RESEARCH ARTICLE

Sokoto Journal of Veterinary Sciences

(P-ISSN 1595-093X: E-ISSN 2315-6201)

http://dx.doi.org/10.4314/sokjvs.v22i2.4

Madziga *et al./Sokoto Journal of Veterinary Sciences*, **22**(2): 102 - 110.

Growth performance of three Nigerian breeds of sheep fed different types of hay

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Publication History:
Received: 15-10-2023
Revised: 04-02-2024
Accepted: 08-02-2024

Abstract

It was hypothesised that hay type will affect feed intake and growth with significant interactions between breeds of sheep. Ten rams aged between 18 and 24 months and weighing 24.70, 25.50 and 24.75 each of Balami, Uda and Yankasa indigenous breeds of sheep in a complete randomised design with a 2 x 3 factorial arrangement were used. The rams were fed *Brachiaria decumbens* or *Digitaria smutsii* hay supplemented with concentrate at 1 % of their body weight. The trial lasted 90 days after 14 days adjustment period to the diets. Individual animal basal and supplementary concentrate feed intakes were recorded daily and liveweights were measured fortnightly. Data were analysed using SAS. Results of breed effect showed that Balami and Uda had significantly ($P<0.05$) higher values for most of the parameters measured while the effect of hay showed that rams fed *Digitaria smutsii* hay had significantly ($P<0.05$) higher feed intake and weight gain than their counterparts fed *Brachiaria decumbens* hay. The interaction effect also revealed that Balami had significantly ($P<0.05$) higher weight gain and feed conversion ratio while Yankasa had the lowest ($P>0.05$). It is therefore concluded from this study that feeding *D. smutsii* hay to rams gave better results than feeding *B. decumbens* hay. Hence, it is recommended that feeding *D. smutsii* hay can be effectively used in a feedlot production system for growing rams during a 90-day feedlot period. Furthermore, the detected interaction effect of hay type level with breed permits working choices of improving the ability to grow rams.

Keywords: Breed, Concentrate, Feedlot, Growth, Hay type, Interaction

Introduction

The population of sheep which is estimated to be 53,061,143 million in Nigeria makes sheep the second most important species in the country after goats and cattle (Abubakr, 2022). In Nigeria, sheep are kept primarily for meat production and they contribute about 11 % to the total meat supply in the country (Adu & Ngere, 1979). Feedloting is referred to as the intensive finishing of animals prior to slaughter in a confined yard using concentrated energy, protein, and mineral diet. Feeding methods for fattening animals are aimed at modifying not only the lean-to-fat meat ratio (Yang *et al*., 2002) but also the percentage and mutual proportions of carcass chemical composition. The low productivity in ruminants and sheep inclusive is mainly associated with a lack of sufficient good quality feeds (Adamu *et al*., 1993). Sheep are raised extensively from natural pastures where they experience long periods of feed scarcity. In addition, the nutrients supplied from seasonal natural pastures are inadequate for maintenance and growth resulting in poor growth rates and prolonged periods to market slaughter weight and maturity Shirima *et al*. (2014). This type of management system might render sheep keeping less

economical. One of the alternatives to address this problem is to develop a system of finishing sheep on quality hay at a relatively shorter time before sending them to the market.

Sheep growth performance, yield, and quality of carcass and non-carcass parts under feedlot conditions may differ depending on factors such as breed and age of the animal when entering the feedlot or the duration of stay in the feedlot as well as the type and amount of diet used during fattening (Shirima *et al.*, 2014). Forage is the most widely available low-cost feed for ruminant animals during the wet season in the tropics and they rely on them almost exclusively for nutrition since it sustains their production (Aderinola *et al.*, 2007). Grasses are the most abundant forage species due to their aggressive growth and as they mature especially during the dry season, their productivity declines sharply as they tend to lose their nutrients (Aderinola *et al.*, 2007). Their crude protein usually drops as low as 3 % which is below the critical level of 7 % recommended by Minson (1982) and this affects the productivity of the animals. Among the several grasses used in the National Animal Production Research Institute (NAPRII), Shika, Zaria, *Brachiaria decumbent (Stapf) and Digitaria smutsii* (Stent) are the most predominantly *used* due to their adaptation to tropical and subtropical climates and high productivity. However, the wide variety of cultivars available can show considerable variations in productivity and nutritional value all of which can interfere with animal performance.

There is a dearth of information on the measurements of the effect of different dry forages on the performance of sheep that exist in the literature. This study, therefore, addressed the following questions. 1) Will growing rams on *Brachiaria* or *Digitaria* alter their feed intake? 2) Can there be any breed difference in weight gain of rams fed *Brachiaria* or *Digitaria* hays? Hence, the aim of this study was to evaluate the effect of *Brachiaria decumbens* or *Digitaria smutsii* hay on feed intake and weight gain of Balami, Udah, and Yankasa rams raised under the feedlot production system.

Materials and Methods

Study site

The study was conducted at the National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Shika–Zaria. Shika is situated in the Northern Guinea Savannah Zone of Nigeria between latitudes 11° 8′ 19.56″N and longitudes of 7° 45′51.22″E at an elevation of 640 meters above sea level. The zone is characterized by a rainy season that starts in April or May, stabilizes in June, and ends in October. The mean annual rainfall is 1100 mm. Maximum temperature ranges from 27°C - 35.0°C recorded in April while the lowest mean minimum temperature of 11.5°C occurs in December–February and the relative humidity is about 72% (IAR, 2017). The dry season begins with a period of dry cool weather called harmattan that lasts from October to January. The harmattan is followed by dry hot weather from March to May.

Animals and experimental design

Ten rams aged between 18 and 24 months each of Yankasa, Balami, and Uda indigenous breeds of sheep procured from the local markets at Achida and Giwa in Sokoto and Kaduna states, respectively, and were used in a completely randomised design with a 2 x 3 factorial arrangement to evaluate the effect of feeding *Brachiaria decumbens* or *Digitaria smutsii* hays on intake and growth performance. The animals were grouped based on their breeds which served as treatments with five animals each serving as a replicate. The statistical model below was used:

$Y_{ijk} = \mu + a_i + b_j + ab_{ij} + e_{ijk}$

Where; Y_{ijk} = dependent variable, μ = Overall mean, a_i = fixed effect of the i^{th} hay (i=1, 2), b_j = fixed effect of the j^{th} breed (j=1, 2, 3), ab_{ij} = interaction effect of breed and hay type, e_{ijk}= random error.

Experimental diets

Digitaria smutsii and *Brachiaria decumbens* hay harvested from sown pastures and concentrate mixture were used as treatment ration. The concentrate was a mixture of cottonseed cake (39.19 %), maize (37.87 %), maize offal (18.94 %), bone meal (2.50 %) and table salt (1.50 %) (Table 1). The concentrate ingredients (cottonseed cake, maize, maize offal, bone meal, and table salt) obtained from the Institute were compounded and stored properly at the experimental site.

Management of animals

On arrival from the market the next day, the animals were ear-tagged and isolated in quarantine for 30 days. During the quarantine period, animals were drenched with a broad spectrum anthelminthic (Albendazole®) against internal parasites and treated with acaricide (Diazzinole®) against external parasites. They were also covered with long-acting antibiotics as prophylaxis against possible infection. Following the quarantine period, the initial body weight of all animals was measured. The animals were grouped

Table 1: Chemical composition (%) of *B. decumbens, D. smutsii* hay, Maize (38%), maize offal (18.9%), cottonseed cake (39.1%), and mineral mixture (2.50%), common salt (1.50%) and experimental concentrate

Nutrients (%)	Ingredients					Concentrate
	B. decumbens	*D. Smutsii*	Maize	Maize offal	Cotton seedcake	
Dry Matter	91.67	91.63	91.18	91.15	91.23	92.78
Organic Matter	81.26	83.90	86.76	81.87	89.01	81.23
Crude Protein	4.56	5.76	8.31	11.69	28.58	13.63
Ether Extract	3.85	4.05	8.03	11.03	11.05	17.15
Crude Fibre	64.08	62 .89	45.21	53.92	50.21	27.40
ADF	45.35	43.12	43.27	34.99	42.35	45.95
NDF	44.09	42.21	48.01	45.21	47.23	56.27
Nitrogen free extract	10.42	15.01	18.61	14.46	6.31	22.00
Ash	8.76	8.92	11.02	10.05	4.98	11.55
ME (MJ/kg DM)	9.31	9.81	10.69	10.88	10.51	11.40
Cost ($ per kg)	0.07	0.07	0.15	0..06	0.07	0.37

The ME values of the experimental feed ingredients were calculated as per Maff (1975) as follows: ME= (MJ/kg DM) = 0.012CP + 0.031EE + 0.005CF + 0.014NFE

ME = Metabolisable Energy, MJ/KJDM = Mega joule per kilo joules dry matter

based on their breed and this served as treatment were fed the concentrate at 1 % of their body weight and the hay fed *ad libitum.*

After an initial adjustment of 14 days, records were taken of the quantity of feed offered and the refused to determine voluntary feed intake expressed in kg x hd^{-1} x d^{-1}, % of BW x d^{-1}, and g x kg^{-1} of $BW^{0.75}$ (Biehler, 2020) Rams were weighed every fortnight and the quantity of feed offered adjusted accordingly. All animals had free access to fresh clean water *ad libitum,* every day.

Chemical analysis

The dried samples of the feeds (concentrate and hays) were ground with a Christy and Norris mill (Glen Creston Type-86-001 Micro Hammer Mill3000PSI Pressure Homogeniser in Caerphilly. United Kingdom) to pass through 1mm sieve and further dried at 105 ^{o}C for one hour to determine the dry matter (DM), ash and nitrogen (N) following the procedure of AOAC (2000). Crude protein (CP) was determined by multiplying N by a value of 6.25. Neutral detergent fibre (NDF) and acid detergent fibre (ADF) were analysed according to the procedure of Van Soest *et al.* (1991). Chemical analysis was also carried out on the faecal samples according to procedures of the Association of Official Analytical Chemists (2000). Neutral detergent fibre (NDF) and acid detergent fibre (ADF) in the faeces were also determined according to the procedure of Van Soest (1991). Urine samples were analyzed for nitrogen content using the Kjeldahl procedure (AOAC, 2000). The digestibility coefficient and nitrogen retention were determined using the formula according to Biehler (2020) below: Apparent digestibility =

$$\frac{(Nutrient\ intake - a\ nutrient\ in\ faeces) \times 100}{Nutrient\ intake}$$

The feed intake of the rams was restricted to just 90 % during the seven days' collection to reduce wastage and minimise orts.

Statistical analysis

All data were subjected to a two-way analysis of variance (ANOVA) of the Statistical Analysis System software version 9.2 (SAS, 2002) according to the following model: $Y_{ijk}= \mu+ a_i + b_j + ab_{ij} + e_{ijk.}$ Where; Y_{ijk} = dependent variable, μ = Overall mean, a_i = fixed effect of the i^{th} hay (i=1, 2), b_j = fixed effect of the j^{th} breed (j=1, 2, 3), ab_{ij} = interaction effect of breed and hay type, e_{ijk}= random error. Duncan's Multiple Range Test (Duncan, 1955) was used to separate mean differences, with the level of significance declared at $P<0.05$.

Results

The chemical composition of the hay (*B. decumbens* and *D. smutsii),* maize, maize offal and cottonseed cake in as well as the chemical composition of the concentrate is presented in Table 1.

The independent effect of breed on the performance of three breeds of sheep fed *B. decumbens* or *D. smutsii* hay is presented in Table 2. The result shows

significant (P<0.05) differences among the three breeds of sheep in hay intake, daily feed intake, weight gain, final body weight, and average daily weight gain. The average daily weight gain showed that Balami and Uda had similar and significantly (P<0.05) higher values (0.16 kg) and (0.15 kg), respectively than Yankasa (0.13 kg). Balami and Uda had similar average daily feed intake (1.06 and 0.99 Kg) which was significantly (P<0.05) higher than Yankasa (0.88 Kg) however, the value of intake per metabolic weight was not significant (P>0.05) among them. Average weight gain followed the same trend with Balami (14.80 Kg) and Uda (13.90 Kg) having significantly (P<0.05) higher values than Yankasa (11.70 Kg).

In Table 3, the independent effect of hay type on the performance of the three breeds of sheep is presented. There was a significant (P<0.05) difference in daily hay intake where *D. smutsii* hay was consumed more (9.3 %) than *B. decumbens*. Average daily feed intake was also significantly (P<0.05) higher in rams fed *D. smutsii* hay than in those fed *B. decumbens* hay. A similar pattern of significant differences (P<0.05) existed for final body weight, total weight gains, and average daily weight gains where rams on *D. smutsii* hay had significantly (P<0.05) higher values (39.33, 14.3,7 and 0.16 Kg) for final body weight, total weight gain, and average daily weight gains respectively than the rams on *B.*

Table 2: Effect of breed on feed intake and growth performance of Balami, Uda and Yankasa rams fed *B. decumbens* or *D. smutsii* hay

Parameter	Breeds		
	Balami	Uda	Yankasa
Daily Con. Intake (Kg DM)	0.44±0.005[a]	0.40±0.004[b]	0.38±0.004[ab]
Daily Hay Intake (Kg DM)	0.62±0.007[a]	0.59±0.007[a]	0.49±0.005[b]
ADFI (Kg DM)	1.06±0.011[a]	0.99±0.011[a]	0.88±0.010[b]
Intake/Metabolic Weight ($WKg^{0.75}$)	0.09±0.001	0.09±0.001	0.08±0.001
Initial Body Weight (Kg)	24.70±0.274	25.50±0.283	24.75±0.275
Metabolic Weight ($WKg^{0.75}$)	11.08±0.123	11.35±0.126	11.09±0.123
Final Body Weight (Kg)	39.50±0.439[a]	39.40±0.438[a]	36.45±0.405[b]
Weight Gain (Kg)	14.80±0.164[a]	13.90±0.154[a]	11.70±0.130[b]
Average Daily Gain (Kg)	0.16±0.002[a]	0.15±0.002[a]	0.13±0.001[b]
Feed / Gain	6.62±0.074	6.60±0.073	6.77±0.075

[a, b] Means bearing different superscripts within the same row differ significantly (P<0.05), Kilogramme (Kg), Dry matter (DM), litre (l), Average daily feed intake (ADFI)

Table 3: Effect of hay type on feed intake and growth performance of Balami, Uda and Yankasa rams fed *B. decumbens* or *D. smutsii* hay

Parameter	Hay type	
	B. decumbens	*D. smutsii*
Daily Con. Intake (DM Kg)	0.39±0.004	0.42±0.005
Daily Hay Intake (DM Kg)	0.54±0.006[b]	0.59±0.007[a]
Average Daily Feed Intake (Kg)	0.93±0.010[b]	1.02±0.011[a]
Intake/Metabolic Weight ($W\ Kg^{0.75}$)	0.08±0.001	0.09±0.001
Initial Body Weight (Kg)	25.00±0.278	24.97±0.277
Metabolic Weight ($W\ Kg^{0.75}$)	11.18±0.124	11.17±0.124
Final Body Weight (Kg)	37.57±0.417[b]	39.33±0.473[a]
Weight Gain (Kg)	12.57±0.139[b]	14.37±0.160[a]
Average Daily Gain (Kg)	0.14±0.002[b]	0.16±0.002[a]
Feed / Gain	6.64±0.074	6.38±0.071

[a, b] Means bearing different superscripts within the same row differ significantly (P<0.05), Kilogramme (Kg), Dry matter (DM), litre (l), Average daily feed intake (ADFI)

decumbens hay (37.57, 12.57 and 0.14 Kg), correspondingly. In Table 3, the independent effect of hay type on the performance of the three breeds of sheep is presented. There was a significant (P<0.05) difference in daily hay intake where *D. smutsii* hay was consumed more (9.3 %) than *B. decumbens*. Average daily feed intake was also significantly

The effect of interaction between breed and hay type is presented in Table 4. Significant differences (P <0.05) existed among the breeds in most of the parameters studied apart from intake per $W^{0.75}$, initial weight, and $W^{0.75}$. Rams fed *D. smutsii* hay performed better than their contemporaries on *B. decumbens*. When Balami was fed *B. decumbens* hay, the final weight, weight gain, and average daily weight gain were 41.40, 15.80, and 0.18 Kg, respectively. These values increased to as high as 47.80, 22.8,0, and 0.25 Kg when *D. smutsii* hay was fed. The same parameters for Uda and Yankasa followed the same pattern as in Balami with *D. smutsii* eliciting significantly higher performance. When Balami rams were fed *D. smutsii* hay, concentrate intake, hay intake, and total dry matter intake were higher (P<0.05) than when their counterparts were fed *B. decumbens.* On the contrary, when Uda and Yankasa rams were fed *D. smutsii* hay, the values of concentrate intake, hay intake, and dry matter intake were similar (P>0.05) to those of their counterparts that received *B. decumbens*.

Discussion

The chemical compositions of the concentrate and the basal diet of *B. decumbens* and *D. smutsii* hay were sufficient to meet the nutritional requirements of growing and fattening sheep. The differences in the CP values between the maize offal used in earlier studies and the present one could be a result of differences in the varieties and soil fertility as well as the environments of the maize. Olorunnisomo *et al.* (2006) and Idowu (2011) reported higher CP of 12.7% and 12.69%, respectively. The NDF and ADF values were higher than 21.64% and 26.3% for ADF and NDF, respectively (Lamidi *et al*. 2008). The values of EE and OM were higher than the 4.40%, and 65.05% reported by Madziga *et al.* (2013) for EE and OM, respectively. However, the value of ash was lower than the 26.7% reported by Lamidi *et al*. (2008). The cottonseed cake used in this study had lower values of DM, OM, CP, and EE compared to 92.99%, 88.01%, 30.88%, and 11.05%, respectively reported by Lamidi (2005) and Lamidi *et al.* (2007). However, the values of ADF and ash were close to 42.35 and 4.98%,

Table 4: Interaction between breed and hay type on feed intake and growth performance of Balami, Uda and Yankasa rams fed *B. decumbens or D. smutsii* hays

	Hay type					
	B. decumbens			*D. smutsii*		
	Breeds					
Parameter	Balami	Uda	Yankasa	Balami	Uda	Yankasa
Daily Con. Intake (Kg DM)	0.43±0.005[b]	0.42±0.005[c]	0.39±0.004[d]	0.51±0.006[a]	0.43±0.005[b]	0.42±0.005[c]
Daily Hay Intake (DM Kg)	0.58±0.006[b]	0.56±0.006[b]	0.48±0.005[c]	0.68±0.008[a]	0.59±0.010[b]	0.50±0.006[c]
Average Daily Feed Intake (Kg)	0.99±0.011[a]	0.96±0.011[b]	0.85±0.009[c]	1.15±0.013[a]	0.99±0.011[a]	0.91±0.010[b]
Intake/Metabolic Weight ($W^{0.75}$)	0.09±0.001	0.08±0.001	0.08±0.001	0.11±0.001	0.10±0.001	0.10±0.001
Initial Weight (Kg)	25.60±0.295	25.40±0.282	24.40±0.271	25.00±0.278	25.00±0.278	24.50±0.272
Metabolic Weight ($W^{0.75}$)	11.38±0.126	11.31±0.125	10.97±0.122	11.18±0.124	11.18±0.124	11.01±0.122
Final Weight (Kg)	41.40±0.460[b]	32.60±0.362[d]	31.00±0.344[d]	47.80±0.531[a]	41.40±0.460[b]	37.60±0.418[c]
Weight Gain (Kg)	15.80±0.176[b]	7.20±0.080[c]	6.60±0.073[c]	22.80±0.253[a]	16.40±0.182[b]	13.10±0.146[b]
Average Daily Weight Gain (Kg)	0.18±0.002[b]	0.08±0.001[d]	0.07±0.001[d]	0.25±0.003[a]	0.18±0.002[b]	0.14±0.002[c]
Feed / Gain	5.50±0.061[a]	12.00±0.133[c]	12.14±0.135[c]	4.60±0.051[a]	5.50±0.061[a]	6.50±0.072[b]

[a,b,c,d] Means bearing different superscripts within the same row differ significantly (P<0.05), Kilogramme (Kg), Dry matter (DM),

respectively reported by Lamidi (2005) and Lamidi *et al.* (2007).

The values of DM, CF, EE, OM and ADF, respectively for *D. smutsii* were lower than 98.84% DM, 44.84% CF, 6.85% EE, 90.75 OM, and 48.75% ADF reported by Lamidi (2005) and Yashim (2014) although, the values of 5.86, 68.89 and 8.82 % for CP, NDF and ash respectively, were higher than those reported by Lamidi (2005) but comparable to the report by Madziga *et al.* (2013). The DM, OM, ND, and ADF of *B. decumbens* used in this study were lower than 96.13, 89.33, 7110 and 55.04, respectively reported by Goska *et al.* (2016). The values of CP, EE, and ash obtained however, were comparable to others (Lamidi, 2005; Madziga *et al.*, 2013; Goska *et al.,* 2016).

The variations observed in the values of the chemical composition of the feed ingredient in the current study as compared to those in the previous reports may have been due to differences in the year of production, method of processing and difference in the laboratory analyses of these materials. The difference observed from the present study and the previous ones with respect to the two hays may be due to the stage of plant growth and/or season of cutting (Ben Salem *et al*., 2002), site of sampling (Makkar & Becker, 1998), and/or proportions of foliage materials sampled (Ben Salem *et al*., 2002).

The slightly higher value of CP in *Digitaria* than *Brachiaria* (5.76 % vs 4.56 %, respectively) is in agreement with the report by Licitra *et al.* (1996), Paulson *et al.* (2008) and Schmidt *et al.* (2013) who stated that *Digitaria* had higher CP than *Brachiaria*. The value of NDF was lower for *Digitaria* compared to *Brachiaria* (42.21 % - *D. Smutsii* vs 44.09 % - *B. decumbens*). This is in support of the report by Buxton & Redfearn (1997) and Schmidt *et al.* (2013) who reported that *Digitaria* contains lower NDF concentration than *Brachiaria* because as fibre concentration decreased so did the proportion of fibre to cell soluble, resulting in higher digestibility.

The disparity in daily feed intake between ram breeds was found in the present study. The differences could be attributed to breed as Balami had the tendency to consume more feed than Uda and Yankasa breeds. This is in agreement with the works of Wildeus *et al*. (2007) and Ríos *et al*. (2011) who investigated the growth performance and carcass characteristics of Pelibuey (PB), Pelibuey x Katahdin (PB-KT) crossbred and Pelibuey x Dorper (PB-DP) hair lamb breeds in Mexico. Both groups of authors discovered that breed type had an effect on feed intake. Similarly, Cammack *et al*. (2005) concluded that under feedlot conditions, daily feed intake in growing lambs demonstrated sustainable genetic variation. A report on the effects of supplementation with oil and breed (Boujenane, 2015) on feed intake and growth responses of rams has been investigated comprehensively where oil supplementation improved feed intake and growth of supplemented rams above that of non-supplemented ones. In beef cattle, Schenkel *et al.* (2004) and Crowley *et al*. (2010) also found significant breed effects on feed intake.

The dissimilarity due to differences in gastrointestinal tract physiologic conditions observed in this study agrees with the report by Boujenane (2015) and the diversity in daily hay intake between breeds. Differences in feed intake and digestive efficiency have also been reported in small ruminants. Silva *et al.* (2004) and Silva *et al.* (2007) compared hair and wool sheep and found that the net protein requirements for body weight gain for hair sheep were higher than those of wool lambs. They also found that Hair sheep had higher nutrient consumption and utilisation efficiency than wool sheep. This is believed to be due to a greater quantity of urea transferred to the gastrointestinal tract and also due to their greater rumen protozoal populations (Hennessy *et al.,* 1995). This finding negates the report by Wildeus *et al.* (2007) in which a forage diet of alfalfa hay (*Medicago sativa*) was fed *ad libitum* to St. Croix, Katahdin and Barbados Blackbelly breeds of sheep and found no significant difference on daily intake between the breeds. Annett *et al.* (2011) also reported no interaction effects on animal intake and growth when either fat inclusion or lamb breed and their interaction were fixed experimental effects. However, Wachira *et al.* (2002) found a significant interaction between dietary fat supplementation and breed for daily feed intake.

Significant interactions between hay type and breed on ADG and feed conversion ratio observed in this study were in agreement with the reports by Holman *et al.* (2014) and Hegarty *et al.* (2006), who concluded that there were significant interaction effects between nutrition and genetic potential for animal performance. The significant interactions between hay type and breed on ADG and feed conversion are relevant because they indicate that animals from the same breed when fed different hay or diet will perform differently. This was the case when Balami rams fed *D. smutsii* hay had higher weight gain above their counterparts that received *B*. *decumbens* hay. Generally, the feed intake and weight gain of the three breeds improved when they were fed *D. smutsii* above those of them that were fed *B*. *decumbens* hay.

It was concluded from this study that rams fed *D. smutsii* hay had higher ADG which was 14.29% higher than for rams fed *B. decumb*ens. Furthermore, the breed was shown to affect the performance of the rams where Balami breed on *D. smutsii* hay outperformed the other breeds on both *D. smutsii* and *B. decumbens*. It is worth noting that the nutritional contents of the two types of hay vary, and Balami breed was more suited to *D. smutsii* hays. By aligning the breed with the appropriate hay type, farmers can optimize the nutritional intake of their sheep, ultimately leading to better weight gain and overall productivity. It is therefore recommended that *Digitaria smutsii* hay supplemented with concentrate mixture at 1% of body weight be fed to rams for efficient feed utilisation and faster growth rate.

Acknowledgement

The authors are grateful to the Executive Director and Management of the National Animal Production Institute, Ahmadu Bello University, Zaria for their support.

Funding

This research was partly funded by the National Animal Production Research Institute, Ahamdu Bello University, Shika–Zaria, Nigeria

Conflict of Interest

The authors declare that there is no conflict of interest.

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