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Effect of Dry Season Supplementary Feeding on Performance of Desert Sheep in North Kordofan State, Sudan

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ABSTRACT

This study was conducted at North Kordofan State, Sudan. The objectives of the study were to investigate the effects of supplementary feeding at mating, late pregnancy and pre-lambing period on ewe productive and reproductive performance for Desert sheep during dry season. Eighty (80) ewes were selected from the flock of Desert sheep for this study. Ewes were weighed and randomly divided into four groups A, B, C and D, They were randomly assigned to supplementary feeding treatments as group A (20 ewes) was supplemented with diet one (40% sorghum, 35% groundnut seed cake, 20% wheat bran, 4% sheath, 0.25% Salt lick and 0.75% Common salt), group B (20 ewes) was supplement with diet two (35% sorghum, 30% groundnut seed cake, 30% wheat bran, 4% sheath, 0.25% Salt lick and 0.75% Common salt), group C (20 ewes) was supplement with diet three (30% sorghum, 25% groundnut seed cake, 40% wheat bran, 4% sheath, 0.25% Salt lick and 0.75% Common salt) and the last group D (20 ewes) as a control (un supplemented with any diet depend on pasture only as practice by farmers). Supplementary groups A, B and C were offered with supplementary feeding with diet one, two and three for 30 days before estrus, 30 days after mating, 45 days before lambing and 90 days after lambing. Supplementation (diet one, two and three) was offered at evening with 350 grams/ewe/day. Supplementary feeding has significant ($p < 0.05$) effect to reproductive traits, by increased conception rate and Lambing rate as compared with control group, also the supplementary feeding was significantly ($p < 0.05$) ($p < 0.05$) affected abortion rate which was highly in the control group, when compared with supplemented groups. The supplementary feeding was significantly ($p < 0.05$) affected prolificacy; it was high in supplemented groups as compared with control group. Supplementation significantly ($p < 0.05$) effected birth weight and weaning weight where supplemented ewes recorded higher lambs weights as 2.32, 2.11 and 2.02 kg for group A, B and C respectively as compared with group D with 1.80 kg, and 11.46, 10.70, 8.82 and 7.86 kg for A, B , C and D respectively. In conclusion supplementation (flushing and steaming-up) with diet one to group A of Sudanese Desert ewes during breeding period improved the reproductive performance of the ewes.

Key words: Desert sheep, supplementation, body change, reproductive, Sudan

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Introduction

Livestock system plays an important role in livelihoods in many rural communities in the Sudan (Idris *et al*, 2014). Sudan Desert sheep and their crosses make about 80% of sheep found in Sudan and mainly predominant north of latitude 120 N (Devendra and McLeroy, 1982).They are raised mainly under harsh dry land farming conditions under open rangelands for mutton production (Idris *et al*., 2011). The breeding

season in north Kordofan is usually planned to be in January–March so that lambing comes in the rainy season (Mukhtar, 1985). Because of the limited production inputs this exposes breeding and pregnant stock to nutritional stress, as the breeding and gestation periods are thus in the dry season when range lands are at their lowest nutritional quality (El-Hag *et al*., 2007), which are reflected in the highest mortality of lambs born in rainy and early dry season (El-Hag *et al*., 2001). There is two methods of controlled breeding in pastoral flocks by use of "kunan" so that lambs are dropped at early rainy season or using supplementary feeding (El-Toum, 2005). Choosing the best time of lambing and matching paddock feed availability to ewe and weaner needs is important for both productivity and profitability. In order to improve the productive and reproductive capacity of smallholder ruminant animals, there is a need to look at ways of extending the availability and quality of feedstuffs produced on smallholder farms using simple and cost effective options, to face the lack of feed due to climate change. Therefore, this paper focused on the effect of supplementary feeding pre-mating, late pregnancy and post-lambing period on ewe productive and reproductive performance and birth and weaning weight, for Desert sheep during climate change.

Material and Methods

The present study was conducted at Foja village (Longitudes 31.47˚-30.05˚ N, Latitudes 14.37˚-13.34˚E), Bara locality, North Kordofan State, Sudan. Eighty (80) ewes reared in natural grazing were selected from the flock of Desert sheep during the normal breeding season (February-March) for this study. Ewes were ear tagged, weighed and randomly divided into four groups A, B, C and D, (20 ewe/group) similar initial body weight (44.46 kg) in complete randomized design. They were randomly assigned to supplementary feeding treatments as group A, B and C was supplemented with diet one, diet two diet three respectively and the last group D as a control (un supplemented with any diet depend on pasture only as practice by farmers) (Table1). All groups depend upon natural pasture grazing from 0800 to 1800 hr and in the evening they were kept indoors in enclosures. Supplementary groups A, B and C were offered with supplementary feeding for 30 days before mating(flashing), 30 days after mating, 45 days before lambing(Steaming-up) and 90 days after lambing. Supplementation was offered at evening with 350 grams/ewe/day. Four mature rams introduced to experimental groups ewes. The data from feeding trials and reproductive traits were statistically analyzed according to complete randomizes design using Statistical Package for the Social Sciences, software package (SPSS, 2005). Duncan's Multiple Range Tests was also used to test significance differences among means; analysis of covariance was carried out.

Table 1. Ingredients of the experimental feed stuffs

Components (%)	**Diet 1**	**Diet 2**	**Diet 3**
Sorghum grains	40	35	30
Groundnut Cake	35	30	25
Groundnut Hulls	20	30	40
Shells	4	4	4
lick salt	0.25	0.25	0.25
Common salt	0.75	0.75	0.75
Chemical composition of the experimental feed stuffs			
DM%	96.38	97.16	82.84
CP %	27.5	18.6	16.86
CF%	23.33	34.10	36.07
EE %	7.49	9.89	7.76
NFE %	33.05	30.41	30.58
Ash%	8.63	7.84	8.73
ME(MJ/ Kg DM)	11.42	11.26	10.51

The metabolizable energy values were calculated from chemical composition according to Ellis (1981). ME(MJ/Kg/DM)=0.012CP+0.031EE+0.005CF+0.014NEF

Results and Discussion

Nutritional interventions involving season-specific feeding and micronutrient supplementation may help the animal to sustain its production during adverse environmental conditions (Sejian *et al*., 2013). Data in Table (2) indicated significant (P<0.05) effects of supplementation on reproductive traits. Steaming up and supplementation had improved ewes reproductive traits, where higher conception and lambing rate were notice in supplemented groups (Table 2), these results agreed with Blumer *et al*. (2015), Sejian *et al*. (2013) and El-Hag *et al*. (1998 and 2007) who reported that strategic supplementary feeding of ewes increased lambing rates, reduced abortion and mortality of ewes. Differences in nutrition probably account for most of the variation in reproductive performance (José *et al*., 2016 and El-Hag *et al*., 2007). Abortion and mortality rate for ewes steaming-up and flushing was very low and high for unsupplemented ewes (Table 2), this result is agreed with El-Toum (2005) who found that supplementary feeding had resulted in a 21.0% decrease in abortion rate. Also agreed with El-Hag *et al*. (2007) and Youder *et al*. (1990) poor nutrition leads to reduced conception, embryonic losses, reduced lambing rates and high ewe mortality. The effects of pregnancy stress on ewes are manifested in increased abortions, weight loss and mortality (Sirohi *et al.*, 2014).The highest twinning rates were in ewes that had been both flushed and steamed-up, where other with no twinning. These results were in line with the findings of El-Hag *et al*. (2007). Flushing and steaming-up had significant (P<0.05) increased prolificacy, the biggest prolificacy was secured by ewes had flushed and steamed-up compared with ewes unsupplemented, similar results obtained by Mekuriaw *et al*. (2013) and El-Hag *et al*. (2006). Youder *et al.* (1990) reported that poor nutrition leads to reduce conception, embryonic loss, and reducing lambing rates.

Table 2. Effect of supplementation on ewes reproductive traits

Animal Group	Conception rate (%)	Lambing rate (%)	Abortion rate (%)	Mortality rate (%)	Twining rate %	Prolificacy
A	100	100	-	-	41	1.35±0.09[a]
B	100	100	-	-	37	1.20±0.07[b]
C	100	95	5	-	22	1.11±0.08[c]
D	90	88.89	5.56	10	00	1.00±0.11[c]
Overall mean	97.5	95.97	2.56	2.50	100	1.17±0.09

[abc] Values in the same column followed with different letters are significant at P<0.05

The supplementary rations that given to the experimental ewes, had highly significant (p<0.01) effect on lamb birth weight (Table 3), lambs of animals that on group A, B and C had significantly (p<0.01) maintained highly body weight as compared with control (unsupplemented) animal which maintained lightly weight. This result was in line with findings of El-Hag *et al*. (2007 and 1998). Supplementations of pregnant ewes during late gestation are to provide adequate energy and protein to support embryonic and fetal growth, maintenance of animal physiological needs, mammary gland growth, colostrum and milk yield. Similar results obtained by Idris *et al*. (2014) and Mellor and Murray (1985) whom stated that inadequate feed intake during late pregnancy has been found to cause a reduction in birth weight, mammary gland development and milk production. Pre and post-partum supplementary feeding of the dams had significant (p<0.05) effects on weaning weight. High weaning weights were observed in supplemented groups compared with low weight in unsupplemented group. May be these supplements had higher nutritive value. This result was in line with findings of Idris *et al*. (2014) and El-Hag *et al*. (2007 and 1998). Lambs from supplemented ewe's growth faster than unsupplemented one this may be due that inadequate feed intake during late pregnancy may cause a reduction in mammary gland development and milk production, so lambs suckling non supplemented ewes obtained low growth rates. Similar results were obtained by Njoya *et al*. (2005).

Table 3. Effect of supplementation on lambs birth and weaning weight

Animal Group	No. of lambs	Birth weight	No. of lambs	Weaning weight
A	27	2.32 ± 0.09 [a]	27	11.46 ± 0.19 [a]
B	24	2.11 ± 0.10[b]	24	10.70 ± 0.20 [b]
C	21	2.02 ± 0.11[b]	21	8.72 ± 0.21 [c]

D	16	1.80 ± 0.12 [c]	15	7.86 ± 0.25 [c]
Overall mean± SE	88	2.08 ± 0.11	87	9.97 ± 0.21

[abc] Values in the same column followed with different letters are significant at P<0.05

Conclusions and Outlook

Flushing and steaming-up to Sudanese Desert ewes during breeding period improved the reproductive performance of the ewes, with high conception and lambing rates. Lambs born from supplemented ewes recoded better production characteristic compared with these depend on natural grazing only. It would, therefore, be strategically to provide the grazing nomadic desert sheep herds with adequate feeds for reproduction during the mating periods, as well as for generating sufficient body reserves for meeting production and reproduction requirements during the dry season. This would require provision of feed supplements in attempt to balance the seasonal nutritional inadequacies of the natural pasture. It is recommended that, Supplementation during mating and late pregnancy should be undertaking using groundnut seed cake, groundnut hulls or other relevant local ingredients

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