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Research Article

Field Practices of the Sheep Owners in Management and Sheep Rearing in River Nile State-Sudan

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Abstract

The study was carried out in the southern part of River Nile State in North Sudan to study sheep production practices adopted by sheep owners in the state, the study was conducted from June to October 2018. A total of 75 sheep owners from different households were investigated using questionnaire. The questionnaire focus on personal household data, herd composition, rearing systems, flock feeding and flock management including practices in productive and reproductive traits and production. The results were summarized in descriptive tables and graphs as multiple response analysis, also analysis of variance ANOVA followed by least significant difference (LSD) were used. The results revealed that the majority of sheep owners (94.7%) were above 25 years old ($P < 0.01$) and 61.3% had experience above 15 years in raising animals, around 80% of sheep owners were illiterate or had basic education "Khalwa". Northern riverine wool sheep (NRWS) is the most abundant type in the study area. Animals mainly raised in open range system and semi sedentary (69%), fed on natural range and different concentrates. The results showed significant differences ($P < 0.05$) in weaning age and ram production age among NRWS, Ashgar and Abrag sheep subtypes and recorded the highest value in the most studied productive and reproductive traits. The major priority selection criteria of ewes and rams were size - feature while the main culling criterion was overage for both ewes and rams, low productivity rises in the second rank of culling criteria in ewes, whereas, sexual performance come in the second rank in rams. Both adult's sheep and lambs suffering from internal and external parasites as the most recurrent diseases. Shortage in feed, diseases and security were main production handicaps of sheep production. Extensive and semi-extensive system were most practiced systems. The study concludes that other desert sheep subtypes were found in the study area beside NRWS. Shortage feed, diseases and security were the main production constrains of sheep production in the study area.

Keywords: *Ashgar Sheep; Flock Management; Natural Range; Lamping Season; Sudan*

Abbreviations

NRWS: Northern Riverine Wool Sheep; ANOVA: Analysis of Variance; LSD: Least Significant Difference; SPSS: Statistical Packages for Social Sciences

Introduction

River Nile State own about 2.55 million head of livestock where, sheep represents about 42.1% of its total livestock numbers [1]. The most dominant sheep types in this state is the desert sheep, including different subtypes of sheep such as Ashgar, few numbers of North

riverine wool and Abrag sheep. Sheep are reared under traditional nomadic pastoralist system involving seasonal traveling movements searching for grazing land and water. it usually bred beside other livestock species particularly goats and owned mainly by nomadic Arab tribes and reared in traditional system lacking of modern scientific procedures, hence it exposed to many stress factors such as long trekking, heat, shortage in water supply, and lack and low nutritive quality of pasture especially during dry season [2], However now adays the nomads tend to rear their animals on the agricultural by-products from private schemes or that purchased from farmers to give their animals a sustainable supply of feed. Rangelands in Sudan are characterized by several plant species due to various reasons such as the action and interaction of soil, climate topography and prevalent human activities In spite of degradation due to overgrazing, drought, fire and desertification, they still provide 82.6% of the livestock feed [2]. Sheep are grazed all the year on rangeland and crop residues far distance from home few sheep owners provide concentrates to their animals because of its' high cost [3]. Several research studies reported that extensive-open range-system was the dominant animal production system. Also, it was pointed to many constrains faced sheep production such as lack of water, feed shortage, diseases and less extension services [5,6,10].

Objective of the Study

The objective of this study is to study the productive and reproductive practices that adopted by shepherds and sheep owners in the River Nile State.

Materials and Methods

Study area

The study was conducted from June to October 2018 in the southern part of River Nile State in northern Sudan. River Nile State is located in desert zone between the latitude 16 - 22° North and longitude 32 - 35° East (Figure 1), River Nile crosses the state from south to north beside Atbara river which comes from the east and drains into the river Nile. There are three discrete seasons in the year, based on rainfall and temperature. Winter (November-February), dry summer (March-June) and wet summer (July-October).

Study design

A cross-sectional survey was conducted to obtain data from a simple random sample consisting of seventy five sheep owners from Eldamer local sheep market as collection point of sheep owners and shepherds. The sample size was based on equation of [4], A fitted structured questionnaires were filled in single interviewed for each households, it focus on personal household data, herd composition, rearing systems and flock feeding, flock management including practiced productive and reproductive traits and production constrains.

Statistical analysis

Collected data was categorized and summarized in Microsoft® Excel sheet then analysed using SPSS for Windows program, Version 16 and the results were presented in form of descriptive statistics tables, graphs as multiple responses. Also, analysis of variance ANOVA followed by least significant difference (LSD) was used, the statistical significance was set at a p-value of ≤ 0.05.

Results and Discussion

Personal information of sheep owners

The majority of sheep owners (94.7%) were above 25 years old ($P < 0.01$) and 65.3% of them had experience more than 15 years compare to 34.7% had less than 10 years of experience (Table 1), it seems to be that rearing sheep is life manner of them [3,5] reported agreed results. Figure 1 records that most of sheep owners (76.7%) were either illiterate or had a basic or "Khalwa" education, whereas few of them had a higher educational level (2%), the educational level could be affected by the nomadic nature. These results were agreed with those found by [5-7]. Also, the results showed that the respondents were mainly animal breeders, beside (94.7%) other activities such as farming and public sector employee (Table 2). These results were disagreed with those of [3] who study some characteristics of sheep production in Gadarif State which characterize as agricultural state; hence farming activities comes at the first rank; however it was agreed with those of [5].

Age group (year)	Experience (year)						Total	
	Less than 15		15 - 30		More than 30			
	n	%	n	%	n	%	n	%
Less than 25	4	15.4	0	0.0	0	0.0	4	5.3
25-45	20	76.9	20	51.3	2	20.0	42	56.0
More than 45	2	7.7	19	48.7	8	80.0	29	38.7
Total	26	34.7	39	52.0	10	13.3	75	100.0
Chi-square value = 23.929								

Table 1: *Relationship between age group and years of experience of sheep owners.*

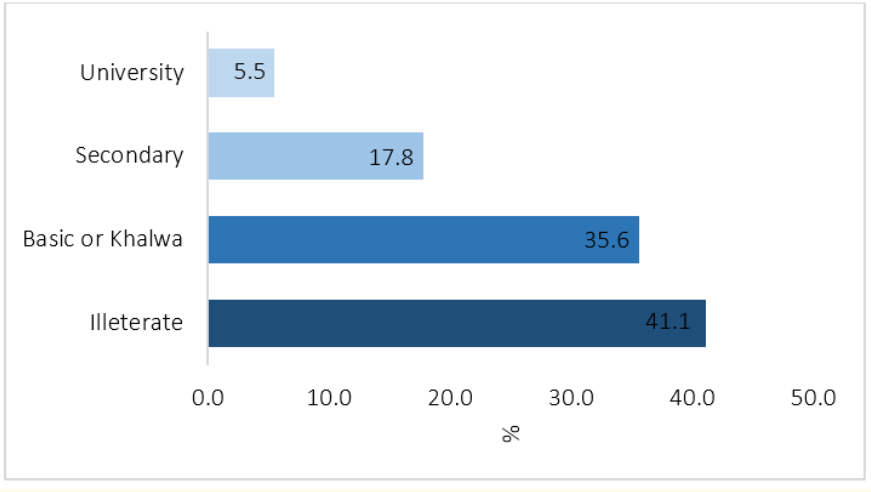

Figure 1: *Educational level of respondents.*

Occupation	n	%	Together
Animal breeder	71	69.6	94.7
Farmer	26	25.5	34.7
Private sector	5	4.9	6.7
Total	102	100.0	136.0

Table 2: *Occupation of sheep owners (N=75).*

Herd structure and sheep subtypes

This study showed that the respondents mainly reared sheep with other livestock species (Table 3) particularly goats. These could be attributed to similarity between sheep and goats source of milk that nomads need for their food. These findings are agreeing to [3,6] from

figure 2. Northern riverine wool sheep (NRWS) was the most abundant sheep subtype in the study area followed by Ashgar ecotype, this might be because of River Nile State a part of NRWS homeland.

Herd	n	%	Together
Sheep	75	55.1	100.0
Goat	37	27.2	49.3
Cattle	21	15.4	28.0
Camel	3	2.2	4.0
Total	136	100.0	181.3

Table 3: *Herd composition.*

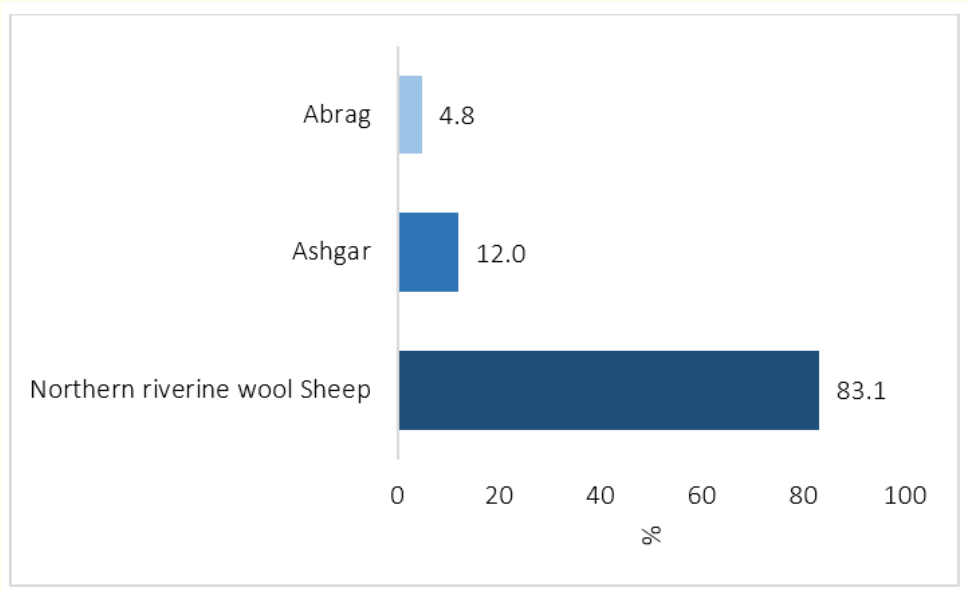

Figure 2: *Proportion of different sheep subtypes in the study area.*

Rearing systems and flock feeding

Figure 3 showed that 37.2% of sheep owners adopted the open range system followed by 31.9% who espoused semi sedentary system with do not difference largely from those practiced on sedentary system 30.9%. these could be due to narrow area of pastures and lack of water source particularly in the end of rainy season in River Nile State which push sheep owners to adopt other rearing systems. Similar finding were found by [8-10]. Also, the obtained results from the interviewers showed that all of them were dependent basically on the natural range followed by different concentrates feedstuffs such as Sorghum (feterita), wheat bran and groundnut cake on feeding their animals, this beside Bersim as main cultivated forage in River Nile State (Table 4). These results were agreed with those of [3,9,10]. The data of most preferable plants by sheep in the study area showed in table 5 where *Hantot (Ipomoea cordovano)* records the highest rank followed by *Sharia* (*Dactvloctenium scindcum*) while *Sarba* and *Bersim* (*Medicago sativa)* (cultivated fodder) come at the last rank.

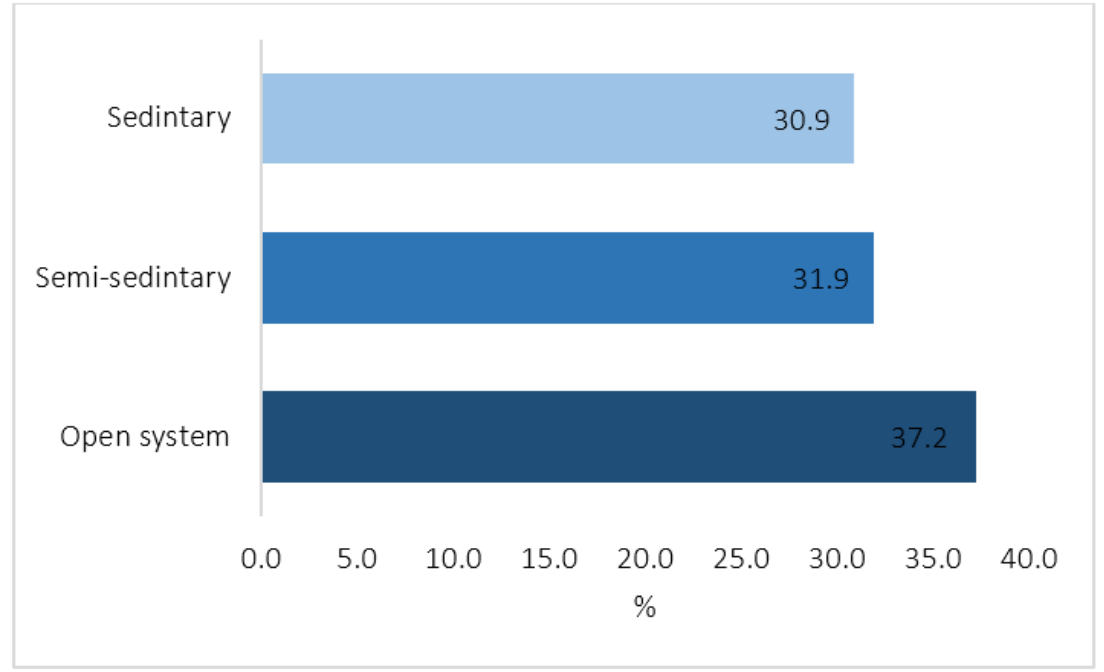

Figure 3: *Management systems adopted by sheep owners in the study area.*

Type of nutrition	n	%	Together
Natural range	75	36.2	100.0
Different concentrates feed	60	29.0	80.0
Bersim	39	18.8	52.0
By-products	33	15.9	44.0
Total	207	100	276

Table 4: *Feeding systems of sheep types in the study area.*

Productive and reproductive traits

The data of the studied productive and reproductive traits (Table 6) showed significant differences ($P < 0.05$) in weaning age and ram production age, Ashgar showed the highest values in most studied productive and reproductive traits. Similar outcomes were found by [11] for the most studied productive and reproductive traits mainly weaning age which ranged from 3.67 to 4 months. Table 7 revealed that wet summer was the most lamping season (89%) of sheep followed by winter (37%), it seems to be that sheep owners flushed their ewes with additional feedstuffs at the beginning of winter and in wet summer (autumn) to reach the season of abundant pasture and feeds.

Local name	Scientific name	n	%	Together
Hantot	*Ipmeacordofano*	64	25.9	85.3
Sharaia	*Dactvlocteniumscindcum*	37	15.0	49.3
Gobash	*Arisidafuniculata*	31	12.6	41.3
Khodra (Molukhia)	*Corchorusdepressus*	21	8.5	28.0
Tarpa	*Boerhaviaerecta/rebens*	19	7.7	25.3
Nageila (Najila)	*Cynododondactylon*	13	5.3	17.3
Sitaih	*Iotusgracinii*	11	4.5	14.7
Seada	*Cyperusesculentus/acumindle*	10	4.0	13.3
Difra	*Echinochloacolona*	10	4.0	13.3
Damblap	*Ischemaischamoides*	6	2.4	8.0
Luba	*Vigna spp.*	6	2.4	8.0
Tabas	*Panicumturgidurn*	6	2.4	8.0
Laplap	*Lablab purpurens*	5	2.0	6.7
Gotom	*Tribulusterrestris*	4	1.6	5.3
Sarba	/////	2	0.8	2.7
Berseem	*Medicago sativa (Indigo ferahochstetteri)*	2	0.8	2.7
Total		247	100.0	329.3

Table 5: *Preferable plants by sheep in the study area.*

Productive and reproductive traits	NRWS	Ashgar	Abrag	Sig.
Birth weight (kg)	2.25 ± 0.53	2.57 ± 0.53	2.43 ± 0.53	NS
Weaning weight (kg)	8.51 ± 2.62^{b}	11.43 ± 2.07^{a}	9.57 ± 1.27^{ab}	*
Mature weight for ram/ewe (kg)	15.92 ± 3.51	18.86 ± 4.71	16.14 ± 3.44	NS
Weaning age (months)	3.68 ± 1.21	3.71 ± 0.76	4.29 ± 1.38	NS
Mature age for ram/ewe (months)	6.85 ± 1.39	5.71 ± 0.95	6.71 ± 1.70	NS
Age at first lambing (months)	11.80 ± 1.85	11.43 ± 0.53	11.29 ± 0.49	NS
Ram production age (year)	5.77 ± 1.70^{b}	6.73 ± 1.11^{ab}	7.29 ± 1.25^{a}	*
Ewe production age (year)	6.43 ± 1.64	6.00 ± 0.58	7.14 ± 0.90	NS
NRWS=North riverine wool sheep. NS=No significant differences, *=Significant at P < 0.05. Different superscript letters within the same row are significant difference at P < 0.05.				

Table 6: *Effect of sheep subtypes on productive and reproductive traits in the study area.*

Lamping time	n	%	Together
Wet summer	65	69.1	89.0
Winter	27	28.7	37.0
Dry summer	2	2.1	2.7
Total	94	100.0	128.8

Table 7: *Lamping time of the studied sheep (N = 75).*

Selection and culling criteria of ewes and rams

The results of selection criteria of ewes practiced by sheep owners (Table 8) indicated that size and feature was the major criterion (98.6%) while maturity age was the lowest selected criterion (27%). In the rams, feature comes at the first rank followed by its physical growth and pedigree of the ram comes in the last rank (Table 9). This could be due to sheep owners tend to select rams for their size and body conformation. These findings were in harmony with those of [5,12] who reported that sheep owners favoured certain subtype than others due to its size and feature. On the other hand, the obtained results of the culling criteria of ewes and rams (Table 10) showed that sheep owners culled their animals due to overage criterion in both ewes and rams, also low productivity comes in the second rank of culling criteria in ewes, where less sexual performance comes in the second rank in rams. These findings were similar to those of [5].

Criterion	n	%	Together
Size and feature	73	42.2	98.6
Colour	54	31.2	73.0
Twining rate	26	15.0	35.1
Maturity age	20	11.6	27.0
Total	173	100.0	233.8

Table 8: *Ewes selection criteria (N = 75).*

Criterion	n	%	Together
Feature	66	35.9	88.0
Sheep subtype	54	29.3	72.0
Growth	40	21.7	53.3
Pedigree	24	13.0	32.0
Total	184	100.0	245.3

Table 9: *Selection criteria of rams.*

Criterion	Ewes			Rams		
	n	%	Together	n	%	Together
Disease	3	2.3	4.1	6	5.0	8.2
Overage	65	49.2	89.0	69	57.5	94.5
Sterility	19	14.4	26.0	-	-	-
Weakness	14	10.6	19.2	16	13.3	21.9
Low productivity	31	23.5	42.5	-	-	-
Less sexual	-	-	-	29	24.2	39.7
Total	132	100.0	180.8	120	100.0	164.4

Table 10: *Culling criteria of ewes and rams.*

Most frequent diseases among adults and lamb of Fulani Sheep

Table 11 shows that internal and external parasites were in the first rank of the most frequent diseases among adult sheep followed by nutritional diseases. While, unspecific diarrhea comes at the last rank. These findings were agreed with those of [3]. Moreover, table

12 revealed that internal and external parasites represent the most frequent diseases in lambs (66.2%) followed by unspecific diarrhea symptoms (46.2%) and pneumonia (41.5%), while viral diseases recorded the lowest value (23.1%). These results were disagreed with those of [13]. Furthermore, two-thirds of interviewees mentioned that lambs less than six months of age were the most infected sheep group compared to one third of animals more than six months of age (Figure 4).

Disease type	n	%	Together
Internal and external parasites	57	29.8	76.0
Nutritional diseases	41	21.5	54.7
Bacterial Diseases	40	20.9	53.3
Viral diseases	33	17.3	44.0
Pneumonia	12	6.3	16.0
Unspecific diarrhea	8	4.2	10.7
Total	191	100.0	254.7

Table 11: *Most frequent diseases in lambs.*

Disease type	n	%	Together
Internal and external	43	37.4	66.2
Unspecific diarrhea	30	26.1	46.2
Pneumonia	27	23.5	41.5
Viral diseases	15	13.0	23.1
Total	115	100.0	176.9

Table 12: *Most frequent diseases among adults sheep.*

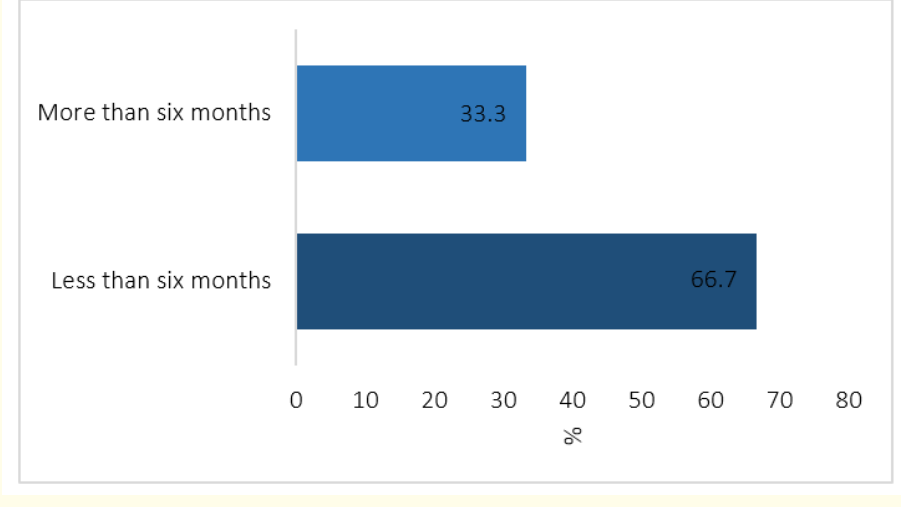

Figure 4: *Most infected sheep age.*

Production constraints

The questionnaire survey revealed that feed shortage, diseases and security (particularly robbing) respectively were the most frequent among production constrains of sheep followed by the existence of predators while lack of water comes at the lowest rank (Table 13). These results were in line with those of [3,14] who found that the main handicaps in rearing sheep were diseases, lack of water and shortage in feed.

Constrains	n	%	Together
Feed shortage	58	25.3	79.5
Diseases	44	19.2	60.3
Security	35	15.3	47.9
Predators	31	13.5	42.5
Lack of extension services	24	10.5	32.9
Lack of labour	19	8.3	26.0
Lack of water	18	7.9	24.7
Total	229	100.0	313.7

Table 13: *Main sheep production constrains.*

Conclusion

It could be concluded that both open and semi-sedentary systems were the most adopted systems by sheep owners, other desert sheep subtypes were found in the study area beside northern riverine wool sheep. Lack of feed, diseases and security were the main production constrains of sheep production in the study area. More consideration and care should be directed to sheep owners and their animals to improve sheep production conditions particularly range management, diseases control and raising the awareness of the owners to be more market oriented in their production.

Bibliography

1. Marfr. Ministry of Animal Resources, Fisheries and Ranges. Department of Statistic and Information. Khartoum, Sudan. Statistical Bulletin for Animal Resources 27 (2018): 3.

2. Daragge A., *et al.* The of range rehabilitation on desertification control workshop seminar (1994).

3. Hamed AHM., *et al.* "The Characteristics of Sheep Production in Gadarif State, Sudan". *Journal of Agriculture and Life Sciences* 4.1 (2017): 16-23.

4. Thompson SK. "Sample Size for Estimating Multinomial Proportions". *American Statistical Association, U.S.A.* 41.1 (1987): 42-46.

5. Fatima EA., *et al.* "Phenotypic Characterization of Fulani Sheep Subtypes". *Journal of Agricultural and Veterinary Sciences* 20.2 (2019): 141-153.

6. Ishag IA and MKA Ahmed. "Characterization of production system of Sudanese camel breeds". *Livestock Research for Rural Development* 23 (2011): 3.

7. Osman AM., *et al.* "Camel owners and perception towards management practices at Butana area, Gaderif state, Sudan". *International Journal of Scientific Technology Research* 4.10 (2015): 286-289.

8. El-Hassan AM. "Livestock price policy: With special reference to sheep in the Sudan". M.Sc. Thesis, (Agri-economics), Faculty of Agriculture, University of Khartoum, Sudan (1994).

9. Osman AM., *et al.* "Studies on Camel's Feeding and Utilization of Camel's Milk in Buttana Area, Gaderif State, Sudan". *Advanced in Dairy Research* 3.3 (2015): 141.

10. Elobied AA. "Effect of management systems and season on the physicochemical properties and fatty acids profiles of Sudanese camel milk". PhD thesis in Animal Production". *Sudan University of Science and Technology* (2015).

11. Sulieman AH., *et al.* "Evaluation of Shugar, Dubasi and Watish sub ecotypes of Sudan desert sheep at El Huda National Sheep Research station, Gezira Province, Sudan". ILCA Research report, Addis Ababa Ethiopia 18 (1990): 30.

12. Adamu M. "Sahel type sheep breeds". In: Animal Health and Production Compendium (AHPC), CAB (2005).

13. Aradaib IEE and B Abbas. "A retrospective study of diseases diagnosed at the University of Khartoum Veterinary Medical Teaching Hospital". *Sudan Journal of Veterinary Science and Animal Husbandry* 25 (1985): 55-66.

14. Elrasheed MMM., *et al.* "Desert Sheep in Kordofan Area –Sudan: production and Marketing". *Journal of Science and Technology* 11.2 (2010): 17-22.

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