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Some Production Characteristics of Sudan Desert Sheep under Range Conditions in North Kordofan, Sudan

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ABSTRACT

The records on the flocks of sheep at El-Obeid Research Station during 1988–1990 were analysed using least-squares mixed-model procedures. The objective was to study some production characteristics of Sudan Desert sheep in North Kordofan, Sudan, in relation to the seasonal variation and husbandry systems. No significant differences ($p > 0.05$) were found between sedentary and nomadic flocks in the number of ewes serviced and the conception, lambing or abortion rates. Mortality rates were significantly ($p < 0.05$) higher in the nomadic flock. The breeding season had a significant effect on all the parameters measured. Higher conception ($p < 0.05$) and lambing ($p < 0.01$) rates were recorded for the rainy and late dry seasons. However, the highest ewe mortality ($p < 0.01$) was in the rainy season. The highest ($p < 0.01$) lamb weights at birth and at 30 days of age were recorded under the nomadic system. None the less, lambs kept under the sedentary system had somewhat higher weight gains from 60 to 150 days of age. Lambs born during the rainy season had the highest birth weights ($p < 0.05$) and the highest weight at 30 days of age. However, the live weights from 60 to 150 days of age were significantly higher in lambs born in the late dry season. The highest lamb mortality was recorded in the lambs born in the rainy season. Lambs born under the nomadic system and during the rainy season had the highest ($p < 0.05$) weights at 30 and 60 days of age, and also higher ($p < 0.01$) mortality rates compared to the other flock × season combinations. It was concluded that the production characteristics of Sudan Desert sheep reflect the seasonal nutritional status and husbandry system. The effects of supplementary feeding on breeding and pregnant ewes, and on the performance of weaned lambs in the area should be studied. Moreover, the socioeconomic factors governing mobility in nomadic flocks should be thoroughly investigated.

Keywords: breed, husbandry, live weights, mortality, nomadism, productivity, reproduction, season

INTRODUCTION

The estimated Sudanese national sheep flock is 23.04 million head (MFEP, 1994). It has been classified on the basis of morphology and distribution into four main groups: Sudan Desert, Sudan Nilotic, Sudan Arid Upland and Sudan Equatorial Upland (Bennett *et al.*, 1948; McLeory, 1961; Wilson and Clarke, 1975). Fused ecotypes from non-systematic crossbreeding at the boundaries of the ecozones have also been recognized.

More than 65% of the sheep in Sudan are of the Sudan Desert type (*Ovis aries*) (Sulieman *et al.*, 1990), which is believed to be a descendant of a sheep of Egyptian origin (*Ovis longipes*). They are distributed north of latitude 10°N, extending eastward into Eritrea and westward into Chad (Wilson, 1991) and are raised under rangeland conditions in the eastern and western regions of the country. Sudan Desert sheep are further classified into tribal subtypes, e.g. Hamari, Kabashi, Shenbali in North and West Kordofan States (Mukhtar, 1985), Shugor, Dubasi and Watish in the Central States (Sulieman *et al.*, 1990) and Bourug in the Butana area of eastern Sudan.

In recent years, the use of Sudan Desert sheep as an export commodity has increased. In 1991/92, it contributed about $60 million to the national foreign exchange earnings at an annual offtake rate of 600 000 head (LMC, 1992). Kordofan region is the major source of sheep for export, mostly of the Hamari and Kabashi subtypes. It holds about 4.63 million head (20%) of the national sheep flock, concentrated mostly in the northern and western states. None the less, the production characteristics of Sudan Desert sheep under the rangeland conditions of North Kordofan have not been studied in detail. This paper summarizes the seasonal trends in some production characteristics of Sudan Desert sheep under two husbandry systems in North Kordofan, Sudan.

MATERIALS AND METHODS

Study area

El-Obeid Research Station is situated in Sheikan Province, North Kordofan (latitude 11° 15′–16° 30′N and longitude 27–32°E), Sudan. The average maximum temperature varies between 30 and 35°C during most of the year, with peaks of above 40°C during April, May and June. The rainy season extends from July to October, reaching its peak in August. The average annual rainfall is about 280 mm. Soil types vary from the predominant sandy (*goz*), through loamy sands (*gardud*) to clays. The dominant vegetation is a varying mixture of grasses and herbs, with scattered shrubs interspersed with bare areas (Technoserve, 1987).

The research station sheep flock

El-Obeid Research Station established two flocks of Sudan Desert sheep in 1984. One hundred and fifteen ewes and 10 rams (3 years old), comprising 40 ewes and 4 rams of the Shenbali, and 75 ewes and 6 rams of the Kabashi subtypes, were bought from producers. All the animals were ear-tagged. Seventy-six head were stationed at ElHamra village in North Kordofan as a sedentary flock, while the other 49 head were maintained as a nomadic flock with the Shanabla tribe.

Both flocks were maintained on open rangelands. Common vegetation species in the ElHamra region are *Zornia glochidiata*, *Gisekia pharaceoides*, *Loudetia togoensis*, *Aristida* spp., *Echinochloa colonum*, *Dactyloctenium aegyptium*, *Cenchrus bifloris* and

some *Chrozophora brochiana*. The dominant species in the Shanabla area are *Alysicarpus monilifera*, *Ethulia conyzoides* and *Tephrosia gracilis*.

Common salt in drinking water at a rate of 70 g/head per day was the only supplement provided. Except in the rainy season, the animals were given water every 3 days.

Service dates, lambing rates, lamb birth weights and growth, abortions and mortality rates were recorded. The first culling was done in 1988, with 60 and 120 ewes being culled from the nomadic and sedentary flocks, respectively. No controlled breeding measures had been imposed on these flocks, and ewes and rams were kept together all the time, resulting in breeding throughout the year.

Routine health practices, such as vaccination against sheep pox, haemorrhagic septicaemia and anthrax, were undertaken. Prophylactic treatment with anthelmintic (Ivomec) was administered, particularly prior to the rains (June) and after the rainy season (November). Shearing was usually done in May–June, just prior to the rainy season.

Production characteristics

Data regarding ewe numbers, services, lambing, abortions and deaths, and data regarding the number of lambs, birth dates, birth weights, monthly live weights up to 150 days of age and lamb mortality were obtained from the flock records for 1988, 1989 and 1990.

The data were arranged and analysed according to the two husbandry systems (nomadic and sedentary flocks) and according to the three seasons; rainy season (July–October), early dry season (winter, November–January) and late dry summer season (February–June).

Statistical analysis was carried out using least-squares mixed-model procedures (Harvey, 1977). The model used included fixed effects of season and lamb sex and the random effect of flock (husbandry system). The year of birth was neglected because of unequal and disproportionate subclass (year) numbers. Arcsine transformations were made before statistical analysis of percentages and rates (Snedecor and Cochran, 1982). An interactive statistical package (CRunch Software, CRISP) (Bostrom and Stegner, 1984) was used for the statistical analyses.

RESULTS

Effect of production system and breeding season on ewe performance

Table I summarizes the least-squares estimates for the mean reproductive performance of the ewes as affected by husbandry system (flock) and breeding season. No significant differences were found between the sedentary and nomadic flocks in the number of ewes serviced, conception, lambing or abortion rates. However, relatively higher rates were recorded for the sedentary flock. The mortality rates in breeding ewes were significantly higher in the nomadic flock than in the sedentary one.

TABLE I
The reproductive performances of Sudan Desert ewes as affected by the management system and breeding season

Factor	*n*	No. of serviced ewes	Conception rate (%)	No. of lambing ewes	Lambing rate (%)	No. of ewes that aborted	Abortion rate (%)	No. of ewes that died	Breeding ewe mortality rate (%)
Overall mean	237	139	58.6	77	55.4	20	14.4	42	30.2
Overall SE		1.4	1.90	2.9	1.53	1.6	2.20	2.0	2.09
Flock									
Sedentary	120	74	61.7	43	58.1	12	16.2	18	24.3
Nomadic	117	65	55.6	34	52.3	8	12.3	24	36.9
Av. SE		3.4 NS	2.25 NS	6.94 NS	3.25 NS	3.5 NS	5.58 NS	2.1 NS	2.13*
Breeding season									
Early dry	23	11	47.8	5	45.5	4	36.4	2	18.2
Late dry	156	94	60.3	55	58.5	15	15.9	25	26.6
Rainy season	58	34	70.8	17	50.0	1	5.9	15	44.1
Av. SE		13.70*	5.47*	2.50**	3.49 NS	0.9**	6.72*	5.7*	5.30**
Flock × season Interaction (SE)		4.1 NS	2.88 NS	2.8 NS	2.35 NS	1.4 NS	2.21 NS	0.82 NS	8.46 NS

NS, not significant ($p > 0.05$)

*Significant ($p < 0.05$)

**Highly significant ($p < 0.01$)

Breeding season had significant effects on all the parameters studied, with the exception of lambing rates. Significantly higher numbers of serviced and lambing ewes were recorded in the late dry season and higher lambing and mortality rates occurred during the rainy season (Table I). No significant flock × season interactions were found.

Effects of husbandry system and lambing season on lamb growth

Complete records were found for only 135 lambs, 70 in the sedentary flock and 65 in the nomadic one. Lambs born under the nomadic system had significantly higher birth weights and body weights at 30 days of age than those born under the sedentary system (Table II). Least-squares means, for lamb weights from 60 to 150 days of age, were not significantly different between the two systems. Lambs kept under the nomadic system had relatively higher weights and significantly higher mortality rates than those kept under the sedentary system (Table II).

Lambing season had significant effects on birth weights and on subsequent live weights up to 150 days of age. Lambs born in the rainy season had the highest birth weights and the highest weights at 30 days of age. Lamb weights (Table II) and growth (Table III) from 90 to 150 days of age were significantly higher in lambs born in the late dry season. The highest lamb mortality was in lambs born in the rainy season, followed by those born in the early dry season (Table II).

There was a significant flock × season interaction in the least-squares means for lamb mortality, birth weight and live weights at 30 and 60 days of age (Table II). Lambs born under the nomadic system and those born during the rainy season had the highest weights and mortality rates (Table II).

Effect of sex of lamb on lamb performance

Lamb sex had no significant effect ($p > 0.05$) on lamb weights (Table II) or growth (Table III). Males were heavier than females, but lamb mortality was highest in females (Table II). No significant sex × flock or sex × season effects were found in the least-squares estimates for lamb weights (Table II) or lamb growth (Table III). However, significant sex × season and sex × flock interaction effects were found for lamb mortality.

DISCUSSION

Sheep husbandry systems in North Kordofan vary between sedentary and nomadic. In sedentary systems, the flocks are kept close to villages, with minimal movement. However, the Shanabla, with whom the nomadic flock was kept, are nomads with no home territory, moving along defined routes throughout the year (El Tahir *et al.*, 1999). The stress caused by moving in the nomadic system could be the cause of the trend towards a low number of ewes serviced, conception and lambing rates, and for the significantly higher mortality rates in breeding ewes (Table I).

TABLE II
Least-squares means for Sudan Desert lamb weights (kg) from birth to 150 days of age and the mortality rate as affected by the management system, season of birth and the sex of the lamb

Factor	Total *n*	Mortality	Least-squares estimates for lamb weights (kg) at different ages (days)					
			Birth	30	60	90	120	150
Overall mean	135	24.8	3.72	8.71	11.29	12.85	14.35	15.79
Overall SE		0.18	0.230	0.279	0.431	0.615	0.704	1.178
Flock								
Sedentary	70	21.0	3.38	8.05	10.89	12.46	14.24	15.62
Nomadic	65	28.6	4.08	9.42	11.72	13.07	14.47	15.97
Av. SE		0.40**	0.135**	0.307**	0.381 NS	0.455 NS	0.487 NS	0.630 NS
Season of birth								
Early dry	58	21.5	3.52	7.70	10.68	11.97	13.45	14.64
Late dry	9	18.2	3.17	9.33	11.04	13.59	16.56	19.67
Rainy season	68	28.4	3.83	9.49	11.84	13.49	14.75	16.26
Av. SE		0.87**	0.217*	0.377**	0.219**	0.360**	0.473**	0.606 NS
Flock × season		0.90**	0.625*	1.416*	1.759*	2.102 NS	2.248 NS	2.908 NS
Sex of lamb								
Males	74	21.5	3.87	8.84	11.65	13.47	14.95	16.64
Females	61	28.2	3.52	8.57	10.85	12.97	13.75	14.89
Season × sex (SE)		0.38**	0.75 NS	1.68 NS	1.95 NS	2.29 NS	2.45 NS	3.15 NS
Flock × sex (SE)		0.50**	0.28 NS	0.69 NS	0.80 NS	0.94 NS	1.00 NS	1.32 NS

NS, not significant ($p > 0.05$)
*Significant ($p < 0.05$)
**Highly significant ($p < 0.01$)

TABLE III
Least-squares means for growth of desert lambs during various periods from birth to 150 days of age as affected by the production system, season of birth and the sex of the lamb

Factor	*n*	Least-squares estimates for lamb growth (kg) at different age periods (days)					
		0–30	30–60	60–90	90–120	120–150	0–150
Overall mean	135	5.03	2.49	1.68	1.68	1.63	12.50
Overall SE		0.313	0.303	0.307	0.343	0.370	0.548
Flock (husbandry system)							
Sedentary	70	4.69	2.88	1.82	1.60	1.38	12.24
Nomadic	65	5.34	2.31	1.31	1.40	1.50	11.89
Av. SE (system)		0.251 NS	0.483 NS	0.538 NS	0.270 NS	0.332 NS	0.813 NS
Season of birth							
Early dry	58	4.18	3.05	1.24	1.57	1.10	11.14
Late dry	9	5.33	1.66	2.54	2.97	3.11	15.61
Rainy season	68	5.65	2.35	1.74	1.26	1.51	12.51
Av. SE (season)		0.552**	1.061 NS	1.180 NS	0.394*	0.728 NS	0.572**
Av. SE (system × season)		1.161**	2.230 NS	2.484 NS	1.248 NS	1.531 NS	0.545 NS
Sex of lamb							
Males	74	4.97	2.67	1.84	1.58	1.62	12.68
Females	61	5.04	2.52	1.25	1.41	1.21	11.43
Av. SE (sex)		0.26 NS	0.47 NS	0.43 NS	0.27 NS	0.33 NS	1.67 NS
Av. SE (sex × system)		0.56 NS	0.98 NS	1.13 NS	0.55 NS	0.68 NS	1.78 NS
Av. SE (sex × season)		0.75 NS	2.41 NS	2.17 NS	1.37 NS	1.68 NS	1.33 NS

NS, not significant ($p > 0.05$)
*Significant ($p < 0.05$)
**Highly significant ($p < 0.01$)

Seasonal effects on the reproductive performance and mortality of the ewes (Table I) could be attributed to the changing nutritional status of the animals with the seasonal availability of good quality grazing. The nutritive value of rangeland grasses declines sharply during the dry season (El-Hag, 1992). Nutrition is one of the environmental factors that affect reproduction in farm animals (Tatman *et al.*, 1990). Direct effects of poor nutrition are reflected in reduced conception, embryonic losses, reduced lambing rates (Diskin and Niswender, 1989) and high ewe mortality (Yoder *et al.*, 1990). El-Hag and colleagues (1998) reported a conception rate of 66.7% and an abortion rate of 50% in ewes under range conditions during the dry season in North Kordofan, Sudan.

Both the husbandry system and the lambing season had significant effects on lamb weights (Table II) and subsequent growth (Table III). Sulieman and colleagues (1990), evaluating Sudan desert sheep in Gezira Province in central Sudan, found that lambs born in the wet summer were heavier than those born in either the winter or the hot dry summer. They attributed differences in the seasonal birth weights to the differences in the condition of the ewes in the immediate prepartum period. The highest number of births reported in this study was during the rainy season, whereas the smallest numbers were during the late dry season (Table II). Lambs born during the rainy or early dry seasons face long dry periods during their first three months of age, with low-quality grazing (El-Hag, 1992) and low milk yields from their dams. This could be the cause of the higher mortality rates in these lambs, which were of lower live weights (Table II) and growth rates (Table III) than those born in the late dry season. The high incidences of pneumonia (10%) and footrot (9%) which occur during the rainy season (Haroun *et al.*, 1993) may be another cause of the high lamb mortality. Sulieman and colleagues (1990) reported that the season of birth generally influences lamb mortality at all ages from 30 days on.

The common practice used by farmers in the area (Figure 1) is to breed their sheep flocks during the summer (January–March) with subsequent lambing during the rains (July–September) (Mukhtar, 1985). This practice would ensure good grazing resources for lambing ewes and hence higher milk yields for their lambs. However, it exposes weaned lambs to the long dry winter and summer periods. This is evidenced by the low

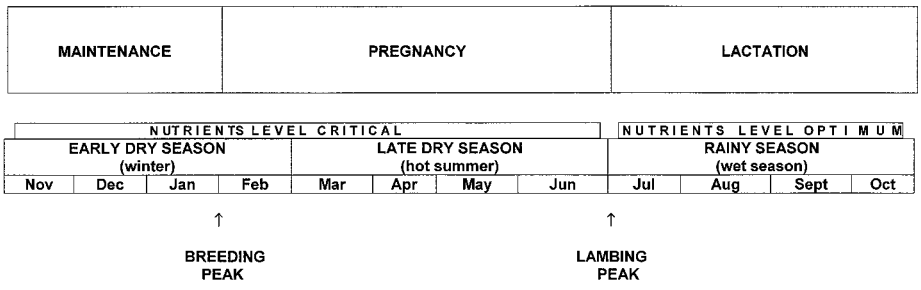

Figure 1. Traditional production cycle of Sudan Desert sheep in North Kordofan, Sudan

growth rates in the lambs born in the rainy and early dry seasons, particularly after 60 days of age (Table III). Lambs born under the nomadic system had higher birth weights (Table II), but the growth rate under the sedentary management system tended to be somewhat higher ($p > 0.05$) (Table III).

Lambs born under the nomadic system and during the rainy season had the highest birth weights and the highest weights at 30 to 60 days of age (Table II). This may be attributed to the nomadic flocks having access to a variety of grasses and herbs owing to movement from one area to another, unlike sedentary flocks, whose grazing was confined to limited areas around the villages.

Male lambs were heavier at birth than females, but their weights (Table II) and growth rates (Table III) were not significantly different. Males have been reported (Bunge *et al.*, 1990) to be heavier and to grow faster from birth to weaning.

CONCLUSIONS

It may be concluded that the production characteristics of Sudan desert sheep are reflections of the seasonal nutritional status and of the management systems. The reproductive performance and mortality of ewes were better under the sedentary production system.

Lambing at the end of the rainy season and during the late dry season necessitates providing supplementary feeding to the lambing ewes and increases the need to provide good quality supplements to weaned lambs so as to improve their growth. Furthermore, preventive measures against pneumonia and footrot should be undertaken in order to reduce lamb mortality, particularly in the nomadic flocks during the rainy season.

Despite the relative merits of the sedentary system, the socioeconomic factors governing mobility in nomadic flocks should be thoroughly investigated. This is a prerequisite before recommending which system is better overall.

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REFERENCES

Bennett, S.C.J., John, E.R. and Hewison, J.W., 1948. Animal husbandry. In: J.D. Tothill (ed.), *Agriculture in the Sudan*, (Oxford University Press, London), 663–667

Bostrom, A. and Stegner, B., 1984. C*Runch Software Interactive Statistical Package (Version 84.1)*, (CRunch Software, 1541 Ninth Avenue, San Francisco, CA)

Bunge, R., Thomas, D.L. and Stookey, J.M., 1990. Factors affecting productivity of Rambouillet ewes mated to ram lambs. *Journal of Animal Science*, **68**, 2253–2262
Diskin, M.G. and Niswender, G.D., 1989. Effect of progesterone supplementation on pregnancy and embryo survival in ewes. *Journal of Animal Science*, **6**, 1559–1563
El-Hag, F.M., 1992. Effects of chopping and wilting on tropical grassland silage quality in South Kordofan, Sudan. *African Livestock Research*, **2**, 11–14
El-Hag, F.M., Fadlalla, B. and Elmadih, M.A., 1998. Effect of strategic supplementary feeding on ewe productivity under range conditions in North Kordofan, Sudan. *Small Ruminant Research*, **30**, 67–71
El Tahir, B.A., El-Hag, F.M. and Mekki, M.A., 1999. Review of pastoral and agro-pastoral systems in North Kordofan, Sudan. A special assignment report for the El Ain Natural Forest Management Project (NFMP) and SOS-Sahel International (UK)
Haroun, B.O., Abdel Karim, E.I., Gismalla, T.H. and El-Hag, F.M., 1993. *Survey of production-related diseases in small ruminant flocks in Sheikan Province, North Kordofan, Sudan*. Livestock Research Technical Report. (Technical Report No. 1; On-Farm Research Project in Traditional Rainfed Areas in Sudan (UNDP/FAO/GOS-SUD/88/022). Season 1992–93)
Harvey, W.R., 1977. *User's guide for LSML'76; Least squares and maximum likelihood computer program*, (Ohio State University, Columbus, OH)
LMC, 1992. Livestock Marketing Corporation (LMC) records. El-Obeid Office, El-Obeid, Sudan
McLeory, G.B., 1961. The sheep of the Sudan. 1. An intensive survey and systems of classification. *Sudan Journal of Veterinary Science and Animal Husbandry*, **2**, 19–35
MFEP, 1994. *Annual Report 1993/94*, Ministry of Finance and Economic Planning (MFEP), (Khartoum, Sudan)
Mukhtar, H.K.. 1985. Constraints to desert sheep production in the sedentary and nomadic systems of North Kordofan. In: M.E. Lazim (ed.), *Annual Research Report (1984–85)*, (El-Obeid Research Station, Agricultural Research Corporation (ARC), Wad Medani, Sudan), 40–55
Snedecor, G.W. and Cochran, W.G., 1982. *Statistical Methods*, (Iowa State University Press, Ames, USA)
Sulieman, A.H., Sayers, A.R. and Wilson, T.R., 1990. *Evaluation of Shugor, Dubasi and Watish subtypes of Sudan Desert sheep at El-Huda National Sheep Research Station, Gezira Province, Sudan*, (ILCA Research Report No. 18, ILCA, Addis Ababa, Ethiopia)
Tatman, W.R., Judkins, M.B., Dunn, T.G. and Moss, T.G., 1990. Luteinizing hormone in nutrient-restricted ovariectomized ewes. *Journal of Animal Science*, **68**, 1097–1102
Technoserve, 1987. *Credit Component Baseline Survey*, (Technoserve Inc., Agricultural Bank of Sudan, US Agency for Agricultural Development, El-Obeid, Sudan)
Wilson, R.T., 1991. *Small ruminant production and small ruminant genetic resources in tropical Africa* (FAO Animal Production and Health Paper No. 18; Food and Agriculture Organization of the United Nations, Rome)
Wilson, R.T. and Clarke, S.E., 1975. Studies on the livestock of southern Darfur, Sudan. 1. Ecology and livestock resources in the area. *Tropical Animal Health and Production*, **7**, 165–187
Yoder, R.A., Hudgens, R.E., Perry, T.W., Johnson, K.D. and Diekman, M.A., 1990. Growth and reproductive performance of ewe lambs fed corn or soybean meal while grazing pasture. *Journal of Animal Science*, **68**, 21–27

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Quelques aspects de la production chez le mouton du désert soudanais à la suite de différentes conditions d'élevage dans le nord Kordofan au Soudan

Résumé – Les observations des troupeaux de mouton au Centre de Recherche El-Obeid entre 1998 et 1990 furent analysées grâce à des modèles mathématiques. L'objectif de cette étude fut de suivre les aspects productifs du mouton du désert soudanais dans le nord Kordofan au Soudan en relation avec les variations saisonnières et d'élevage. Aucune différence ne fut significative ($p > 0,05$) en comparant les troupeaux, soit sédentaires, soit nomadiques, en ce qui concerne le nombre d'accouplement, de conception, d'agneaux ou d'avortement. Les taux de mortalité furent significativement ($p < 0,05$) plus élevés chez les troupeaux nomadiques. La saison de reproduction eut un effet significatif sur les paramètres mesurés. Les taux les plus élevés pour la conception ($p < 0,05$) et pour l'agnelage ($p < 0,01$) furent observés à la saison des pluies et à la saison sèche tardive. Cependant la plus grande mortalité des brebis ($p < 0,01$) fut pendant la saison des pluies.

Les poids les plus élevés des agneaux à la naissance ($p < 0,01$) et après 30 jours furent observés dans le système nomadique. Néanmoins les agneaux gardés dans le système sédentaire montrèrent les gains en poids les plus élevés entre 60 et 150 jours. Les agneaux nés pendant la saison des pluies eurent les poids les plus élevés à la naissance ($p < 0,05$) et après 30 jours. Cependant les poids entre 60 et 150 jours furent les plus élevés chez les agneaux nés pendant la saison sèche tardive. La mortalité la plus élevée pour les agneaux fut observée pendant la saison des pluies. Les agneaux nés dans le système nomadique et pendant la saison des pluies eurent les poids les plus élevés ($p < 0,05$) au bout de 30 et 60 jours ainsi que les taux de mortalité les plus élevés ($p < 0,01$) comparés aux autre types d'association (type de troupeau/saison).

Il fut conclut que les caractéristiques de production du mouton du désert soudanais reflète l'état nutritionnel en fonction des saisons et du système d'élevage.

Les effets des apports nutritifs sur l'agnelage et sur la performance des agneaux après sevrage devraient aussi être suivis dans la zone étudiée, ainsi que les facteurs socio-économiques influençant les mouvements des troupeaux nomadiques.

Características productivas de las ovejas del desierto de Sudán bajo condiciones extensivas en el norte de Kordofan, Sudán

Resumen – Se analizaron los registros de rebaños de ovejas en la Estación de Investigación de El-Obeid durante 1988–1990 mediante el procedimiento de mínimos cuadrados. El objetivo era estudiar algunas características productivas de las ovejas del desierto de Sudán en el norte de Kordofan, Sudán, en relación a la variación estacional y los sistemas de labranza. No se encontraron diferencias significativas ($p > 0,05$) entre los rebaños sedentarios y los nómadas en el número de ovejas cubiertas, en la concepción, en los niveles de partos y abortos. Los niveles de mortalidad fueron significativamente más altos ($p < 0,05$) en el rebaño nómada. La época de reproducción tuvo un efecto significativo en todos los parámetros medidos. Se registraron altos niveles de concepcion ($p < 0,05$) y de partos ($p < 0,01$) en las estaciones lluviosa y al final de la seca. Sin embargo, la mayor mortalidad de ovejas ($p < 0,01$) fue en la estación húmeda.

El mayor peso de los corderos al nacer ($p < 0,01$) y a los 30 días se registró bajo las condiciones nómadas. Sin embargo, los corderos que se mantuvieron bajo el sistema sedentario ganaron más peso entre los 60 y los 150 días de edad. Los corderos nacidos durante la estación lluviosa tuvieron mayor peso al nacer ($p < 0,05$) y a los 30 días. De cualquier modo, el peso vivo de los 60 a los 150 días fue significativamente más alto en corderos nacidos al final de la estación seca. El mayor nivel de mortalidad se registró en corderos nacidos en la estación lluviosa. Los corderos nacidos bajo el sistema nómada y durante la estación lluviosa tuvieron el mayor peso ($p < 0,05$), y mayores niveles de mortalidad ($p < 0,01$) entre los 30 y 60 días, comparados con otras combinaciones de rebaño × estación.

Se concluyó que las características de producción de las ovejas del desierto de Sudán reflejan el estatus nutricional estacional y el sistema de labranza. Deben estudiarse los efectos de una alimentación suplementaria en las ovejas preñadas, y en los corderos destetados en el área. Además, deberían investigarse a fondo los factores socioeconómicos que gobiernan los desplazamientos de los rebaños nómadas.