Concepts of Dairy & Veterinary Sciences

DOI: 10.32474/CDVS.2019.02.000146

ISSN: 2637-4749

Research Article

Growth Performance and Linear Measurements of Intact West African Dwarf Bucks Fed Varying Levels of Local Brewers' Dried Grain with Ber (Ziziphus Jujube) Leaves Basal Diet

Babale DM* and Augustine C

Department of Animal Production, Adamawa State University, Nigeria

***Corresponding author:** Babale DM, Department of Animal Production, Adamawa State University, Mubi, Nigeria

Received: March 30, 2019 **Published:** April 30, 2019

Abstract

The aim of this study was to evaluate growth performance of intact West African Dwarf bucks fed varying levels of local brewers' dried grain with ber (Ziziphus jujube) leaves basal diet. Twelve (12) West African Dwarf bucks with average age of Twelve (12) months weighing 13 (+_0.7) Kg were used for the experiment. They were subjected to four experimental diets consisting of ber leaves (Ziziphus jujube) as basal diet, supplemented with local brewers' dried grain at 50g, 100g, 150g and 200g designated as treatments T1, T2, T3 and T4 respectively. These treatments were replicated three times each. These diets were fed to the animals throughout the experimental period of 63 days. At the end of the experimental period, harness bags were used in collecting faecal droppings to determine apparent digestibility of the test diets. Data obtained were subjected to Analysis of Variance (ANOVA) using a Randomized Complete Block Design using SAS (2001). Where significant differences occurred among means, Duncan Multiple Range Test was used to separate them. Total weight gain, average daily gain, feed conversion ratios, and feed efficiencies were influenced by the proportions of roughage and concentrate taken. While the dry matter intake of the supplemental diet (BDG) differed significantly (P<0.01) across treatments, those of the basal feed were similar (P>0.05) across treatments. Final live weights (FLW) differed (P<0.01) significantly across treatments with treatment T4 (16.43 Kg) the highest and treatment T1 (15.38 Kg) the lowest. The results also revealed that average daily weight gain (ADG), dry matter intake as percent of live weight (DMI%LVW), feed conversion ratio (FCR), feed conversion efficiency (FCE) and dry matter digestibility were significantly (P<0.01) different across treatments. These parameters improved with increase in the levels of the supplemental diet. The diets were therefore suitable for fattening goats.

Keywords: Growth Performance; Linear Measurements; Intact West African Dwarf goats; Ber leaves and Brewers' dried grain

Introduction

For raising meat goats, one of the important factors in maintaining economic viability is how quickly and efficiently goats grow. High growth rate and efficiency decreases the time that it takes the animals to reach market weight, which in turn decreases the labor and feed cost associated with raising them [1]. Castration of food animals is a common management practice that imposes unnecessary pain and stress and may reduce performance (Hopkins-Shoemaker et al., 2004). Intact males have relatively greater muscle in the neck and forequarter than females or castrates. The presence of testicular hormones is related to greater muscle growth capacity in intact males (Arnold, 1997 as cited by Brandstetter, 2000). Castration is one of the management activities practiced in different parts of the country as castration in goats has an advantage of eliminating the strong male odor present in bucks. Un-castrated and sexually mature goats are difficult to sell, or they may have low market price because of their strong male taint. Castrations also affect growth and carcass composition (Solomon, 1991). Castrating yearling male sheep can reduce their growth capability and higher dressing percentages in castrated males than intact rams were reported (Demisse, 1988). Early castration has much greater effect on carcass quality especially on marbling degree than has latter castration and male kids not required for breeding should preferably be castrated at early ages, both to get good quality carcass and to prevent unwanted mating. The action and level of androgen differ at different ages and hence castration at different ages may produce different outcome. Claudete, et al. [2] reported that higher concentrate diet increases level of energy. With high proportion of soluble carbohydrates which are oxidized in the rumen, large amount of metabolic water is supplied to the animal. Therefore, even with little availability of water, even below requirement, animals will not have their performance impaired.

Animal protein consumption in Nigeria and other developing countries has been reported to be comparatively low Ayorinde and Aromolaran [3]. The average Nigerian consumes about 54 grams of protein per day, with 6.5 grams coming from animal sources. This is a far cry from the recommended daily protein intake of 80 grams with 28 grams derivable from animal protein FAO [4].This problem has generally been attributed to shortage of animal protein products which is responsible for the existing high price of animal products making them out of reach to an average Nigerian Akinmutimi et al. [5] Etuk et al. [6]. One of the ways of solving this problem is by directing efforts at promoting and encouraging production of prolific, indigenous animal species Ahamefule and Ibeawuchi [7]; Odoemelam et al. 2013. The West African dwarf goat is most prevalent in the hot humid forest zone of Southern Nigeria. Its relative tolerance to excessive humidity and trypanosomiasis, both of which are important factors in animal production in a forest zone has singled it out as a breed of choice in Southern Nigeria Odoemelam [8]. The West African dwarf goat is early maturing, prolific and a non-seasonal breeder Osuagwuh and Akpokodje [9]; Akusu and Ajala [10]. Nutrition has been identified as one of the major factors responsible for poor performance of this indigenous breed Odoemelam, et al. [11]. The animals are exposed to severe nutritional stress especially during the dry season when forage is scarce and of low quality Agishi [12]; Lamidi, et al. [13]. To improve on the productivity of this breed and hence the animal protein intake of the average Nigerian, it becomes necessary to supplement the seasonal fodder fluctuations of natural pasture with concentrates. However, the escalating price of conventional feedstuffs as a result of competition between man, industries and livestock Ukachukwu [14]; Esonu, et al. [15]makes this difficult. Efforts by earlier researchers to test non-conventional, unexploited novel legumes Udedibie and Carlini [16]; Ukachukwu [14], on livestock in Nigeria are a welcome approach to the development of the subsector.

Materials and Methods

Study Site

The experiment was conducted at the Livestock Teaching and Research Farm of the Faculty of Agriculture, Adamawa State University Mubi, Nigeria. Mubi is located in the Northern part of Adamawa State. It lies on Latitude 90o11I north of the equator and Longitude 13o45I east of the Greenwich Meridian at an altitude of 696m above sea level. It is bounded in the South and East by Republic of Cameroun. The State has a land area of 4,728.77m^2 and population of 245,460 (Saidu and Gadiga, 2004), it is situated in the Sudan Savanna zone of Nigeria. The vegetation type is best described as Combretacious woodland savanna (Areola, 1983) which consists of grasses or weeds and shrubs collectively making 70% of the entire vegetation. Some of these grasses, weeds and shrubs are used as animal feeds. The area has two distinct seasons; Rainy season lasts for four (4) months and dry season that lasts for eight (8) months. Annual rainfall ranges from 700-900mm with highest peak in August. The area has minimum temperature of 12.70C in January and maximum of 370C in April (Adebayo, 2004).

Sources of feeds

Feeds were obtained from two different sources in and around Mubi environs. The ber (Ziziphus jujube) leaves were obtained from the wild by lopping the trees and collecting the leaves and bagging after drying under the shade. Local Brewers' dried grain was bought from the local beer brewers.

Experimental animals and management

The experimental animals were bought from local markets in and around Mubi and Michika Local Government area, Adamawa State, Nigeria. Twelve (12) West African Dwarf bucks with average age of Twelve (12) months weighing about 13 (+_0.7)Kg were used for the experiments. The animals were then individually housed in wooden pens measuring 1.50m^2 floor spaces and 1.50m heights. The floor was made of concrete and covered with wood shavings to conserve heat and absorb animal urine. All the animals were dewormed, treated against ectoparasites; Beranil was used against hemoparasites and antibiotics were administered. At the end of the adaptation period of one week after healing from castration, they were tagged and randomly allocated to different experimental diets. They were weighed to obtain initial weights and balanced for the weights before embarking on data collection. There were four (4) treatments each replicated three times making twelve (12) experimental animals.

Experimental Diets

The experimental diets consisted of ber leaves (Ziziphus jujube) as basal diet, supplemented with local brewers' dried grain at 0g, 100g, 150g and 200g designated as treatments T1, T2, T3 and T4 respectively as indicated in Table 1. These diets were fed to the animals throughout the experimental period of 63 days. At the end of the experimental period, harness bags were used in collecting faecal droppings to determine apparent digestibility of the test diets.

Table 1: Composition of experimental diets.

	TREATMENTS			
Feeds	T1	T2	T3	T4
BDG (g)	0	100	150	200
BL	ad lib	ad lib	ad lib	ad lib
Salt (NaCl) %	2	2	2	2

Parameters determined

Parameters determined were proximate compositions of experimental diets and faeces, dry matter intake (DMI), live weight, live weight changes and Digestibility. These were used to determine growth performance, digestibility of treatment diets, feed conversion ratios and feed efficiencies. Proximate compositions of experimental diets and faeces were determined using the methods described by (A.O.A.C, 2008). Daily dry matter intake (DMI) was obtained by finding the differences between the daily feed offered and feed rejected. Daily weight changes were determined by weighing the animals every week, Weight change in a week divided by seven gave the average daily weight change. Apparent digestibility was obtained as the difference between dry matter intake and fecal output divided by dry matter intake times hundred. Dry matter intake as a percentage of live weight was obtained by dividing dry matter intake by the live weight of animal times hundred. Feed efficiency was calculated by dividing weight gain by feed intake.

Data analysis

Data obtained were subjected to Analysis of Variance (ANOVA) using a Randomized Complete Block Design using SAS (2001). Where significant differences occurred among means, Duncan Multiple Range Test (Duncan, 1955) was used to separate them.

Results and Discussion

While Table 1 shows the experimental diets, the chemical compositions of experimental diets are presented in Table 2. The crude protein levels of supplemental feed (brewers' dried grain BDG) being 19.61% and basal feed Ziziphus jujube (16.10 %) are high enough to meet the nutritional requirements of goats (Devendra and Mcleroy, 1992). However, the crude fiber levels are lower than that required by the animals. Bhatta et al. [17] reported that although fodder trees are often valuable sources of dietary protein and energy for livestock in semi-arid regions, maximum nutritional and economic benefits could be harvested, if used as supplement rather than as a sole feed. Ghulam, et al. [18] found that tree leaves successfully replaced 50% concentrate in the ration of growing goats. Table 3 shows the effects of the experimental diets on growth performance of the animals. While the dry matter intake of the supplemental diet (BDG) differed significantly (P<0.01) across treatments, those of the basal feed were similar (P>0.05) across treatments. Final live weights (FLW) differed (P<0.01) significantly across treatments with treatment T4 (16.43 Kg) the highest and treatment T1 (15.38 Kg) the lowest. The results also revealed that average daily weight gain (ADG), dry matter intake as percent of live weight (DMI%LVW), feed conversion ratio (FCR), feed conversion efficiency (FCE) and dry matter digestibility were significantly (P<0.01) different across treatments. These parameters improved with increase in the levels of the supplemental diet.The effects of the diets on linear measurements are presented in Table 4. The effects of the experimental diets on linear body measurements are presented in Table 4. With the exception of girth circumference (GC), all the parameters were significantly (P<0.05) affected by the experimental diets. For heights at withers (HW), heights at rump (HR), abdominal circumference (AC) and abdominal length (AL) parameters, treatment T4 had the highest being 49.23cm, 54.70cm, 67.44cm and 42.61cm respectively. Neck circumference was highest in treatment T2 (119.23 CM) with that of T3 (95.66cm) the lowest. These results are similar to those obtained by Babale et al. [19] when they fed Red Sokoto male goats replacement levels of corn cobs for maize bran with cowpea husk basal diet. Berge (2007) as cited by Babale et al. [20] reported that recent studies have shown that body measurements could serve either to supplement body weight as a measure of productivity or as predictor of some less visible characteristics in goats [21].

Table 2: Chemical Composition of experimental feeds.

Parameters	Brewers' dried grain (BDG)	Ber leaves (Ziziphus jujube)
Dry matter (DM) %	9	85.79
Crude protein (CP) %	19.61	16.1
Crude fiber (CF) %	15.82	11.04
Ether extract (EE) %	6.5	4.4
Ash %	9.2	9.2

Table 3: Chemical Composition of experimental feeds.

	TREATMENTS					
Parameters	T1	T2	T3	T4	SEM	SigLev
ILW (Kg)	13.01	13.3	13.45	13.81	0.23	NS
FLW (Kg)	15.38^{b}	15.79^{b}	16.06^{ab}	16.43^{a}	0.23	**
BDGI (g)	50^{d}	100^{c}	150^{b}	200^{a}	0.33	**
BLI (g)	386.19	407.72	449.23	425.36	5.34	NS
TDMI (g)	436.19^{d}	507.72^{c}	599.23^{b}	625.36^{a}	7.53	**
ADG (g)	51.86^{c}	71.41^{b}	86.76^{ab}	88.03^{a}	2.8	**
DMI%LVW (%)	2.89^{c}	3.29^{b}	3.90^{ab}	3.93^{a}	0.06	**
FCR	10.13^{a}	7.39^{b}	7.51^{b}	8.03^{a}	0.33	**

FCE	0.12^{b}	0.13^{ab}	0.15^{a}	0.14^{ab}	0.01	**
DMD (%)	55.97^{d}	69.15^{c}	72.84^{b}	76.64^{a}	1.03	**

abc: Means with different superscripts within a row are significantly different (P<0.05),

SEM: Standard Error of Means. ILW=Initial live weight, FLW=Final live weight, BDGI=Brewers' dried grain intake, BLI=Ber leaves intake, TDMI=Total dry matter intake, ADG=Average daily gain, DMI%LVW=Dry matter intake as percent of live weight, FCE=Feed conversion efficiency, FCR=Feed conversion ratio and DMD=Dry matter digestibility.

Table 4: Effects of diets on linear measurements of West African Dwarf goats.

TREATMENTS				PARAMETERS			
	HW	HR	GC	AC	AL	NL	NC
1	46.23b	50.39ab	53.14	61.67c	42.13a	15.66a	96.47b
2	45.66b	48.67bc	54.68	64.23b	39.57b	14.52b	119.23a
3	45.39b	47.93c	54.14	62.97cb	39.89b	14.70b	95.60b
4	49.23a	54.70a	53.74	67.44a	42.61a	15.01b	97.82b
SEM	0.48	0.43	0.35	0.41	0.34	0.12	0.25
Lev. Signif.	**	**	NS	**	**	**	**

abc: Means with different superscripts within a column are significantly different (P<0.05).

NB: HW=Height at withers, HR=Height at rump, GC=Girth circumference, AC=Abdominal circumference, AL=Abdominal length, NL=Neck length and NC=Neck circumference.

SEM: Standard Error of Means.

Conclusion and Recommendations

In conclusion, although feeding the basal diet only (T1) without supplementation gave some weight gain (51.86g) supplementation significantly improved weight gain T2 (71.41g) to T4 (88.03g). The linear body measurements were also positively affected by supplementation. Therefore, fodder tree leaves may supplement the existing feed resources for small as well as large ruminant and can help to bridge the wider gap between demand and supply of nutrients. Tree leaves may become a rich source of supplementary protein, vitamins and minerals and their use in ruminant to enhance microbial growth and digestion. These diets are therefore recommended for fattening goats.

References

1. Sahni KL, Chawla DS (2002) Crossbreeding of dairy goats for milk production. In Proceedings of the Third International Conference on Goat Production and Disease Tulsa USA p. 575-583.
2. Claudete MS, Gherman GLA, Bruna YSO, Augusto GA and Dermeval AF (2016) Performance and economic viability of feedlot sheep fed different levels of roughage, concentrate, and water. Semina: Ciências Agrárias, Londrina 37(3): 1595-1606.
3. Ayorinde IA, Aromolaran AB (2008) Economics of rabbit production in Abeokuta South L.G.A. Ogun State, Nigeria. Nigerian Journal of Animal Production 25: 100-105.
4. Food and Agricultural Organization (FAO) (2005) Food and Agricultural Organisation. Production year book. Rome, Italy. Report of a Technical Workshop, Rome, Italy, p 3-6.
5. Akinmutimi AH, Odoemelam VU, Abasienkong SF (2006) Effect of replacing maize with ripe plantain and yam peels in the diet of weaner rabbits. Journal of Animal Veterinary Advances 5(9): 737-740.
6. Etuk EB, Orih AG, Ohaji JN, Odoemelam VU (2011) Evaluation of soybean hulls in grower turkey diets. International Journal of Agriculture and Rural Development 13(2): 220-223.
7. Ahamefule FO, Ibeawuchi JA (2005) Milk yield and composition of West African Dwarf (WAD) does fed pigeon peal-based diets. Journal of Animal and Veterinary Advances 4(2): 991-999.
8. Odoemelam VU (2012) Evaluation of Bambara Nut Seed Meal based diets for Goat Production min South Eastern Nigeria. Ph.D Thesis. Michael Okpara University of Agriculture Umudike, Nigeria.
9. Osuagwuh AI, Akpokodje JU (2001) West African Dwarf (Fouta Djallon) goat. Causes of early mortality. International Goat and sheep Research 1: 303-309.
10. Akusu MO, Ajala OO (2000) Reproductive performance of West African Dwarf goats in the humid tropical environment of Ibadan. Israel Journal of Veterinary Medicine 55(20): 1-9.
11. Odoemelam VU, Ahamefule FO, Ibeawuchi JA, Ezeokeke CT (2014) Growth performance and carcass characteristics of West African Dwarf bucks fed Panicum maximum and bambara nut (Vignasubterrenea) seed meal supplemented diets. Nigerian Journal of Animal Production 41(1): 155-165.
12. Agishi EC (2005) Forage resources of Nigerian rangeland. In: small ruminant production in Nigeria. Eds Adu IF, Taiwo BBA, Osinowo OA, Alhassan WS Publication NAPRI, Zaria, Nigeria pp. 115-124.
13. Lamidi AA, Aina ABJ, Sowande SO (2010) Nutrient Digestibility and Nitrogen Balance in West African Dwarf goats fed blended diets for dry season production. Proceeding 35th Conference Nigerian Society for Animal Production, Ibadan. pp. 476.
14. Ukachukwu SN (2000) Chemical and Nutritive Evaluation of Mucunacochinchinensis(Lyon's bean) as an Alternative Protein Ingredient in Broiler Diets. Ph.D Dissertation. University of Nigeria, Nsukka Nigeria.
15. Esonu BO, Iheukwumere FC, Emenalom OO, Uchegbu MC, Etuk EB (2002) Performance, nutrient utilization and organ characteristics of broilers fed Microdesmuspuberula leaf meal. Livestock Research for Rural Development 14(6): 1.
16. Udedibie ABI, Carlini CR (2008) Questions and answers to edibility problems of Canavalia Ensiformis seeds: A review. Animal Feed Science and Technology 7: 95-106.

17. Bhatta R, S Vaithiyanathan, NP Singh, AK Shinde, DL Verma (2005) Effect of feeding tree leaves as supplements on the nutrient digestion and rumen fermentation pattern in sheep grazing on semi-arid range of India - I. Small Ruminant Research 60(3): 273-280.

18. Ghulam H, Mohammad S, A Hameed (2013) Mineral Composition of Local Tree leaves for feeding sheep and Goats in Kohat District of Khyber Pakhtunkhwa. Sarhad Journal of Agriculture 29(1): 2013.

19. Babale DM, Kibon A, Yahaya MS (2015) Performance and linear body measurements of Red Sokoto male goats on replacement levels of corn cobs for maize bran with cowpea husk basal diet. Net Journal of Agricultural Science 3(2): 35-40.

20. Babale DM, Abaya HY, Hussein U, Gworgwor Z (2018) Relationship between liveweights, linear body measurements and cost prices of small ruminants sold in and around Mubi environs, Adamawa State, Nigeria. Journal of Dairy Veterinary & Animal Research 7(6): 273- 277.

21. Wachukwu EN, Etuk IF (2013) Milk yield and composition of West African Dwarf (WAD) does fed Bambara nut meal-based diets. Nigerian Journal of Animal Science.

DOI: 10.32474/CDVS.2019.02.000146