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EFFECT OF SAFARI (*CROTALARIA SENEGALENSIS*) HUSK AND SORGHUM HUSK (*SORGHUM BICOLOR*) ON THE PERFORMANCE OF DESERT LAMBS

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ABSTRACT

The experiment was conducted at animal production farm, faculty of Agricultural and Environmental Sciences, University of Gadarif to investigate the effect of Safari *(Crotalaria senegalensis)* huskand Sorghum husk *(Sorghum bicolor)* on the performance of desert lambs. Twelve desert lamb males were selected (6-9 month of age) from animal production farm flock with average weight 26.7 kg. Animals were distributed randomly to three treatments with four replicates as follows: Treatment A offered Sorghum husk (100%), treatment B (50% Sorghum husk + 50% Safari husk) and treatment C (100% Safari husk). Safari husk and Sorghum husk were offered adlibitum as basal diet with 300g/animal/day concentrate. The experiment lasted for eight weeks with the first two weeks as adaptation period. Feed and water intake, weight gain and feed conversion ratio were determined. Results showed that treatment B (50% Safari husk+50% Sorghum husk) was highest in daily feed intake (1.195kg) followed by treatment A (100% Sorghum husk)(0.995kg) and treatment C(100% Safari husk) was the lowest (0.890kg). Daily water consumption was 5.12, 5.11 and 4.44 Liter for treatment A,B and C respectively and treatment C was significantly lowest($P \leq 0.05$) and there was no significant difference between the other treatments. The daily weight gain was significantly highest in treatment B(137.44g) followed by treatment C(94.62g) and treatment B was the lowest(89.75g).Final body weight was 35.76,33.43 and 32.89 kg for treatment C,A and B respectively. There was no significant difference found between treatments ($P \geq 0.05$) in feed conversion ratio although treatment C was the best (10.15) followed by treatment B (10.34) and treatment A (12.35). The study concluded that Safari husk and Sorghum husk had low nutritive value and can be used as a basal diet for ruminants, especially in the dry season and should be supplemented for better utilization.

INTRODUCTION

Safari is the local name of Crotalaria (*Crotalaria senegalensis)* which belongs to the family Fabaceae. Safari is grown naturally as a native forb in Butana region. Butana region is located in the North eastern part of Sudan and considered as natural pasture. The plant has high total crude protein (17%) with excellent palatability especially for sheep and camel (RPA, 2015). The disappearance of annual grasses has had repercussions at different levels of the ecosystem such as considerable decrease in productivity (Pierre, 2011). Range and pasture administration concerns about this plant due to its nutritional value and due to its adaptive advantage under harsh condition. Range rehabilitation and improvement measure carried by Range and pasture administration including reseeding of Safari seeds and the husks are the residues remain after collection of the seeds. Sorghum (*Sorghum bicolor* (L.) Moench) is an important crop in the Sudan and the country ranked 8th in world sorghum grain production producing 3.5 million Metric Tons (World sorghum production.com, 2013). It is the main crop in Gadarif state and about 5-6 million feddans (2.1-2.52 h) is cultivated annually. Sorghum husk was the residues after removing the grain and it was used as an animal feed. In Sudan animals are mainly reared in traditional systems (Fadlala and Ahmed, 1997) based on rangeland and village flocks with low inputs and outputs. Sudan Desert sheep production characteristics reflected seasonal nutritional and husbandry (Elhag *et al*., 2001). The sector has many problems hindering its development, Mufarrih (1991) stated that sheep production in the semi-arid areas of the Sudan is hampered by

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water shortage, complicated grazing problems, diseases and parasites, reduced rangeland area, successive drought and migratory camels and sheep penetrated into the savannah belt in the dry season. Livestock in the Butana area depends mainly on rangeland grasses and forbs throughout the year and on agricultural residues during the dry season. The extensive management system practiced in Sudan affecting adversely animal performance due to fluctuation in feed quantity and quality. Many factors affect nomadic system such as seasonal fires, overgrazing and drought and desertification and the situation become worse during dry season. In tropical and subtropical countries, low quality forages are used as the major component of a diet for large ruminants for a considerable part of or through the year (Jackson, 1981). This situation necessitates using of alternatives for animal feed which would decrease the cost of animal production and contribute in reduction of environmental pollution. Due to availability of Safari husk and Sorghum husk as residues, it is important to evaluate its nutritive value as ruminant feed. The study aim was to determine the nutritive value of Safari (*Crotalaria senegalensis*) husk and Sorghum husk (*Sorghum bicolor*) and to identify its effect on the performance of desert sheep.

MATERIALS AND METHODS

Study site

The study was conducted in the animal Production Farm in Faculty of Agricultural and Environmental Sciences, Gadarif University, Gadarif state, Sudan. The area lies in the eastern part of the Sudan at latitudes 12◦ 40' - 15◦ 45' N and longitudes 33◦ 34'- 37◦ 1' E. The area has a mean annual rainfall of 602mm.Mean maximum temperature is 40.7◦C in April. Safari husk were obtained from Range and pasture administration, Ministry of Animal resources and fishery, Gadraif state. Safari husk are the residues remain after removing the seeds. Sorghum husk were obtained from Faculty experimental field and it represents the residues after removing the grains.

Proximate composition

The proximate composition of the Safari husk and Sorghum husk was determined as described by AOAC (1995). The sample was analysed for dry matter (DM), crude protein (CP), crude fibre (CF), ether extract (EE), Ash and nitrogen free extract was determined by deference.

Diets formulation, Animal housing and feeding trial:

12 desert male lambs (6-9 month of age) with average weight 26.7kg were allocated to three treatment groups. Treatment A offered Sorghum husk (100%), treatment B offered 50% Sorghum husk + 50% Safari husk and treatment C offered Safari husk (100%) as basal diet. In addition to the basal diet the animals received each per day 300g of concentrate as supplement. Chemical composition of the concentrate mixture is presented in Table 1. All animals were housed individually in a roofed shed and had free access to water. All animals were treated against internal and external parasites. The experiment lasted for eight weeks with the first two weeks as adaptation period.

Table 1. The ingredients of the concentrates mix fed to desert lambs in Gadarif, Gadarif State, Sudan

Ingredients	Percentages
Sorghum grain	54
Wheat bran	34
Ground nut cake	10
Oyster shell	01
Salt	01
CP	15.27
ME(MJ/Kg DM)	12.28

CP% and ME calculated according to Animal Resources Research Corporation, Kuku, Khartoum North, Sudan, 1999

Statistical analysis

Analysis of variance was used for data analysis using SAS. Mean separation was done using the least significant difference (LSD) procedure.

RESULTS AND DISCUSSION

Table 2 shows the proximate analysis of Safari husk .Safari husk had low content of crude protein (6.71%). Safarihad very low content of EE (1.85%) and had high content of crude fiber (59.65%).

Table 2. The Proximate analysis (%) of Safari (*Crotalaria senegalensis*) husk in Gadarif, Sudan

Parameter	%	SD
DM	94.45	2.87
CP	6.71	0.21
EE	1.85	0.02
CF	59.65	0.14
Ash	3.80	0.13
NFE	22.44	3.05

Table 3 shows the proximate analysis of Sorghum husk. Sorghum husk had low crude protein content (5.94%) and high crude fibre (41.50%). The nutrients composition of the studied feeds was within the range reported by many authors for similar stuffs (Asma and Elimam, 2014, Selma, 2009).

Table 3. The Proximate analysis (%) of Sorghum (*Sorghum bicolor*) husk in Gadarif, Sudan

Parameter	%	SD
DM	94.80	3.12
CP	5.94	0.31
EE	1.00	0.01
CF	41.50	0.20
Ash	10.86	0.15
NFE	35.50	1.02

Safari husk and Sorghum husk used in this study had a chemical composition typical of low quality roughage characterized by a low CP and high fibre content (Osuji *et al*., 1995). The studied Safari huskand Sorghum husk considered of low nutritional value because it contain less than 80 g /kg DM of CP (Leng, 1990).

Table 4 shows the feed and water intake of Sudan desert lambs fed Safari husk (*Crotalaria senegalensis*) in Gadarif, Sudan. Daily feed intake of roughage was 0.995, 1.195 and0.890 kg for treatments A, B and C respectively. It was significantly

highest (P≤0.05) in treatment B compared to treatment C. There was no significant difference between the intake of Sorghum husk (Treatment A) and Safari husk (Treatment C). The highest intake of diet B (50%Sorghum+50% Safari) indicates that the combination of legumes-cereal residues was more palatable.

Table 4. The Feed and water intake of Sudan desert lambs fed Safari husk (*Crotalaria senegalensis*) and Sorghum husk (*Sorghum bicolor*) in Gadarif, Sudan

Parameter/ Treatments	A	B	C	S.E	C.V
Dailyfeed intake (kg) (roughage)	0.995ab	1.195a	0.890b	0.08	16.29
Daily feed intake (kg) (concentrate+roughage)	1.30ab	1.50a	1.20b	0.08	11.83
Total feed intake (kg)	54.48ab	62.60a	50.09b	3.43	14.46
Daily water intake (L)	5.17a	5.11a	4.44b	0.16	6.32

Means with different superscripts in the same row are significantly (p<0.05) different. S.E.=Standard error of mean; C.V=Coefficient of variation

Daily feed intake of (concentrate + roughage) was 1.30, 1.50 and 1.20 kg for treatments A, B and C respectively. It was significantly highest (P≤0.05) in treatment B compared to other two treatments. There was no significant difference between the intake of Sorghum husk and Safari husk. Total feed intake was ranged from 50.09 to 62.60 kg and was significantly highest in treatment B and lowest in treatment C. Daily feed intake found in the present study was similar to that found in lambs fed graded level of cotton gin trash (Asma *et al*., 2014). Water intake was ranged from 4.44 to 5.17 (Litre/day). It was lowest in treatment C (P≤0.05) and there was no significant difference between treatment A and B. The increased water intake in treatment A and B was due to the increase of feed intake in the two treatments compared to treatment C. Many authors postulated the presence of correlation between water intake and feed intake. The correlation between water intake and feed intake was 0.73 (Ewald Kramer, 2009). Water intake is closely correlated with food intake and factors affecting food intake indirectly influence water consumption (Zeigler, 1972). Table 5 shows the performance of Sudan desert lambs fed Safari husk (*Crotalaria senegalensis*) and Sorghum husk (*Sorghum bicolor*) in Gadarifstate, Sudan.

Table 5. The performance of Sudan desert lambs fed Safarihusk (*Crotalaria senegalensis*) and Sorghum husk (*Sorghum bicolor*) in Gadarifstate, Sudan

Parameter/Treatments	A	B	C	S.E	C.V
Initial weight(kg)	28.83	27.00	27.83	1.99	12.79
Final weight(kg)	33.42	32.89	32.13	3.44	15.57
Daily weight gain(g)	109.00b	137.44a	102.38b	15.06	28.00
Total weight gain(kg)	4.60	5.89	4.30	0.50	16.81
Feed conversion ratio	12.35	10.34	10.15	1.31	20.72

Means with different superscripts in the same row are significantly (p<0.05) different. S.E.=Standard error of mean; C.V=Coefficient of variation

Daily weight gain (g) was 109.00, 137.00 and 102.38 for treatments A, B and C respectively. It was significantly highest in treatment B compared to other two treatments. This was due to differences in the amount of feed intake and the nutritional value of safari and the combination versus Sorghum husk. The daily weight gain found in this study was similar to that found in desert lambs fed Sorghum stover (Selma, 2013). Total weight gain (kg) was ranged from 4.30 to 5.89. There was no significant difference between treatments in the total weight gain. Feed conversion ratio was 12.35, 10.15 and 10.34 for treatments A, B and C respectively. Lambs fed diet B and C were more efficient in converting feed into body weight than those fed diet A.

Conclusions

The high level of fibre content and low content of nitrogen are the main deficiencies of Safari husk and Sorghum husk affecting its value as ruminants feed. For better utilization, Safari husk and Sorghum husk can be treated with urea or supplemented with concentrates.

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