmelina bark, carcass, Offals and Organs.**

1. INTRODUCTION

It is obvious that dressing percentage as important as it is in evaluation of meat yield of goat and other farm animals is influenced by such factors as breed, sex of animal, nutrition and other management factors Dressing percentage is both a yield and value-determining factor and is therefore an important yardstick in assessing performance of meat producing animals (Yusuf *et al*., 2014) hence an indication of how much meat a carcass will yield. This implies that it is a measurement of the weight of the carcass compared to the live weight of the animal (Dressing percentage (DP) = (hot carcass weight/live weight) x 100). Dressing percentage values on the empty body weight basis are higher than that of slaughter weight basis. Literature reports indicates that dressing percentage in goats varies between 38 and 56% by breed, sex, age, weight and conformation (Anjaneyulu and Joshi, 1995; El Hag and El Shargi, 1996; Dhanda *et al*., 1999; Getahun, 2001). According to Devendera and Burns (1983), dressing percentage is affected by plane of nutrition and other factors such as breed, age and sex. Pralomokarn *et al*. (1995) also indicated that dressing percentage increased as feed intake increased. Nutrition is predominant, because changes in goat diets may improve both the quantity and quality of the goat meat as a final product (Geay *et al*., 2001).

2. MATERIAL AND METHODS

Site and Location of the Study Area

The study was conducted at the Livestock Teaching and Research Farm of the Department of Animal Health and Production, Federal Polytechnic Bali, Taraba State. Bali covers a total land area of about 5,500 KM and extends between latitude 8^0 and 35^1 00^{11} North of the equator and 10^0 46^1 00^{11} East of the Greenwich meridian (Taraba State Government, 2015). It lies within the guinea savanna zone. The climatic condition is characterized by dry and rainy season. Rainfall varies from 1000 mm-1500 mm/annum, and the temperature ranges from 30 to 38^0C depending on the season. (Taraba State Government, 2015). Rainy season starts in April and ends in October, while the dry season begins in November and ends in March. (Taraba State Government, 2015). The dry season reaches its peak in January and February when the dusty north east trade wind blows across the local government. The climate, soil and hydrology of the local government area provide ideal atmosphere for the growth of browse trees such as *Ficus spp, Gmelina arborea, Daniella africana, Afzelia africana, Tamarindus indica, Parkia clappertoniana, and Prosopis africana*. The area is suitable for the cultivation of crops such as Groundnut, Soya beans, Rice, Maize, Sorghum and Cowpea, and the vegetation is marked by tall grasses such as West African baful grass and Gamba grass.

Experimental Animals and their Management

Prior to the commencement of the experiment the pens were thoroughly swept, washed and disinfected to eliminate any disease-causing organism. The pens were allowed to dry for 5 days before introducing the bucks. The bucks were kept in individual pens measuring 1.5m X 1.5m X 4m (width x length x height). The bucks were vaccinated against PPR and pasteurellosis and treated against internal and external parasites with ivemectin injection based on individual body weight. Proper sanitation was maintained during the experimental period. The bucks were fed for adaptation period of fourteen (14) days to enable them adjust to the diets and confinement before data collection.

Experimental Design

Twenty five (25) bucks with average body weight of 18.25-19.00 kg were used for the study. The bucks were purchased from Graba Chede cattle market in Bali Local Government Area, of Taraba State. The bucks were balanced for weight and divided into four (4) groups and each group of four (5) bucks was randomly assigned to one of the treatments in a completely randomized design (CRD). The study lasted for a period of 12 weeks (84 days).

Collection and Preparation of Feed

The *Afzelia africana* leaves and Gmelina bark were harvested within Federal Polytechnic Bali campus and were allowed to wilt before feeding to the bucks daily.

Treatments /Experimental diets

Five (5) treatments consisting of fresh bark of *Gmelina arborea* and *Afzelia africana* leaves were used. *Afzelia africana* leaves were given *ad libitum* as the basal diet, while Gmelina bark was fed at the rate 0, 100, 150, 200 and 250 g/head/day in treatments 1, 2, 3, 4 and 5, respectively.

T_1- *Afzelia africana* leaves only (control)

T_2- *Afzelia africana* leaves + 100g of Gmelina bark /head/day

T_3- *Afzelia africana* leaves + 150g Gmelina bark /head/day

T_4- *Afzelia africana* leaves + 200g of Gmelina bark /head/day

T_5- *Afzelia africana* leaves +250g Gmelina bark/head/day

Feeding and Management

The basal diets was fed *ad libitum* twice daily at 7:00 am and 4:00 pm, while Gmelina bark were fed at the rate of 0, 100, 150, 200 and 250 g/head/ day in treatment 1, 2, 3, 4 and 5, respectively. Clean drinking water and mineral salt lick were provided *ad libitum* throughout the experimental period. The bucks were allowed to fast over-night and weighed once weekly to determine their live weight change.

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Carcass characteristics

At the end of the experiment, three (3) bucks were randomly selected from each treatment for carcass analysis based on average weight of the group. The goats were weighed and then starved overnight for 12 hours. The bucks fasting weight were recorded in the morning before slaughter. The goats were slaughtered by transversely cutting the trachea, oesophagus, large carotid arteries and jugular vein to ensure maximum bleeding (Mann, 1960). Carcass characteristics were determined by measuring the live weight of the representative goat before slaughtering. The slaughtered animals were dressed and cut into component parts. The dressed carcass is the part of the goat left after the removal of the head, feet, skin, kidneys and visceral organs. The weight of dressed carcass were expressed as a percentage of live weight to obtain the dressing percentage.

$$\text{Dressing percentage} = \frac{CarcassWeight(kg)}{liveweight(kg)} \times 100$$

Cut-up Parts

Each carcass was divided into the following anatomical parts; head, thigh/rump, neck, rib cage, loin and the weight of individual parts from each goats was taken and weighed using weighing balance.

Offal and organ measurements

The offal and organ components such as head, skin, legs, liver, heart, kidneys, intestine, spleen and abdominal fat were removed from individual carcass in all the treatment groups and were weighed using weighing balance and expressed as percentage (%) of slaughter weight.

Statistical Analysis

Data collected were subjected to analysis of variance appropriate to Completely Randomized Design (CRD) (Steel and Torrie, 1980). Significant differences among treatment mean were determined using least significant difference (LSD) (Steel and Torrie, 1980). Statistix version 8.0 was used for the analysis.

Table 1: Carcass Characteristics of Goats Fed *Afzelia africana* Leaves and varying Levels of Gmelina bark

	Levels of Gmelina arborea bark					
Parameters	**T_1(0 g)**	**T_2 (100 g)**	**T_3 (150 g)**	**T_4 (200 g)**	**T_5 (250 g)**	**SEM**
Fasting weight(kg)	24.90^{b}	26.45^{b}	32.49^{a}	34.63^{a}	33.86^{a}	1.07^{*}
Slaughter weight(kg)	23.92^{b}	25.26^{b}	31.10^{a}	33.34^{a}	32.41^{a}	1.21^{*}
Dressed weight(kg)	11.57^{b}	12.02^{b}	14.34^{a}	14.40^{a}	14.36^{a}	0.67^{*}
Dressing percentage	46.42^{a}	45.44^{a}	44.14^{ab}	42.24^{b}	42.41^{b}	1.15^{*}
Weight of cut-up parts (kg)						
Neck	0.60^{b}	0.73^{b}	1.37^{a}	1.43^{a}	1.42^{a}	0.10*
Rib	1.27^{b}	1.40^{c}	2.10^{b}	2.27^{a}	2.25^{a}	0.16*
Loin	1.00^{c}	0.83^{c}	1.33^{b}	1.67^{a}	1.66^{a}	0.09*
Forelimb	1.30^{c}	1.20^{c}	1.70^{b}	2.79^{a}	2.75^{a}	0.11*
Hind limb	1.33^{b}	1.47^{b}	2.47^{a}	2.73^{a}	2.71^{a}	0.19*

SEM = Standard Error of Mean, NS = Not Significant, * = Significant, a,b,c = Means on the same row with different superscript differs significantly ($P < 0.05$).

Table 2: Offals and Organ Weights of Bucks Fed *Afzelia africana* Leaves and Varying Levels of Gmelina Bark Express as Percentage of Slaughter Weight

	levels of Gmelina bark					
Parameters (%)	**T_1(0 g)**	**T_2 (100 g)**	**T_3 (150 g)**	**T_4 (200 g)**	**T_5 (250 g)**	**SEM**
Head	5.11	5.23	5.66	5.44	5.47	0.28^{NS}
Skin	5.16	5.14	5.36	5.44	5.41	0.41^{NS}
Legs	1.04^{b}	1.90^{a}	1.09^{b}	1.02^{b}	1.03^{b}	0.29^{*}
Abdominal Fat	0.43^{c}	1.33^{b}	1.16^{b}	1.92^{a}	1.86^{a}	0.15^{*}
Liver	1.86^{b}	2.44^{a}	2.63^{a}	2.78^{a}	2.83^{a}	0.11^{*}

Heart	1.78^{b}	2.01^{b}	2.22^{ab}	2.90^{a}	2.96^{a}	0.25*
Spleen	1.44^{b}	1.84^{a}	1.89^{a}	1.92^{a}	1.94^{a}	0.06*
Kidney	1.70^{ab}	1.31^{b}	1.33^{b}	2.26^{a}	2.30^{a}	0.21*
Small intestine	3.32^{a}	1.82^{b}	1.83^{b}	2.36^{ab}	2.34^{ab}	0.54*
Large intestine	1.09^{c}	1.88^{b}	2.52^{a}	1.22^{c}	1.20^{c}	0.09*
Rumen	3.81^{a}	2.00^{a}	2.19^{b}	1.70^{b}	1.72^{b}	0.22*
Reticulum	3.61^{a}	3.54^{a}	2.94^{a}	0.62^{b}	0.65^{b}	0.24*
Omasum	1.12	0.81	1.11	1.14	1.15	0.21^{NS}
Lungs	2.23^{a}	1.11^{b}	0.82^{b}	0.65^{b}	0.68^{b}	0.33*
Abomasum	2.76^{a}	1.99^{ab}	1.39^{b}	1.95^{ab}	1.94^{ab}	0.28*
Testis	1.23^{a}	0.82^{b}	0.59^{d}	0.56^{d}	0.66^{c}	0.06*

SEM = Standard Error of Mean, NS = Not Significant, * = Significant, a,b,c = Means on the same row with different superscript differ significantly ($P < 0.05$).

3. RESULT AND DISCUSSION

Carcass characteristics

The results of the carcass characteristics of bucks fed *Afzelia africana* leaves and varying levels of Gmelina bark is presented in Table 4. There were significant ($P < 0.05$) differences between treatments for all the parameters measured. Treatment (1) (control) and T2 (100 g GAB) had higher values (46.42 and 45.44 %, respectively) of dressing percentage (DP) but did not differ ($P > 0.05$) significantly from T3 (150 g GAB); T4 (200 g GAB) and T5 (250 g GAB) had the least (42.24 and 42.41 %) respectively. Fasting, slaughter, dressed weight, weight of the neck in T3, T4 and T5 were significantly ($P < 0.05$) higher than those fed other diets with similar values. T4 and T5 had the heaviest ($P < 0.05$) weight for rib, loin, forelimb and hind limb.

The values of dressing percentage obtained in the present study was slightly higher than the range of 35 – 40 % reported by others (World Bank, 1983; Steele, 1996; and Attah *et al*., 2004) but fell within the ranged of 45 – 49 %, reported by Hassan and Idirs (2002) and Jibir *et al*. (2012) for that recorded the least (1.86, 1.78 and 1.44 %, respectively). T1, T2 and T3 recorded the heavier weight of rumen than T4 and T5 with similar values. T1 (control), T2 (100 g GAB) and T3 (150 g GAB) had the heavier weight ($P <0.05$) of reticulum compared to T4 and T5. The weight of kidney were heavier ($P<0.05$) in T4 and T5 but did not differ ($P>0.05$) significantly from T1 (0 g GAB). However T1 (control) is similar to the other treatment groups. The weight of head, skin and legs in the present study were not affected by the level of treatments. Atti *et al.* (2000) reported that the weight of most non-carcass component (offal) depend more on weight at slaughter than on the level of treatments or chemical composition of the diets. Also Mahouachi and Atti (2005) reported that components with a high proportion of bone and low metabolic activity (head and legs) showed little variation when animals were subjected to different levels of feeding.

The weight of abdominal fat express as percentage of slaughtered weight were 0.43, 1.33, 1.16,1.92 and 1.86 % for T1, T2, T3,T4 and T5 diets, respectively. There were significant ($P<0.05$) differences of diets on fat deposition in the abdominal region. Bucks fed T2, T3, T4 and T5 diets had heavier abdominal fat compared to T1 diet. The values obtained for bucks fed T2, T3, T4 and T5 diets fell within the range of 1.2 – 2.6 and 0.72-2.6 % reported by (Ahamefule *et al*., 2005) and Ukpabi (2007), respectively in West African dwarf goats.

The results of the organ weights in the study revealed that weight of liver, heart, and spleen increased as the level of Gmelina bark increases in the diets. This agreed with the report of Martins *et al*. (2014) who reported that weight of non-carcass components, organs and viscera were heavier for animals fed *ad libitum*. The author further stated that the high dry matter intake could have led to further development of the stomach and liver to digest and metabolize greater amount of feed and nutrient in animals with high feed availability. The range of values, 1.86 – 2.83, 1.78 – 2.96, 1.44 – 1.94, 1.31 – 2.30 and 0.65 – 2.23 %, for liver, heart, spleen, kidney and lungs, respectively were higher than 2.15 – 2.23, 0.57 – 0.76, 0.17 – 0.20, 0.77 – 1.22 and 1.58 – 1.81 % for liver, heart, spleen, kidney and lungs, respectively reported by Victor *et al*. (2014) in west African dwarf goats fed *Panicum maximum* supplemented concentrate containing Bambara nut meal. The differences in the internal organs in the present study might be influence by the levels of crude fibre level of the diets, levels of anti-nutritional factors and also individual animal differences.

4. CONCLUSION

It can be concluded that 150 – 250 g /day/head supplementation of *Gmelina arborea bark* in the diet of growing goats offered *Afzelia africana* leaves as basal diet gave best carcass yield.

REFERENCES

[1] Anjaneyulu, A.S.R., Joshi, H.B., 1995. Carcass characteristics andcomposition of goat meat in Indian breeds – an overview. In: National Symposium on Production and Marketing ofGoat Meat, CIRG and ISSGPU, India.

[2] Ahamefule, F. O., Ibeawuchi, J.A and Ibe, S. N. (2005). Performance of West African Dwarf (WAD) bucks fed pigeon pea-cassava peel based diets. *Journal of Animal and Veterinary Advances* 4 (12):1010-1015.

[3] Atti, N., Noziere, P., Doreau, M., Kayouli, C. and Bocquier, F. (2000). Effects of underfeeding and refeeding on offal's weight in the Barbary ewes. *Small Ruminant Research* 38:37-43.

[4] Attah, S., Okubanjo, A.O., Omojola, A.B., and Adesehinwa, A.O.K. (2004) Body and carcass lines measurement of Goats slaughter at different weights. *Livestock Research for Rural Development* 16 (8) 2004.

[5] Dhanda, J.S., Taylor, D.G., McCosker, J.E., Murray, P.J., 1999. The influence of goat genotype on the production of Capretto and Chevon carcasses. 3. Dissected carcass composition. Meat. Sci. 52, 369-374.

[6] Devendra, C., Burns, M., 1983. Goat production in the tropics.Common Wealth Agricultural Bureaux, London, UK, pp 183.

[7] El Hag, M.G., El Shargi, K.M., 1996. Feedlot performance and carcass characteristics of local (Dhofari) and exotic (Cashmere) goats fed on a high-fibre by-products diet supplemented with fish sardine. Asian-Aust. J. Anim. Sci. 9, 398-396.

[8] Geay, Y., Bauchart, D., Hocquette, J.F., Culioli, J., 2001. Effect of nutritional factors on biochemical, structural and metabolic characteristics of muscles in ruminants, consequences on dietetic value and

[9] Hassan, W. A. and Idris, A. (2002). A rapid assessment of dressing out percentage for Red Sokoto goats. *Proceedings of Annual Conference of the Animal Science Association of Nigeria. ASAN*. IART, OAU, Ibadan, Nigeria. 7: 265-266.

[10] Jibir, M., Isa, A.M., Garba, S., Jibrila, I. and Omojola, A. B. (2012). Linear body measurement and slaughter characteristic of meat goats in the semiarid Zone of North-Western Nigeria. *Journal of Animal Science and Advance* 3(6): 297-303.

[11] Mann, I. (1960). Meat handling in under developed-countries. Food and Agriculture Organization, Rome, Italy.

[12] Mahouachi, M. and Atti, N. (2005). Effects of restricted feeding and re-feeding of Barbarian lambs: intake growth and non-carcass components. *Animal Science* 81:305-312.

[13] Martins, S. R., Chizzotti, M. L., Yamamoto S. M., Rodrigues R. T. S., Busato K. C. and Silva, T.S. (2014). Carcass and non-carcass component yields of crossbred Boer and Brazilian semiarid indigenous goats subjected to different feeding levels. *Tropical Animal Health and production* 46:647-653.

[14] Steel, R.G.D., and Torrie, J. H. (1980). Principles and procedures of statistics. A biometrical approach 2nd ed. McGraw-Hill book co. Neew York, USA.

[15] Steel, M. (1996) Goats. The Tropical Agricluturalist Series. *Macmillian press Ltd. London and Basingstoke.pp152.*

[16] Taraba State Dairy, (2008). Writing by Taraba State Government of Nigeria.

[17] Ukpabi, U. H. (2007). Evaluation of Mucuna Seed Meal based diets for goat's production in South Eastern Nigeria Ph. D dissertation. Michael Okpara University of Agriculture Umudike, Nigeria.

[18] Victor, O., Ahamefule, V. U., Ahiwe F. O., and Abstract J. I. (2014). Carcass yield, organ characteristics and economic of West African Dwarf bucks fed *Panicum maximum* Supplemented concentrate containing Bambara nut (Vigan subterranean) meal. *Journal of food Agriculture and Environment* 10 (4):18-24.

[19] World Bank (1983). *Sheep and Goats in Developing Countries: Their present and potential Role*. Winrock International, Morrilton Arkansas, U.S.A. 116 pp.