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# GROWTH PERFORMANCE OF DESERT SHEEP UNDER GRAZING CONDITIONS IN NORTH KORDOFAN STATE

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**ABSTRACT:** *The experiment was conducted to study the effect of changing the nomadic husbandry practices during summer with feed supplementation and water restriction on the performance, carcass characteristics of desert sheep (Hamari sub type). Thirty desert sheep of about 8 month age were randomly allocated to three groups (ten animals each, 5 males and 5 females), group (A) watered daily and supplemented with concentrates, (B) watered daily only and (C) watered every 2- 3 days and was considered as control (the normal nomadic husbandry). The results included that average final live weights were significantly (P<0.05) different among the groups and were not significantly affected by sex but males in group A were heavier than the other two groups. The tail length, height at withers, heart girth, chest depth and body length were significant (P<0.05) different between the three groups. The average daily live weight gain was significantly (P<0.05) different among the groups, and the highest rate of gain was in A followed by B and C, respectively. The average daily live weight gains obtained were significantly (P<0.05) different between females and males of groups A, B and C. The males gave higher daily live weight gains than females. These results concluded that management strategy which involves shorter watering intervals and feed supplementation will probably reflect positively on the performance of Hamari sheep under range conditions.*

ORIGINAL ARTICLE

**Keywords:** *Dessert sheep, growth performance, Body linear measurements, concentrate ration, Sudan*

## INTRODUCTION

Sudan is one of the largest countries in Africa characterized by a great numbers of livestock, vast areas of range and cultivated land. Sheep are multiple purpose animals, providing meat, milk and skin. They are raised under nomadic condition with traditional methods of management and natural grazing (Mcleroy, 1961). Thus improving sheep productive performance reflected economically to improve the nomadic life and relief poverty and hence stop people migration and support Sudanese animal export. Sheep in Sudan is about 50.39 million representing 32.51% of the total livestock population which is approximately 155 million head (MARF, 2007).The share of livestock in the national income is about 22.3%, about 18.2% of total exports and about 38% of agricultural exports. The composition of sheep exported as slaughtered animals was 700,276 sheep (M.A.R.F, 2007).

Meat is a very valuable food as it contributes to tissue building in addition to the provision of energy, vitamin, protein and minerals. It plays an important nutritional and economical role in the lives of human beings. In spite of the importance of sheep they are still raised under nomadic conditions using traditional methods of management depending on natural grazing. The specific problem regarding sheep nutrition under range land conditions is feed shortage and nutrient deficiencies. This situation becomes very critical during the dry season which extends from November through to June. This is reflected in seasonality of reproduction, high mortality rate among both young and adult animals and poor reproductive performance (EL Hag et al., 1998). Reproduction is synchronized in such a way that lambs are dropped during wet summer when fodder and water are available. The direct effects of poor nutrition are reflected in reduced conception, embryonic losses, reduced lambing rate and high ewe mortality. Rarely farmers provide their animals with different supplements during the critical period of feed shortage. Supplements used are mainly oilseed cakes and cereal grains. However, Kordofan, where most of the sheep wealth is located has a high density of trees and shrubs from which pods and foliage could be used as feeds (Fadul, 2007). There is scarcity of data on how to improve the nomadic management systems under range conditions to enhance the reproductive and productive performance of hamari sheep. The present experiment was designed to study the



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effect of changing the nomadic husbandry practices during summer with feed supplementation and water restriction and sex on the performance of desert sheep (Hamari sub type).

## MATERIALS AND METHODS

The study was conducted in Mhagor-Area about 30 km south of El-Nuhood (lies within latitudes 11.5-13.75 N° and longitudes 27-29.5 E°) about 900 km west to Khartoum. Average annual rainfall is 300 and 400 mm in the north and southern parts respectively. Average maximum temperature is 24-39°C during most of the year, with peaks above 36°C during April, May and June. The soil types varied from sandy (Goze) dissected by batches of loamy sands (Gardud or gurraba) in the southern part. The main cash crop grown in the locality is mainly millets, sorghum, watermelon, rosella (*Hibiscus sabdariffa*) and groundnut.

### Experimental animal's management

T Thirty desert sheep (15 males +15 females) of the same age (about 8 months) were used in this study. The animals were ear tagged and randomly divided into three groups according to age and body weight and designed as A,B and C respectively each group consist of 10 animals (5 male and 5 female). The first group (Group A) was allowed to drink water every day and was supplemented with additional concentrates, consisting of 40% durra grains, 30% groundnut cake, 29% groundnut hulls and 1% salts. Every head from this group was given 750g concentrates daily. The second group (group B) was allowed to drink water every day without supplementation. The third group (group C) was allowed water at 2-3 days intervals without supplementation. This group was considered as control. All the groups were allowed to graze at night on natural grasses available on pasture and kept in shade during the day from 7:00 am to 6:00 pm. All the parameters related to performance such as weight, body length, and fertility was recorded regularly. The sheep were allowed to mate with the rams in throughout the year.

The animals were given the experimental diet for adaptation period of two weeks. During this period the sheep were treated with Ivomec subcutaneously against external and internal parasites. Albendazole drenches for deworming were given orally. At the end of the adaptation period, the animals were individually weighed after an overnight fast, to give the initial live weight. Live animal body weights were recorded every week while the liner body measurements were done by means of a tap every two weeks (Owen et al., 1977). Body linear measurements included:

- Height at withers from the highest point on the dorsum of the animal to the ground surface at the level of the front feet.
- Body length from the tip of the scapular to the pin bone.
- Heart girth around the circumference of the chest just behind the forelegs and along the xiphoid depression.
- The length of the head from the tip of the nose to the atlas joint along the curvature of the head.
- Ear length from the base of the ear at the skull along the dorsal surface to tip of the ear.
- The length of the neck from the atlas joint to first thoracic spinal process.
- The length of the tail from the bas to the tip.

### Statistical analysis:

Data were analyzed by using SPSS version 13 analysis of a completely randomized design (CRD), in factorial arrangement using LSD test for mean separation by use a computer program.

## RESULTS

### Growth performance of desert sheep (Hamari sub type)

The importance of supplementation during the dry season was confirmed in this study. The average initial body weights for the three groups were 32.56, 33.60 and 31.60 and were not significantly (P>0.05) (Table 1). The average final body weights were significantly (P<0.05) different among the treatment groups, sheep in treatment A (48.10 kg) had greater final body weight than treatments B (44.40 kg) and C (42 kg) (Table 1).

**Table 1 - Growth performance of desert sheep (Hamari sub type)**

| Parameters | Animal Groups | | | S.E | L.S |
|---|---|---|---|---|---|
| | A | B | C | | |
| Experimental period (days) | 120 | 120 | 120 | - | - |
| Initial body wt (kg) | 32.56 | 33.60 | 31.60 | 1.39 | N.S |
| Final body wt (kg) | 48.10$^{a}$ | 44.40$^{b}$ | 42.00$^{c}$ | 1.39 | * |
| Daily live weight gain (gm) | 129.5$^{a}$ | 90$^{b}$ | 86.67$^{c}$ | 0.6 | * |

Values in the same column followed by different letters are significantly different at P<0.05 or 0.001. For this and preceding tables the superscript letters determine the significant differences: NS = Not significantly different; * = Significantly different at 0.05; ** = Significantly different at 0.01; *** = Significantly different at 0.001; S.E = Standard error; L.S = Level of significant.

The initial body weight is very indicative of how animal can response to the supplemented diets. Result obtained here is similar to the results of Ahmed (1993) for the same breed. The values of final weights were 36.8,



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32.8 and 28.3 kg for groups A, B and C, respectively. This result agrees with Beshir (1996) who reported that, the average final body weight were not significantly different among the treatment groups, their values were 37.71, 36.69 and 36.04 kg in treatments A, B and C, respectively.

The average daily weight gain was significantly (P<0.05) different among the treatment groups, and the highest rate was in treatment A (129.5 gm) followed by B (90 gm) and finally C (86.67 gm). The average daily weight gain reported here agrees with that reported by El-Khider (1989) who reported an average daily gain of 121 and 117 gm per day for desert sheep fed molasses-urea blocks plus oil seed cake and concentrates. Ahmed and Suliman (1988) and Mansour (1987) found similar results for Sudan desert sheep fed 10% and 15 % blood meal. Suleiman and El-Amin (1980) and Allama (1987) reported that daily gain of Sudan desert sheep was 237 and 215 gm per day which is superior to the values reported in the present study. These values are superior to the values reported in this study for the Desert sheep subtypes. The most likely reason for this discrepancy might be due to the fact that animals used in this study were more mature than those in the other studies reported and also may be due to different management practice.

### Effect of sex on body weight growth

The sex in this study seem to be have no significant (P>0.05) effect on growth performance of the dessert sheep. In all groups there were no significant differences in initial body weight. In groups B and C the average final body weight of males (47.60, 47.60 kg, respectively) was significantly (P<0.05) greater than that of females (41.20, 42.40 kg, respectively). The differences in final weight between males and females in treatments B and C may be attributed to the anabolic effect of male sex hormones and may be to genetic factors. This results are similar to those of Mohamed (2004) who reported that, the final live weight was significantly (P<0.05) higher for ram than ewe lambs. And in line with Musa et al (2005) who reported body weights of rams and ewes were 45.59 and 39.50 kg, respectively.

The average body weights of females were significantly (P<0.05) different among the three groups. The average live weight was higher in females of group A than those of B and C respectively. This result is in harmony with the results of Lutfi (1985) and Fadul (2007) who found that there were significant differences between ewes fed on pasture and those supplemented.

The average live weights of males in the three treatments were significantly (P<0.05) different. The males in group A had higher average live weights than those of males in the other groups. This result disagrees with the results of Amani et al. (2009) and Suliman (1999) who reported that animals fed on groundnut cake had the highest final body weight average (31.69 kg), while animals fed on sesame cake had the lowest final body weight average (29.98 kg). These differences may be attributed to differences between rations.

**Table 2 - Effect of sex and management system of desert sheep (Hamari sub type)**

| Parameters | Animal groups | | | | | |
|---|---|---|---|---|---|---|
| | A | | B | | C | |
| | Female | Male | Female | Male | Female | Male |
| Initial body wt(kg) | 33.26 ±1.97 | 31.85±1.97 | 32.60±1.97 | 34.60±1.97 | 32.46±0.73 | 33.70±0.73 |
| Final body wt(kg) | 48.28±1.97 | 48.00±1.97 | 41.20±1.97 $^{b}$ | 47.60± 1.97$^{a}$ | 42.40±0.73$^{b}$ | 47.60±0.73 |
| Daily live weight gain (gm) | 125.52±1.97 | 134.58±1.97 | 71.67±1.97b | 108.33±1.97a | 82.83±0.73b | 115.83±0.73a |
| Females | 38.74 ±0.48 a | | 35.21 ±0.48 a | | 34.21 ±0.48 b | |
| Males | 38.73 ±0.48 a | | 37.07 ±0.48 b | | 36.08±0.48 c | |

Values in the same column followed by different letters are significantly different at P<0.05 and P<0.01.

### Body measurement

The determination of correlations between body measurements in sheep may help to provide tools for predicting characters which are not usually easily measured in the field. In the current study seven basic physical measurements were taken with the purpose of providing a comparative description of the three groups of animals under investigation.

Effect of sex in linear body measurements there were no significant differences between females and males in the length of head, ear, neck and tail (Table 3). However, the height at withers, heart girth, chest depth and body length, were significantly (P<0.05) different in the two sexes. The males had higher measurements than females; their values were 84.54, 84.04, 42.01 and 64.11 cm, respectively. The corresponding measurements for females were 82.60, 82.22, 41.58 and 60.71 cm, for height at withers, heart girth, and chest depth and body length, respectively. These results are agreement with Mohamed (2004) and Musa et al (2005) who indicated that the average body length, heart girth, height at withers and chest depth of ram were 64.17, 86.59, 82.65 and 43.43 cm and for ewe were 61.87, 83.10, 76.97 and 41.12 cm, respectively.

Wither height and body length were significantly (P<0.01) greater in rams than in ewes and this may partly be due to differences in the degree of development as a consequence of the effects of sex hormones. These results were in line with Maglad et al. (1986) and supported by Mehta et al. (1995) who stated that sex of the animal had a significant effect on body weight, height at weathers, body length and chest girth. In addition, the results are also in agreement with the findings of Suliman (1999) who reported that Shugor and Dobasi have the best chest depth in



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relation to age, followed by heart girth, body length and withers height. these results showed that among live measurements of body condition score heart girth, body length and withers height, have the highest correlation with body length and withers height. These differences in results may be due to genetic factors and confirm the belief that males have higher body measurements than females.

**Table 3 - Effect of management systems and sex on body measurements of desert sheep (Hamari sub type)**

| Parameters (cm) | Animal Groups | | | | | Sex | | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | S.E | L.S | Females | Males | S.E | L.S |
| Head length | 29.4 | 30.24 | 29.18 | 0.10 | NS | 29.19 | 30.40 | 0.08 | NS |
| Ear length | 19.80 | 19.39 | 19.30 | 0.09 | NS | 19.49 | 19.50 | 0.07 | NS |
| Neck length | 30.11 | 30.88 | 30.86 | 0.09 | NS | 30.84 | 30.06 | 0.08 | NS |
| Tail length | 64.13 | 62.27 | 63.61 | 0.44 | NS | 64.65 | 63.69 | 0.36 | NS |
| Height | 82.42 | 84.65 | 83.14 | 0.42 | NS | 82.60 | 84.54[a] | 0.34 | * |
| Heart girth | 82.35 | 84.56 | 83.98 | 0.35 | NS | 82.22 | 84.04[a] | 0.28 | * |
| Chest depth | 41.15 | 42.77 | 41.47 | 0.17 | NS | 41.58 | 42.01[a] | 0.14 | * |
| Body length | 64.81 | 64.46 | 62.96 | 0.29 | NS | 60.7 | 64.11[a] | 0.24 | * |

The different measurements of females and males of the three treatments in the study were showed no significant (P>0.05) differences among females in head, ear, neck, tail, height, chest depth and body length in treatments A, B and C, respectively (Table 4). Also males of the three treatments were not significantly (P>0.05) different with regard to those parameters (Table 5). This result is in harmony with the results of Mohamed (2002) who found that, there were no significant differences in these measurements between Hamari and Kabashi lambs. However, Kabashi had higher values for height at withers, heart girth and head length.

**Table 4 - Effect of female and management systems on linear body measurements (cm)**

| Parameters (cm) | Animal Groups | | | S.E | L.S |
|---|---|---|---|---|---|
| | A | B | C | | |
| Head length | 29.55 | 30.39 | 28.96 | 0.14 | NS |
| Ear length | 19.16 | 19.54 | 18.41 | 0.12 | NS |
| Neck length | 29.99 | 29.76 | 29.76 | 0.13 | NS |
| Tail length | 63.45 | 62.69 | 64.44 | 0.62 | NS |
| Height | 82.42[b] | 79.51[b] | 82.87[b] | 0.59 | * |
| Heart girth | 82.40[b] | 82.76[b] | 81.50[b] | 0.48 | * |
| Chest depth | 41.65[b] | 41.37[b] | 41.73[b] | 0.24 | * |
| Body length | 60.95[b] | 59.66[b] | 60.51[b] | 0.41 | * |

**Table 5 - Effect of male and management systems on linear body measurements (cm)**

| Parameters (cm) | Animal Groups | | | S.E | L.S |
|---|---|---|---|---|---|
| | A | B | C | | |
| Head length | 30.39 | 30.43 | 30.40 | 0.14 | NS |
| Ear length | 19.77 | 19.24 | 19.54 | 0.12 | NS |
| Neck length | 30.23 | 30.00 | 29.96 | 0.13 | NS |
| Tail length | 61.44 | 60.86 | 63.62 | 0.62 | NS |
| Height | 84.41[a] | 83.79[a] | 84.41[a] | 0.59 | * |
| Heart girth | 84.30[a] | 84.36[a] | 81.50[a] | 0.48 | * |
| Chest depth | 42.15[a] | 42.18[a] | 41.73[a] | 0.24 | * |
| Body length | 64.67[a] | 63.26[a] | 60.51[a] | 0.41 | * |

## CONCLUSIONS

It may be concluded that the final body weights of Hamari sheep supplemented with concentrates were greater than those grazed on natural pasture. Hamari sheep grazing on natural pasture gave male with higher body weights than female. Finally the body measurements of Hamari sheep were significantly higher with regard to height at withers, heart girth, chest depth and body length in males compared to females.

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