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Full Length Research Paper

Growth performance of castrated West African Dwarf Bucks fed varying levels of local brewers' dried grain with Ber (*Ziziphus jujube*) leaves basal diets

Babale, D. M.[1]*, Gworgwor, Z.[2] and Yahya, M. M.[2]

[1]Department of Animal Production, Adamawa State University, Mubi, Adamawa State, Nigeria.
[2]Department of Animal Science and Range Management, Modibbo Adama University of Technology, Yola, Adamawa State, Nigeria.
*Corresponding author E-mail: babaled@yahoo.com

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This study was designed to determine the effects of feeding varying levels of local brewers' dried grain with Ber *(Ziziphus jujube)* leaves basal diet on the growth performance of castrated West African Dwarf bucks. Twelve West African Dwarf bucks with average age of twelve (12) months weighing about 13±0.7 Kg were subjected to four dietary treatments consisting of ber leaves (*Ziziphus jujube*) as basal diet, supplemented with local brewers' dried grain at 50 g, 100 g, 150 g and 200 g designated as treatments T_1, T_2, T_3 and T_4 respectively. The parameters determined were proximate compositions of experimental diets and feces, dry matter intake, 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 feces were determined. 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 differed significantly ($P<0.05$) across treatments, those of the basal feed were similar ($P>0.05$) across treatments. Final live weights differed ($P<0.05$) significantly across treatments with treatment T_4 (16.43 Kg) the highest and treatment T_1 (15.38 Kg) the lowest. The results also revealed that average daily weight gain, dry matter intake as percent of live weight, feed conversion ratio, feed conversion efficiency and dry matter digestibility were significantly ($p<0.05$) different across treatments. These parameters improved with increase in the levels of the supplemental diet. The study concluded that the diets may be used to supplement the existing feed resources for small ruminant and can help to bridge the wider gap between demand and supply of nutrients.

Keyword: Ber leaves, brewers, dried grain, castrate, growth performance, West African Dwarf goats

INTRODUCTION

Goats are basically browsers, which feed on green leaves and pods of trees and thorny bushes. They are very efficient in digesting fibrous feeds and can make use of agricultural by-products. Their ability to feed hardy roughages makes them withstand harsh environments and climatic variability. Goats can be reared under

intensive and extensive systems. However, if the feed is deficient in required nutrients, their growth and production will get affected (Rata, 2013).

Majority of goats are raised in crop-cattle-goat poultry farming systems. Farmers consider goat raising as profitable due to less investment, care and generation of secondary cash income. Availability and accessibility of forages determines their sustenance and potential productivity in the present farming situation (Ocheja *et al*., 2016).

The provision of adequate nutrition to ruminants has been identified as one of the biggest management problems faced by stock owners in the tropical parts of the world especially during the long dry season (Lufadeju and Lamidi, 2003). Grasses which are the most abundant basal feed for ruminants most of the time dry up during the long dry season or become dormant (Lakpini, 2002). In Nigeria, this problem is very pronounced in the savannah and rain forest zones where small ruminants are tethered to prevent destruction of crop farms. The resultant effect of which is low dry matter intake of forages by animals resulting from high moisture content of the forages. During the dry season available herbage are of low quality and crop residue availability often exceed animal requirement so much so that the excess is either burnt or allowed to decompose (Ratta, 2013). This seasonal variability in the quality and quantity of natural forages therefore results in annual cyclical pattern of live weight gains and losses with incredibly high losses, the slow improvement in crop yield and competition between humans and animals for the available grains and tubers make nutritional requirements at reasonable cost difficult to achieve since a viable livestock industry is dependent on agro products, consequently animals are unable to meet both protein and energy requirements (Speedy and Pugliese, 2002).

Trees and shrubs have provided valuable forage to herbivorous animals since the time of their domestication especially in arid regions where cultivable land is limited, fragmented and predominantly used for grain crops. Tree foliage has become a significant feed source and is considered as fodder bank that continuously supply fodder round the year and significantly contribute to filling feed gap during dry periods in feed resource limited regions of the world (Gutteridge and Shelton, 1998). Bhatta *et al.* (2005) 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. It is also reported that in arid and semi-arid zones like those of the Sahel, tree feed resources growing near villages, roadsides and communal lands contribute up to 80% of the protein during the dry spells (Speedy and Pugliese 2002).

Ber leaves especially those of *(Ziziphus mauritania)* are good source of fodder for desert animals such as sheep, goat, camel and cattle. In arid regions, it is more popular because of its ability to grow and regenerate quickly even under environmental stress (Meghwal *et al*., 2007). The leaves are rich in protein and minerals. It provides sufficient leaf biomass which can be utilized as fodder in lean period and also suitable for hay and silage for goat as it contains 11-13 percent crude protein (Tewatia and Khirwar, 2002).

Castration of food animals are 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 *et al*., 1997 as cited by Brandstetter *et al*., 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 *et al*., 1991). Castrating yearling male sheep can reduce their growth capability and higher dressing percentages in castrated males than intact rams were reported (Demisse *et al*., 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 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. Information on growth performance of castrated West African Dwarf bucks fed varying levels of local brewers' dried grain with ber (*ziziphus jujube*) leaves basal diet in Mubi region, Nigeria is scanty. The research was therefore carried out to bridge this gap.

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 90°11^{l} north of the equator and Longitude 13°45^{l} east of the Greenwich Meridian at an altitude of 696 m 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 700-900 mm with highest peak in August. The area has minimum temperature of 12.7°C in January and maximum of 37°C in April (Adebayo, 2004).

Sources of feeds

Feeds were obtained from two different sources Mubi. 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 castrated using burdizzo, then individually housed in wooden pens measuring 1.50 m^2 floor spaces and 1.50 m 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 external parasites; Beranil was used against haemoparasites 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 50 g, 100 g, 150 g and 200 g designated as treatments T_1, T_2, T_3 and T_4 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.

Parameters determined

Parameters determined were proximate compositions of experimental diets and feces, 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 feces were determined using the methods described by (AOAC, 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 by finding the difference between dry matter intake and fecal output with the result 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) at ($p<0.05$) 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

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, 1995). However, the crude fiber levels are lower than that required by the animals. Bhatta *et al.* (2005) 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.* (2013) found that tree leaves successfully replaced 50% concentrate in the ration of growing goats.

Effects of the experimental diets on the growth performance of castrated West African Dwarf goats are presented in (Table 3). The results reveal that, initial live weights which had ranges of 13.01 – 13.81 Kg did not differ ($p>0.05$) significantly across treatment. This was because the animals were initially balanced on weight bases among treatments. However, final live weights (FLW) which ranged from 15.38 - to 16.43Kg, average daily gain (ADG) 51.86 to 88.03g, and feed conversion ratios of 7.39 to 3.24 and feed conversion efficiencies of 0.12 to 0.15 were significantly ($P<0.05$) affected by the

Table 1. Composition of experimental diets

Feeds	Treatments			
	T_1	T_2	T_3	T_4
BDG (g)	50	100	150	200
BL	*ad lib*	*ad lib*	*ad lib*	*ad lib*
Salt (NaCl) %	2	2	2	2

NB: BDG=Brewers' dried grain, BL=Ber leaves, and T_1 to T_4=Treatments.

Table 2. Chemical composition of experimental feeds.

Parameters	Brewers' dried grain (BDG)	Ber leaves *(Ziziphus jujube)*
Dry matter (DM) %	9.00	85.79
Crude protein (CP) %	19.61	16.10
Crude fiber (CF) %	15.82	11.04
Ether extract (EE) %	6.50	4.40
Ash %	9.2	9.2

Table 3. Effects of diets on growth performance of castrated West African Dwarf bucks.

Parameters	Treatments				SEM	SigLev
	T_1	T_2	T_3	T_4		
ILW (Kg)	13.01	13.30	13.45	13.81	0.23	NS
FLW (Kg)	15.38^{b}	15.79^{b}	16.06^{ab}	16.43^{a}	0.23	**
DMI (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}	2.80	**
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, DMI=Dry matter intake, ADG=Average daily weight gain, DMI%LVW=Dri matter intake as percentage of live weight, FCR=Feed conversion ratio, FCE=Feed conversion efficiency, DMD=Dry matter digestibility.

dietary treatments. The average daily gain was similar to 66.90g obtained by Makun *et al*. (2008) for Red Sokoto goats. Similarly, daily dry matter intakes ranging from 436.19 to 625.36 g were also significantly (P<0.05) different among treatments. The differences recorded may be due to the differences in animal species used, diets and initial ages of the animals since the older the animal the lower the rate of growth. The daily concentrates, total feed intakes and feed conversion ratios obtained in this study are at variance with earlier findings of Jokthan *et al*. (2013). These were similar to those of Babale *et al*. (2018) who obtained ADG range of 63.33 to 94.94 g and feed conversion efficiency range of 12.98 to 22.23 when they fed fattening goats varying levels of maize bran with groundnut haulms as basal diet. They concluded that supplementing groundnut haulms with maize bran gives a better weight gain and hence gives a better profit and then recommended the diets as feed supplement for commercial goats' production.

The apparent dry matter digestibility (DMD) ranges were 55.97 to 76.64 % with that of treatment T_1 (55.97) fed the lowest quantity of supplement, the lowest and highest T_4 (76.64%) fed the highest quantity of supplement the highest.

Conclusion

Based on the results obtained, ranges of average daily gains (51.86-88.03g), dry matter digestibility (55.97-76.64%), feed conversion ratios (7.39-10.13) and feed conversion efficiencies (0.12-0.15) obtained shows that the fodder tree leaves used can 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. All the treatments can be profitably applied the ruminants fattening.

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Authors` Declaration

We declare that this study is an original research by our research team and we agree to publish it in the journal.

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