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CARCASS COMPONENTS AND DRESSING PERCENTAGE OF THREE SHEEP BREEDS FED *BRACHIARIA DECUMBENS* OR *DIGITARIA SMUTSII* HAY

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ABSTRACT

Digitaria smutsii (Stent) or *Brachiaria decumbens (Stapf)* hay was utilized to assess the impact on carcass features and meat yield in thirty intact rams, ten of each breed of sheep (Balami, Uda, and Yankasa). An analysis of variance was performed on the data, and the Duncan test was used to compare the means at 5 % significance. Hay type had an impact on carcass yield, slaughter weight, and body weight. When compared to *B. decumbens* hay, rams fed *D. smutsii* hay produced larger weights of both hot and cold carcasses. Breed differences showed that Balami performed best, followed by Uda, and Yankasa performed worst in terms of carcass features and some organ weight. Animals grown on *D. smutsii* outperformed those raised on *B. decumbens*, according to the interaction effect. Animals reared on *D. smutsii* hay exhibited superior dressing % and rib eye area in comparison to those raised on *B. decumbens*. Compared to Balami, Uda, and Yankasa raised on *B. decumbens*, the dressing percentage of Balami on *D. smutsii* was greater by 2.21, 7.75, and 34.23 %, respectively. It was determined that Balami was the best animal and that animals given *D. smutsii* outperformed those fed *B. deumbens*. For a faster development rate and greater carcass production, farmers are advised to raise their animals on *D. smutsii* hay supplemented with concentrate.

Keywords: Ribeye area; Tropical grasses; Sheep; Carcass yield; Breed.

INTRODUCTION

During dry seasons or feed shortages, pasture conservation is a method used to feed animals because it lowers seasonality and production costs (Emerenciano *et al.*, 2017). The grasses that are most frequently used at the National Animal Production Research Institute (NAPRII) are Shika, Zaria, Brachiaria decumbent (*Stapf*), and Digitaria smutsii (*Stent*), due to their high productivity and capacity to adapt to tropical and subtropical climates. Notwithstanding, as observed in other tropical nations such as Brazil by Emerenciano *et al*. (2020) and Fernandes *et al*. (2020) utilizing distinct cultivars of pastures, the extensive range of cultivars accessible may manifest notable fluctuations in productivity and nutritional worth, all of which may impede animal functioning and, as a result, compromise the quality of the remains and meat.

Through characterisation, possible genetic resources for the production of slim lambs could be found. Therefore, to identify lambs for the production of lean meat (Suliman *et al*., 2021; Álvarez *et al*., 2022) and to comprehend the management options needed for various genotypes (Ramírez-Retamal and Morales, 2014), the carcass composition could be employed as a criterion in breed characterisation.

The features of the carcass are a reflection of the objective and subjective standards related to the qualities necessary for the portion of the meat that is fit for consumption. The objective of sheep production is to produce carcasses with higher levels of muscle and fat that are neither too high nor too low to ensure the meat's juiciness and quality (Urbano *et al.*, 2017). Weight, yield, state of greasiness, and conformation are the primary traits examined in carcass evaluation (Oliveira *et al*., 2017; Silva *et al*., 2018). On the other hand, genotype, sex, age, rearing system, and health are the factors that impact carcass

quality (Ekiz *et al*., 2012; Hopkins & Mortimer, 2014; Silva *et al*., 2020). The quality of the flesh, which includes its color, tenderness, and approximate composition, is another crucial factor to consider in the production of sheep meat (Santos *et al*., 2020).

Ilişiu *et al*. (2020) have described the existence of genetic variations in growth and carcass characteristics among breeds. When the scientists examined the development rate and carcass features of various Romanian sheep breeds, they found that there was genetic heterogeneity among them. While studying Bragancano and Mirandes, Teixeira *et al*. (2005) found that breed differences in carcass characteristics contribute to variation in the quality of lamb meat when slaughter weight is held constant. Some breeds of sheep in Portugal.had a higher percentage of subcutaneous fat, while others had higher growth rates, less kidney, and pelvic fat.

As was previously indicated, the production and chemical content of various forage grasses vary (Veras *et al.*, 2020; Emerenciano *et al*., 2020; Fernandes *et al.*, 2020). Thus, it was assumed that giving rams hay containing *Brachiaria decumbens* (*B. decumbens*) or *Digitaria smutsii* (*D. smutsii*) would change the carcass features, quality, and meat yield. This study evaluated the carcass features, yield, and meat quality of Balami, Uda, and Yankasa rams that were completed on *B. decumbens* or *D. smutsii* hay in the dry season.

MATERIALS AND METHODS

Location of the study

The study was conducted at the National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Shika–Zaria, Nigeria. Shika is situated in the Northern Guinea Savannah zone of Nigeria between latitudes 11^{o} 8 19.56 N and longitudes of 7^{o} 45 51.22 E at an elevation of 640 metres 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^{o}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 cold weather called the harmattan season that lasts from October to January. The harmattan season is followed by a hot - dry hot weather from March to May.

Animals and experimental design

Thirty rams comprising Balami, Uda, and Yankasa breeds, aged between 18 and 24 months with average weights of 24.75, 25.50, and 25.50 kg for Balami, Uda and Yankasa, respectively, were purchased from open markets at Achida and Giwa in Sokoto and Kaduna States of Nigeria, respectively. They were used to evaluate the effect of feeding *B. decumbens or D. smutsii* hay as basal supplemented with concentrate diets on carcass components of rams. The rams were balanced for weight and randomly allotted to either of the two hays. There were six treatments in a 2×3 factorial arrangement in a completely randomized design (CRD) with five replications per treatment. One factor was the breed with three breeds of sheep (Balami, Uda and Yankasa) and the second factor was roughage type (*B. decumbens* and *D. smutsii* hay).

Experimental diets

The experimental diets consisted of *B. decumbens or D. smutsii* hay (Wooly finger grass) as basal diets. The supplement was a concentrate mixture of cottonseed cake (39.19 %), maize (37.87 %), maize offal (18.94 %), bone meal (2.50 %), and table salt (1.50 %) as shown in Tables 1.

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					
	B. Decumbens	***D. Smutsii***	**Maize**	**Maize offal**	**Cotton seedcake**	**Concentrate**
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

Management of animals

Before the commencement of the trial, the rams were ear-tagged and isolated in a quarantine for 30 days. During the quarantine period, they were drenched with a broad spectrum anthelminthic (Albendazole®) against internal parasites and dipped in acaricide (Diazzinole®) against ectoparasites. They were also covered with long-acting antibiotics as prophylactic against possible infection. At the end of the quarantine period, the rams were housed in individual feeding pens and offered either of the two hays and concentrate. During each feeding time, the rams were first given the concentrate mixture at 1% of their body weight and allowed 30 – 45 minutes to eat before the basal diets were offered *ad libitum* in separate troughs provided in the pens. Water was provided in a 10 litre-capacity plastic buckets to allow for *ad libitum* water consumption, and changed every morning. The study lasted 90 days following an adjustment period of 14 days.

Slaughter protocol

At the end of the feeding trial, all rams were fasted overnight before being transported them to the Meat Laboratory, Animal Science Department, Ahmadu Bello University, Zaria, Nigeria. The animals were slaughtered by severing the jugular vein and the carotid artery with a knife. The blood was drained into a bucket and its weight was recorded. The skin was carefully flayed to prevent fat and tissue adhesions. The skin was weighed with ears and immediately after the removal of legs below the fetlock joints. The gastro-intestinal tract with the exception of the oesophagus was removed with its contents and weighed. The gastrointestinal organs

were reweighed after emptying their contents. Fat in the gastrointestinal tract and kidney fat were removed and individually weighed. Internal organs, namely, the lung, trachea, esophagus, heart, liver, kidney, spleen and pancreas were also removed and weighed separately. The hot carcass weight was recorded after removing the weight of the head, thorax, abdominal and pelvic cavity contents as well as legs below the hock and knee joints. After evisceration, the carcass was weighed and cut along the backbone. The empty body weight was calculated as gut content deducted from slaughter weight. The percentage of total edible offal components (TEOC) was taken as the sum of the trachea, heart, liver, empty gut, kidney, testis, head, legs, and fat (omental, kidney knob, and channel fat). The percentage of total non-edible offal component (TNEOC) was taken as the sum of horn, blood and gut content. The dressing percentage was calculated as the proportion of hot carcass weight and empty body weight. For the determination of rib eye area, a cross-sectional area of the eye muscle (Longissimus thoracic) was measured between the 12th and 13th ribs with the use of tracing paper.

Chemical analyses

Feed chemical analysis

Chemical analysis of experimental feeds and refusals were carried out on the representative samples. The samples were mixed and partially dried at 60^{o}C in an oven for 72 hours. The dried samples were ground with a Christy and Norris mill to pass through 1 mm sieve and kept in airtight containers at room temperature (25-26) until chemical analysis. The ground samples were analyzed for DM, ash and nitrogen (N) following the procedure of Association of Official Analytical Chemist (AOAC, 2000). Crude protein (CP) was determined by multiplying N by a value of 6.25. Neutral detergent fiber (NDF) and acid detergent fiber (ADF) were analyzed according to the procedure of Van Soest et al. *(*1991). Chemical analysis was carried out on the faecal samples according to procedures of the AOAC (2000). Neutral detergent fibre (NDF) and acid detergent fibre (ADF) were determined according to the procedure of Van Soest (1991). Urine samples were analyzed for nitrogen content using the Kjeldahl procedure (AOAC, 2000).

Statistical analyses.

All data were analysed using Statistical Analysis System software version 9.2 (SAS Institute, Cary, NC, USA). These data were then analysed using the General Linear Model procedure (PROC GLM) of Statistical Analysis System (SAS, 2002, version 9.2) according to the following statistical 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 level of significance declared at $P < 0.05$.

RESULTS

Carcass components and dressing percentage of Balami, Uda, and Yankasa rams fed *B. decumbens* or *D. smutsii* hay

Balami outperformed Uda and Yankasa in terms of slaughter weight, empty body weight, hot carcass weight, cold carcass weight, dressing percentage, and rib eye area, all of which were significantly (P<0.05) greater in Table 2's independent influence of breed. Compared to Uda and Yankasa, Balami had considerably (P<0.05) higher weights of hide, head, liver, full stomach, empty gut, kidney fat, and omental fat. The testis weight difference between Uda and Balami and Yankasa was statistically significant (P<0.05). Table 3 shows the independent effect of hay type on carcass traits. When rams were given *D. smutsii* hay, their leg, liver, heart, testis, and kidney fat weights were considerably (P<0.05) larger. For rams fed *B. decumbens* hay, the only

factor that was significantly (P<0.05) greater was empty body weight.

Rams fed *D. smutsii* hay performed considerably (P < 0.05) better than those fed *B. decumbens*, according to Table 4's effect of the breed and hay type interaction. With the exception of the kidney and spleen weights, which were comparable, Balami rams fed *D. smutsii* hay had considerably (P < 0.05) greater values for every carcass component than Balami rams fed *B. decumbens*. Uda observed a similar pattern: all carcass component weights were considerably (P < 0.05) larger in animals given *D. smutsii* hay than in those fed *B. decumbens*, with the exception of the weights of the kidney and spleen, which were similarly distributed.Regarding Yankasa, the majority of the carcass component values were significantly (P < 0.05) higher in the group fed *D. smutsii* hay than in the group fed *B. decumbens*, with the exception of the weight of the entire gut, where the group fed *B. decumbens* had significantly (P < 0.05) higher values than the group fed *D. smutsii* hay, and the weights of the kidney and spleen, which were comparable.

Table 2: Independent effect of breed on carcass and non-carcass components (Kg) and dressing percentage of Balami, Uda and Yankasa rams fed *B. decumbens* or *D. smutsii* hay

	Breed			SEM	LOS
Parameter	**Balami**	**Uda**	**Yankasa**		
Slaughter Weight (Kg)	37.15^{a}	35.70^{b}	33.70^{c}	0.46	*
Empty Body Weight (Kg)	31.70^{a}	26.28^{b}	21.77^{c}	0.42	*
Hot Carcass Weight (Kg)	21.51^{a}	18.68^{b}	18.59^{b}	0.53	*
Cold Carcass Weight (Kg)	21.14^{a}	18.36^{b}	18.30^{b}	0.52	*
Dressing Percentage (%)	57.90^{a}	52.32^{c}	55.07^{b}	1.04	*
Rib Eye Area (cm)	2.13^{a}	2.08^{ab}	1.98^{b}	0.04	*
Feet (Kg)	0.77^{a}	0.73^{c}	0.76^{ab}	0.01	*
Hide (Kg)	2.43^{a}	1.63^{c}	2.05^{b}	0.06	*
Head (Kg)	2.40^{a}	2.07^{b}	2.12^{b}	0.04	*
Liver (Kg)	0.43^{a}	0.36^{b}	0.36^{b}	0.01	*
Spleen (Kg)	0.05	0.05	0.05	0.01	NS
Heart (Kg)	0.13	0.14	0.14	0.01	NS
Kidney (Kg)	0.10^{a}	0.08^{b}	0.09^{ab}	0.01	*
Full gut (Kg)	7.06^{a}	6.61^{ab}	6.10^{b}	0.19	*
Empty gut (Kg)	2.44^{a}	2.25^{bc}	2.20^{c}	0.06	*
Testis (Kg)	0.18^{c}	0.34^{a}	0.29^{b}	0.01	*
Kidney Fat (Kg)	0.24^{a}	0.16^{b}	0.16^{b}	0.01	*
Omental fat (Kg)	0.41^{a}	0.25^{b}	0.16^{b}	0.03	*

$^{a, b, c}$Means bearing different superscripts within the same row differ significantly (P<0.05), Standard error of means (SEM), Nitrogen (N), Kilogramme (Kg), Centimeter (cm), Level of significance (LOS), Significant at 5% (*), Not significant (NS).

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Table 3: Independent effect of hay on carcass and non-carcass components and dressing percentage of Balami, Uda and Yankasa rams fed *B. decumbens* or *D. smutsii* hay

	Hay type		SEM	LOS
Parameter	***B. decumbens***	***D. smutsii***		
Slaughter Weight (Kg)	34.77	36.27	0.41	NS
Empty Body Weight (Kg)	23.747[b]	29.41[a]	0.35	*
Hot Carcass Weight (Kg)	19.13	20.06	0.44	NS
Cold Carcass Weight (Kg)	18.80	19.73	0.43	NS
Dressing Percentage (%)	51.75	52.84	0.85	NS
Rib Eye Area (cm)	2.06	2.08	0.03	NS
Feet (Kg)	0.68[b]	0.83[a]	0.01	*
Hide (Kg)	1.97	2.10	0.05	NS
Head (Kg)	2.15	2.28	0.03	NS
Liver (Kg)	0.35[b]	0.42[a]	0.02	*
Spleen (Kg)	0.05	0.05	0.01	NS
Heart (Kg)	0.12[b]	0.15[a]	0.01	*
Kidney (Kg)	0.08	0.09	0.01	NS
Full gut (Kg)	6.60	6.58	0.15	NS
Empty gut (Kg)	2.16[b]	2.43[a]	0.05	*
Testis (Kg)	0.24[b]	0.30[a]	0.01	*
Kidney Fat (Kg)	0.16[b]	0.21[a]	0.01	*
Omental fat (Kg)	0.28	0.28	0.02	NS

[a, b, c] Means bearing different superscripts within the same row differ significantly (P<0.05), Standard error of means (SEM), Nitrogen (N), Not significant (NS), Centimeter (cm), Level of significance (LOS), Significant at 5% (*), Not significant (NS).

Table 4: Interaction effect of breed and hay type on carcass and non-carcass components and dressing percentage of Balami, Uda and Yankasa rams fed *B. decumbens* and *D. smutsii* hay

	Hay type						SEM	LOS		
	B. decumbens			*D. smutsii*				B	H	BxH
	Breed									
Parameter	Balami	Uda	Yankasa	Balami	Uda	Yankasa				
Slaughter Body Weight (Kg)	38.95	35.35	27.45	43.95	37.90	29.50	0.71	*	*	*
Empty Body Weight (Kg)	24.48	19.07	11.12	41.40	35.65	27.75	0.59	*	*	*
Hot Carcass Weight (Kg)	22.78	19.05	10.76	26.61	22.66	14.51	0.75	*	*	*
Cold Carcass Weight (Kg)	23.47	18.80	10.56	26.16	22.38	14.22	0.74	*	*	*
Dressing Percentage (%)	56.95	52.21	37.39	59.06	58.05	47.25	1.47	*	*	*
Rib Eye Area (cm)	2.27	1.63	1.63	2.53	2.27	1.70	0.05	*	*	*
Feet (Kg)	0.70	0.65	0.65	0.90	0.70	0.83	0.02	*	*	*
Hide (Kg)	1.60	2.30	2.00	2.55	2.55	2.10	0.08	*	*	*
Head (Kg)	2.03	2.30	2.13	2.50	2.50	2.23	0.06	*	*	*
Liver (Kg)	0.33	0.41	0.33	0.45	0.45	0.40	0.01	*	*	*
Spleen (Kg)	0.05	0.05	0.05	0.05	0.05	0.05	0.01	NS	NS	NS
Heart (Kg)	0.13	0.13	0.10	0.15	0.15	0.18	0.01	*	*	*
Kidney (Kg)	0.10	0.10	0.10	0.10	0.10	0.10	0.01	NS	NS	NS
Full gut (Kg)	6.60	6.52	6.50	7.52	6.70	5.70	0.26	*	*	*
Empty gut (Kg)	2.05	2.18	2.25	2.45	2.70	2.15	0.08	*	*	*
Testis (Kg)	0.17	0.33	0.23	0.20	0.35	0.35	0.02	*	*	*
Kidney Fat (Kg)	0.13	0.25	0.10	0.19	0.23	0.23	0.01	*	*	*
Omental fat (Kg)	0.20	0.50	0.13	0.30	0.33	0.20	0.04	*	*	*

Standard error of means (SEM), Nitrogen (N), Not significant (NS), Centimeter (cm), Level of significance (LOS); Significant at 5 % (*), Breed (B), Hay (H), Breed x Hay (BxH), Significant at 5% (*), Not significant (NS). .

Relative organ weight (Kg) of Balami, Uda and Yankasa rams fed *B. decumbens* or *D. smutsii hay*

The results of the independent breed influence on the three breeds of sheep's relative organ weight are shown in Table 5. It demonstrates that Yankasa rams had the highest foot weight (P<0.05) and Uda had the lowest foot weight (P>0.05). The hide and head weights in Balami were substantially higher (P<0.05) than those in Yankasa or Uda. The liver and kidney weights of Yankasa and Balami were both substantially (P<0.05) larger than those of Uda. Balami had the highest weights of full stomach, renal fat, and omental fat, followed by Uda, and Yankasa had the lowest. Balami had the highest empty gut weight (P<0.05), whereas Uda had the lowest. Testicular weight in Uda was much higher (P<0.05) than in Yankasa, while it was lowest in Balami. The outcome of hay's independent effect on the three breeds' respective organ weights is displayed in Table 6. It demonstrates that, with the exception of the weights of the hide, head, and kidney, which were comparable for both hays, practically all of the organs were considerably (P<0.05) heavier in animals raised on *D. smutsii* hay than in those grown on *B. decumbens* hay. Table 7 displays the outcome of the breed and hay interaction effect on the relative organ weight of the three breeds. With the exception of the weights of the kidney and spleen, which were not statistically different from those of their counterparts grown on *B. decumbens*, balami rams fed *D. smutsii* hay had significantly larger (P<0.05) weights of practically all the organs.Both Yuksa and Uda followed this tendency.

Table 5: Independent effect of breed on relative organ weight (Kg) of Balami, Uda and Yankasa rams fed *B. decumbens* or *D. smutsii* hay

	Breed			SEM	LOS
Parameter	**Balami**	**Uda**	**Yankasa**		
Slaughter Weight (Kg)	37.15[a]	35.70[b]	33.70[c]	0.46	*
Feet (Kg)	2.07[b]	2.04[c]	2.26[a]	0.01	*
Hide (Kg)	6.54[a]	4.57[c]	6.08[b]	0.06	*
Head (Kg)	6.46[a]	5.79[c]	6.29[b]	0.04	*
Liver (Kg)	1.16[a]	1.01[c]	1.15[a]	0.01	*
Spleen (Kg)	0.13	0.14	0.15	0.01	NS
Heart (Kg)	0.35[c]	0.39[b]	0. 42[a]	0.01	*
Kidney (Kg)	0.27[a]	0.22[b]	0.27[a]	0.01	*
Full gut (Kg)	19.00[a]	18.52[b]	18.10[c]	0.19	*
Empty gut (Kg)	6.57[a]	6.30[c]	6.53[b]	0.06	*
Testis (Kg)	0.48[c]	0.95[a]	0.86[b]	0.01	*
Kidney Fat (Kg)	0.65[a]	0.49[b]	0.47[b]	0.01	*
Omental fat (Kg)	1.10[a]	0.70[b]	0.47[c]	0.03	*

[a, b, c] Means bearing different superscripts within the same row differ significantly (P<0.05), Standard error of means (SEM), Nitrogen (N), Kilogramme (Kg), Centimeter (cm), Level of significance (LOS), Significant at 5% (*), Not significant (NS).

Table 6: Independent effect of hay on relative organ weight (Kg) of Balami, Uda and Yankasa rams fed *B. decumbens* or D. *smutsii* hay

	Hay type		SEM	LOS
Parameter	***B. decumbens***	***D. smutsii***		
Slaughter Weight (Kg)	34.77	36.27	0.41	NS
Feet (Kg)	1.96[b]	2.29[a]	0.01	*
Hide (Kg)	5.67	5.79	0.05	NS
Head (Kg)	6.18	6.29	0.03	NS
Liver (Kg)	1.01[b]	1.16[a]	0.02	*
Spleen (Kg)	0.14	0.14	0.01	NS
Heart (Kg)	0.35[b]	0.41[a]	0.01	*
Kidney (Kg)	0.23	0.25	0.01	NS
Full gut (Kg)	18.98[a]	18.14[b]	0.15	*
Empty gut (Kg)	6.21[b]	6.70[a]	0.05	*
Testis (Kg)	0.69[b]	0.83[a]	0.01	*
Kidney Fat (Kg)	0.46[b]	0.58[a]	0.01	*
Omental fat (Kg)	0.58[b]	0.77[a]	0.02	*

[a, b, c] Means bearing different superscripts within the same row differ significantly (P<0.05), Standard error of means (SEM), Nitrogen (N), Not significant (NS), Centimeter (cm), Level of significance (LOS), Significant at 5% (*), Not significant (NS).

Table 7: Interaction effect of breed and hay type on relative organ weight (Kg) of Balami, Uda and Yankasa rams fed *B. decumbens* and *D. smutsii* hay

	Hay type						SEM	LOS		
	B. decumbens			*D. smutsii*				B	H	BxH
	Breed									
Parameter	Balami	Uda	Yankasa	Balami	Uda	Yankasa				
Slaughter Body Weight (Kg)	38.95	35.35	27.45	43.95	37.90	29.50	0.71	*	*	*
Feet (Kg)	1.80	1.84	2.37	2.05	1.85	2.81	0.02	*	*	*
Hide (Kg)	4.11	6.51	7.29	5.80	6.73	7.12	0.08	*	*	*
Head (Kg)	5.21	6.51	7.76	5.69	6.59	7.56	0.06	*	*	*
Liver (Kg)	0.85	1.16	1.20	1.02	1.19	1.36	0.01	*	*	*
Spleen (Kg)	0.13	0.14	0.18	0.11	0.13	0.17	0.01	NS	NS	NS
Heart (Kg)	0.33	0.37	0.36	0.34	0.39	0.61	0.01	*	*	*
Kidney (Kg)	0.26	0.28	0.36	0.23	0.26	0.34	0.01	NS	NS	NS
Full gut (Kg)	16.94	18.44	23.68	17.11	17.68	19.32	0.26	*	*	*
Empty gut (Kg)	5.26	6.17	8.19	5.57	7.12	7.29	0.08	*	*	*
Testis (Kg)	0.44	0.93	0.84	0.46	0.92	1.17	0.02	*	*	*
Kidney Fat (Kg)	0.33	0.71	0.36	0.43	0.61	0.78	0.01	*	*	*
Omental fat (Kg)	0.51	0.50	0.47	0.68	0.87	0.53	0.04	*	*	*

Standard error of means (SEM), Nitrogen (N), Not significant (NS), Centimeter (cm), Level of significance (LOS); Significant at 5 % (*), Breed (B), Hay (H), Breed x Hay (BxH), Significant at 5% (*), Not significant (NS).

DISCUSSION

Carcass components and dressing percentage of Balami, Uda, and Yankasa rams fed *B. decumbens or D. smutsii* hay

A detailed examination of the study's findings reveals that breed had an impact on carcass measurements, with Balami rams having higher measurements than Uda and Yankasa rams. The current study disagrees with the report of Tsegay *et al.* (2013), which described an experiment wherein two Ethiopian local sheep breeds, Afar and Washera, were crossed with Dorper (Dorper × Indigenous), and the results showed no differences in the measurements of carcass characteristics. The current study's findings for various body weight (BW), slaughter weight (SW), and cold carcass weight (CCW) were found to be in conflict with the authors' report. The variations in the breeds and foods utilized in the trials may be the cause of these discrepancies in the outcomes. Lawrie (1998) found that carcass composition is weight dependant and essentially unaffected by age or dietary regimen. This conclusion is consistent with the increased carcass weight seen in Balami sheep compared to Uda and Yankasa sheep. In this study, the carcass yields of Balami Uda and Yankasa sheep were shown to be higher than those of certain tropical sheep (Adu and Brinckman, 1981).

On the other hand, some of the carcass components were similarly impacted by the type of hay. Rams fed Digitaria smutsii showed greater values of several carcass components, such as empty body weight, liver, heart, and empty gut; this is likely because Digitaria smutsii has a higher protein content than Brachiaria decumbens. This result corroborates that of Majdoub-Mathlouthi *et al.* (2013), who found that weaning Barbarine lambs on an oat hay-based diet supplemented with concentrate altered the carcass features. A cursory look at the significant breed x hay type interaction effect for most carcass measurements in the present study is contrary to the report by Tsegay *et al*. (2013) which indicated no significant difference in two Ethiopian local sheep breeds and their crosses fed Rhodes grass supplemented with concentrate (comprised of wheat bran 44 %, noug cake 29 %, maize grain 26 % and salt 1%) except for CCW, for which all supplemented lambs were similar to each other and higher than the control lambs. A previous study by (Getahun, 2014) also showed no breed and diet interaction effects when the effect of concentrate supplementation on the growth performance of Ethiopian Lowland Afar and Blackhead Ogaden Lambs were studied.

For the purpose of evaluating the edible portions of animals that have been slaughtered, dressing percentage based on complete body weight is a crucial commercial metric. The dressing percentage in this investigation varied between 52.32 % and 57.90 %. The Balami sheep had a greater dressing percentage (DP) than the Yankasa and Uda sheep. The breed, management style, and diet may all have a role in the greater DP seen in this study for Yankasa sheep as compared to those noted by Adu and Brinckman (1981) for Yankasa and crossbred sheep. The weight gain and the notable difference in rib eye area between the Balami and Uda and Yankasa rams indicate that the rib eye area of the heavier animals was larger. Breed effect resulted in notable differences between breeds for non-carcass organs, with the exception of empty gut, which was more common in Yankasa and Uda. For practically every organ that isn't a carcass, Balami had the greatest values. These variations concur with the findings of Assefu (2012), who documented the influence of breed on the relative feedlot performance and carcass features of Washera and Horro sheep that were fed distinct ratios of roughage and

concentrate. In contrast, Macit *et al.* (2002) found no breed-specific differences in the proportion of head, liver, and heart in lambs raised on grass supplemented with concentrate from Awassi, Morkaraman, and Tushin.

The proportion of head, blood, and stomach viscera did not differ across breeds of Mexican sheep that were studied for hair vs wool (Hernández-Cruz *et al*., 2009). In contrast, Tibebu *et al*. (2019) observed that in sheep, genotype has an impact on the percentage of liver, heart, and head. The breed effect on carcass components identified in this study is consistent with that reported by Merera *et al*. (2010), who showed that genotype had an impact on the same components in an experiment including sheep breeds, the Afar (Af) and Blackhead Ogaden (BHO).

In the current study, hay type and breed interaction resulted in differences in the weight of several carcass components between rams fed Digitaria smutsii and those fed Bracharia decumbens hay.The findings of Majdoub-Mathlouthi *et al*. (2013), who found that nutrition only impacted the proportions of the empty intestine, not the kidney, liver, or heart, are not consistent with this.

Relative organ weight (Kg) of Balami, Uda, and Yankasa rams fed *B. decumbens* or *D. smutsii hay*

Breed-specific variations in the relative weights of the organs were noted. Balami breeds exhibited greater relative weights for the most of the organs obtained, whereas Yankasa breeds showed the lowest values for the majority of the organs. The present discovery corroborates the findings of Yıldırım *et al.* (2014), which compared the gastrointestinal tract features of rams of similar weights in six sheep breeds in Turkey: Turkish Merino (TM), Anatolia Merino (AM), Akkaraman (AK), Kıvırcık (KV), Awassi (AW), Karayaka (KY), and Morkaraman (MK). According to this report, AK rams had a larger relative weight of a full stomach than other rams. Additionally, it aligns with earlier research on Mexican hair sheep (Ríos *et al*., 2011) and the digestive tract of Norwegian sheep (Steinheim *et al*., 2003). Another study by Steinheim *et al*. (2003) showed that breed had an impact on gut weight; in comparison to short-tailed breeds, the long-tailed breed had the longest small intestine relative to body mass and the heaviest rumen, indicating the largest rumen capacity. As a result, the current study's findings confirm that breed-related substantial differences in organ weights are accurate (Ríos *et al*., 2011) and are in line with findings from Teke and Unal's 2009 study on TM, AK, and MK breeds.

A quick look at the hay type effect shows that lambs grown on *D. smutsii* hay had bigger organ weights than lambs fed *B. decumbens* hay, indicating that their digestive tracts were better developed. This may be explained by the fact that *D. smutsii* is softer and more appetizing, which encourages a higher feed intake and consequent development of other organs. According to Nsoso *et al.* (2004), varying fodder kinds led to varying body measurements, which is to be expected given that different forage types provide varying amounts of nutrients.

There was interaction since the organ weights of the rams from all three breeds fed *D. smutsii* hay seemed to be higher than those of the corresponding rams grown on B. decumbens. Channon *et al.* (2004) state that breed, age, sex, amount and kind of feed consumed, and environmental factors are known to interact and contribute to variance in the efficiency of feed utilization for growth and maintenance amongst animals. The current study's findings confirm this, since rams from every breed fed *D. smutsii* hay had larger relative organ weights than corresponding rams grown on *B. decumbens*.

CONCLUSION

It is concluded in terms of dressing percentage and some organ weights, that *D. snutsii* performed better than *B. decumbens* in all breeds. As a result, farmers were advised to use *D. smutsii* hay for growing and fattening rams supplemented with concentrate mixture containing roughly 14% CP and 10.52 MJ/Kg DM ME for a period of 90 days.

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