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EFFECT OF FAT TAIL ON REPRODUCTION OF SUDAN DESERT SHEEP IN MAIDUGURI, NIGERIA

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ABSTRACT

Some morphometric characteristics of the fat tailed Sudan desert sheep were studied in two flocks resident in Maiduguri, Northeastern Nigeria. One of the flocks had ewes that had not reproduced in the past two years while the other had ewes known to have conceived and delivered of a lamb within the last two or more years. A total of 30 ewes were sampled in each of the flocks to determine body weight, body condition score, height at withers, and tail base width. The results showed that the mean age of the normally reproducing ewes was 2.38 ± 0.48 years, body weight was 40.53 ± 10.55 kg, height at withers was 76.03 ± 10.68 cm and tail base width was 4.53 ± 0.83 cm while those of the normally not reproducing SDE's were 5.26 ± 1.08 years, 46.90 ± 8.15 kg, 81.03 ± 3.86 cm and 6.22 ± 1.15 cm respectively. There was a significant and positive correlation ($p < 0.05$) between the body weight age, body condition score and tail base width in both groups studied. The tail base width was significantly correlated ($p < 0.05$) with body weight in both the normally reproducing and non-reproducing Sudan desert ewes ($r=0.39$ and $r=0.52$) respectively. In conclusion, the tail base width of the Sudan desert ewes was higher in older, non-reproducing ewes, and might be responsible for failure of intromission during natural mating and may be the reason for their not conceiving and lambing (non-reproduction) among the older Sudan desert ewes.

Keywords: **Sudan desert ewe, reproduction, fat tail width, Maiduguri**

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INTRODUCTION

The Sudan desert sheep (SDS) is one of the fat tailed breeds of sheep distributed from Sudan extending eastwards into Eritrea and westwards into Lake Chad [1, 2]. The distinctive features of the Sudan desert sheep, their origin, ecology and production potentials have been described [1]. The population of the SDS in Nigeria is yet to be determined but a small number of them are kept for breeding by some farmers in Maiduguri, northeastern Nigeria.

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The determinants of fertility in ewes include inherited traits, health and management practices [3,4,5]. The fat tail is a characteristic of some sheep breeds and have been described [2,6]. The tail of the SDS has a wide base which is an adaptation for storing nutrients when food is plentiful for use at the time of food scarcity; they may deposit up to 20 % of their total body weight in their tail [7]. In many countries, fat tailed sheep breeds are an important source of meat and produce more meat than the thin tailed sheep breeds [8].

Puberty in Sudan desert sheep (SDS) is attained at the age of 7 months for the ewe and 12 months for the lamb [1,9]. Studies have shown that the production characteristics of the Sudan desert sheep is influenced by seasonal nutritional status and husbandry system [7]. In addition, feed supplemented with concentrates increase birth weight and growth rate in the ewes [5].

The body condition score (BCS) and morphometric characteristics of sheep have been reported to influence their production and reproductive traits [6,10]. For instance, the body condition score (BCS) of fat-tailed Barbarine ewes were positively correlated with lamb growth parameters, ewe body weight and BCS at weaning [11]. The fat-tailed ewes mobilize their reserves during pregnancy to cover the conception requirements enabling them to reach lambing even with low BCS [11].

The SDS is not indigenous to Nigeria but were imported into the country due to. The population of the SDS in Nigeria is yet to be determined but a small number of them are kept for breeding by some farmers in Maiduguri, northeastern Nigeria. Over the years, the University of Maiduguri Veterinary Teaching Hospital received several complaints from sheep breeders that the SDE do not conceive and produce lambs as frequently as other indigenous breeds of sheep.

A previous report by Alaku [3] had compared production characteristics of 609 indigenous Balami sheep breed and 483 imported Sudan desert sheep in Maiduguri, Nigeria. The author reported that the local Balami breed was significantly superior in almost all production traits considered and suggested that the rearing of the Sudan desert sheep in Maiduguri was neither economically justifiable nor rational. Previous reports have shown that the large flabby tail of breeds such as SDE constitutes a major impediment to intromission by the ram during mating [12,1].

This study was therefore designed to study some morphometric characteristics and the fat tail in normally reproducing and non-reproducing Sudan desert ewes in Maiduguri, Nigeria.

MATERIALS AND METHODS

Experimental Animals and their Management

This study was carried out in two private farms in Maiduguri, Borno State, Nigeria. Data were purposively collected from 60 Sudan desert ewes using cross sectional study design. The first group of 30 ewes was SDE whose owners complained of not conceiving and lambing for 2 years or more while the second group of SDE were from those that had conceived and lambed at least twice in the last 2 years.

All the farms visited had mixed populations of SDS, Uda and Balami breeds of sheep that were reared under intensive system of management. They were fed with groundnut hay, bean husk and wheat offal while water was provided *ad libitum*. The ewes were allowed to run freely with rams in the flock. Biometric measurements such as height at withers (HW) and tail base width (TBW) were taken in centimetres (cm) using a flexible measuring tape and a Vernier caliper (Triclebrand® 6-150mm, Sigmat Jangka sorong, China). The height at withers (cm) was determined as the vertical distance from the shoulder at the withers to the ground [13]. Tail base width was determined in centimetres by holding the tail at an angle of 90^0 from the body while the measurement was taken from the dorsal site of the tail from its root using a Vernier caliper [14]. All measurements were obtained while the animal was restrained in a standing position.

The age of each animal was determined by dentition [15]. Individual ewes were weighed using a sack attached to a SALTER® hanging spring balance. The ewes weighed between 35 and 50 kg. Each ewe was assigned with the body condition score of 3 to 5 (1=very thin, 2=thin, 3= average, 4=fat and 5=very obese) [10].

Data were analyzed using SPSS® 16.0 statistical software version 20. Data were summarized and expressed as Means ± Standard deviations. Student T-test was used to compare means. Correlation analyses were conducted between the parameters studied. Values were considered significant at $p< 0.05$.

RESULTS

As shown in Table 1, the age of SDE that were not reproducing (5.26 ± 1.08 years) was significantly ($p < 0.05$) higher than those reproducing (2.38 ± 0.48 years). The body weight (46.90 ± 8.15 kg) and tail base width (6.22 ± 1.15 cm) of the non-reproducing ewes were significantly ($p < 0.05$) higher than those of the reproducing group (40.53 ± 10.55 kg and 4.53 ± 0.83 cm respectively). On the other hand, the height at withers of reproducing ewes was significantly lower than that those of the non-reproducing ewes.

Table 1. Mean ± standard deviation of age and morphometric measurements of normally reproducing and non-reproducing Sudan desert ewes in Maiduguri.

Parameters	Reproductive status of Sudan desert ewes	
	Reproducing (n=30)	Non-reproducing (n=30)
Age (years)	2.38 ± 0.48[a]	5.26 ± 1.08[b]
Body weight (kg)	40.53 ± 10.55[a]	46.90 ± 8.15[b]
Height at withers (cm)	76.03 ± 10.68[a]	81.03 ± 3.86[b]
Tail base width (cm)	4.53 ± 0.83[a]	6.22 ± 1.15[b]

[ab] Figures in the same row with different superscripts are significant different ($P < 0.05$).

In normally reproducing SDE, body weight was significantly ($p<0.05$) correlated with age (r=0.55), height at withers (r=0.69) and tail base width (r=0.39). A similar relationship was recorded between age and height at withers (r=0.65), age with tail base width (r=0.48), tail base width with height at withers (r=0.45). On the other hand, a weak positive ($p>0.05$) relationship was obtained between body condition score with age, body weight and tail base width in normally reproducing SDE (Table 2).

The correlation coefficients (r) of morphometric parameters of non-reproducing Sudan desert ewes in Maiduguri and their significance are shown in Table 3. The body weight had a positive and significant ($p<0.05$) correlation with body condition score (r=0.71) and tail base width (r= 0.52). A similar relationship was recorded between tail base width and body condition score (r=0.40) although some parameters showed weak degree of correlation ($P>0.05$).

Table 2; Correlation between linear body measurement of fertile Sudan desert sheep in Maiduguri

Parameters (n=30)		Body Weight	Age	Height at withers	BCS	Tail width
Body weight	Pearson Correlation	1	0.550*	0.697*	0.076	0.391*
	Sig. (2 tailed)		0.002	0.000	0.691	0.033
Age	Pearson Correlation		1	0.659*	0.297	0.485*
	Sig. (2 tailed)			0.000	0.111	0.007
Height at withers	Pearson Correlation			1	0.362*	0.446*
	Sig. (2 tailed)				0.049	0.013
BCS	Pearson Correlation				1	0.207
	Sig. (2 tailed)					0.274
Tail width	Pearson Correlation					1

*Correlation is significant at 0.05 level (2-tailed); BCS = Body condition score.

Table 3: Correlation between linear body measurements of infertile Sudan desert sheep in Maiduguri.

Parameters		Body Weight	Age	Height at withers	BCS	Tail width
Body weight	Pearson Correlation	1	-0.134	-0.166	0.71*	0.52*
	Sig. (2 tailed)		0.002	0.000	0.691	0.033
Age	Pearson Correlation		1	0.31	-0.056	-0.102
	Sig. (2 tailed)			0.872	0.770	0.593
Height at withers	Pearson Correlation			1	-0.288	0.227
	Sig. (2 tailed)				0.122	0.228
BCS	Pearson Correlation				1	0.408*
	Sig. (2 tailed)					0.025
Tail width	Pearson Correlation					1
	Sig. (2 tailed)					

*Correlation is significant at 0.05 level (2-tailed); BCS = Body condition score.

DISCUSSION

The results of this study suggest that the mean age of the ewes failing to reproduce was higher than those that were reproducing. This finding contrasts with previous reports which reported that fertility rate and multiple birth rates were lower in young ewes than in older ewes or that ewes with higher live weights had higher fertility rates [4]. This suggests that other factors than age might be responsible for the problems these non-reproducing SDEs were having in conceiving and lambing.

The findings of this study that in normally reproducing SDEs body weight was significantly ($p<0.05$) correlated with age (r=0.55), height at withers (r=0.69) and tail base width (r=0.39) agree with previous reports in other sheep breeds [6,16,17,14]. Furthermore, Adejoro and Salako [6] reported that, the general positive influence of body weight and age with other phenotypic traits of properly managed animals is expected since the size and shape of animals increased significantly with increasing age.

The body weight of SDE showed positive and significant ($p<0.05$) correlation with body condition score and tail base width agrees with Taye *et al*. [17] who reported a positive correlation between fat tail width and body weight in older fat tail ewes. A previous study of the mating potentials of fat-tail and Javanese thin-tail sheep breeds showed that fat-tail and thin-tail rams served the thin tail ewes, but were unable to serve fat tail ewes because the fat tail of the ewe in all instances precluded intromission [12]. It was also previously reported that the large tail base of the SDE tail prevents mating unless an assistant quickly intervenes by holding the ewe and shifting the tail with his other hand while the ram stands by to mount. In most cases one mount effects successful mating and conception [1].

It was therefore concluded that the problems of failure of conception and lambing observed in the Sudan desert ewes by farmers in Maiduguri was associated with older Sudan desert ewes probably because their wide tail base width caused failure of intromission during natural mating. It is thus recommended that an assistant lifts the tail during mating for successful intromission to occur.

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