A survey Study on some Sudanese Desert Sheep Management systems in Gezira, Sinnar and Blue Nile States

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Summary:

A survey was conducted by personal interviews with 150 livestock owners in selected districts in Gezira, Sinnar and Blue Nile States and was used to gather information on Dubasi, Shugor and Watish ecotypes owners and the characteristics of sheep production in one-visit-interviews. Feeding, watering, housing and diseases prevalence were investigated. Collected data were analyzed using SPSS version 21. The majority of interviewees (87.4%) were farmers, followed by business men (11.3.0%), and only a few were public employees(1.3%). Shugor ecotype represented the largest population in the study area (84%) followed by Dubasi(42%) and Watish(28%) in flock size of more than 100 heads.Free grazing of communal rangelands and supplementation were the most commonly adopted feeding system. In the Gezira state the most important source of water was the canals, while in Sinnar and Blue Nile, hafirs (Ponds) were more important. The owners revealed that Pneumonia was an important disease in all studied states (46.5%). The study recommended that livestock extension and effective veterinary services are important to improve sheep production in the study areas.

Keywords: *sheep , Dubasi, Shugor ,Watish, mating system, ewe exclusion, Sudan*

Introduction:

Livestock in the Sudan are an important source of livelihood in rural areas of the country. Their numbers are in- excess of one hundred millions and more than 40 million of them are sheep (Ministry of Animal Resources and Fisheries, 2016). Small ruminants play an integral role in livestock farming in most tropical countries. In the Sudan, Desert sheep are abundant small ruminants and are found in all ecological zones of the country. They are highly adapted to varying feeding habitats and a wide range of ecotypes are raised by different tribes. More than 65% of the sheep in Sudan are of the Desert sheep type. They are bred basically for meat production. Also they represent the most important export animal in Sudan.Most Desert sheep are owned exclusively by Nomadic Arab tribes who live north of latitude 12º N to the latitude 18º N, in arid and semi-arid conditions. These animals are well adapted and can thrive with water shortage, low-quality range grasses and high temperature (Faisal, 1992). There are three different ecotypes of Sudan Desert sheep located in central Sudan mainly in the Gezira, Sinnar and Blue Nile States. These are: Dubasi, Shugor and Watish.

Dubasi ecotype is distinguished by its white colour with a black saddle in the back and is found in abundance in the northeastern regions of the Gezira. While Shugor ecotype is distinguished by its blond colour, it is similar in size to Dubasi and is found mainly in the western regions of the Gezira and the areas along the White Nile. Watish ecotype differs slightly compared to Dubasi and Shugor, as it is characterized by its small size and three colour (fawn, red, and white with light spotting) as McLeroy, (1961b) described. It is widely spread in the areas of Sinnar and Blue Nile (Sulieman et al., 1990). Nomadic production systems still exists in the arid and semi-arid regions of the Sudan, and migration routes and grazing rights are a source of continuous conflict between farmers and nomads. In the nomadic system all the family and animals which are mainly camels migrate annually in search of pasture and water. On the other hand the most prevalent system in livestock production in the Sudan is the transhumant system in which the household has a permanent residence and only young men move with the animals in the dry season when necessary and movement is generally

restricted to short distances.. The resident members of the family usually practice small scale cultivation or other activities. The transition from nomadic to transhumant or sedentary production systems is a slow process. Although these producers are receptive to programs that will improve their livestock, they are generally not willing to accept any program that restricts their movement or livestock numbers. The number of animals owned is a measure of the social status of the family. Market contacts are limited and live animals are sold only to obtain cash for purchase of needs (El-Dierani, 1995). The major feature of this system is its reliance on natural pastures and seasonal migration, which is affected by the seasonality and inconsistency of rainfall. This leads to a decrease in the productive ability and reduce reproductive potential as a direct result of under nourishment.

The objective of this study is to identify and describe Desert sheep production systems by knowing the flock structure and management practices in the open range in the Gezira, Sinnar and Blue Nile States.

Materials and Methods

Questionnaire methodology:

A survey was conducted by way of personal interviews with 150 respondents in selected districts in Gezira, Sinnar and Blue Nile States (Table 1), with the objective of characterizing sheep production systems, to gain insight into the farming systems of sheep in these States. A detailed structured questionnaire was prepared and used to collect information from sheep owners in one-visit-interviews. The sheep owners were selected randomly within the three locations and were asked to complete the questionnaire. Some of the information collected during interviews was supported by field observations. The questionnaire was designed to obtain information on general household characteristics, flock structure, flock management and dynamics, feeding management and disease prevalence. The three states and the villages sampled are shown in table 1.

Table 1. The villages surveyed in the three States and the number of interviewees.

State	Villages	Number of owners
Gezira	Mihiriba, Tabat, Saleem, Sarasir and Doba (Dubasi areas)	50
Gezira	Al-Azazi, Wad-Kibash, Awad-Elaleem (Shugor areas)	50
Sinnar	Abu-Houjar, Wad-Elnayal, El-Dindir, El-Souki and Sinja (Watish areas)	25
Blue Nile	Damazin, El-Roserires (Watish areas)	25
Total		150

Data analysis:

SPSS statistical computer software (SPSS for windows, release 21) was used to analyze the data. The results were presented mainly in the form of descriptive tabular summaries and chi-square tests (χ^2)were carried out to assess statistical significance or degree of association, as appropriate. Analysis of variance and Duncan multiple range tests were carried out where suitable to assess the statistical significance of various factors affecting flock structure.

Results

General household information:

Table 2 shows the occupation of the sampled interviewees in the three states. The majority of interviewees (87.4%) were farmers, business men (11.3%), and only a few farms were on public employees(1.3%). The chi-square test showed that there was significant ($P < 0.01$) association between state and occupation of sheep owners.

Table 2. The percentage occupation of sheep owners

Owner	States			Total
	Gezira	**Sinnar**	**Blue Nile**	
Farmer	82%	100%	95.7%	87.4%
Business Men	16%	0.0%	4.3%	11.3%
Public employees	2%	0.0%	0.0%	1.30%
Total	100%	100%	100%	100%

Flock size:

The number of animals per flock of the different sheep ecotypes is presented in Table 3 About 84% of Shugor owners owned more than 100 heads of sheep, followed by Dubasi owners with 42% having a flock size of more than 100 heads. There were significant differences (P<0.001) in the flock size of the different ecotypes.

Table 3. Flock size of studied sheep ecotypes

Number of sheep	Ecotypes			Total %
	Dubasi	**Shugor**	**Watish**	
5 - 20	8%	0%	8%	5.3%
20 - 50	18%	2%	28%	16%
50 - 100	32%	14%	36%	27.3%
More than 100 heads	42%	84%	28%	51.3%
Total %	100%	100%	100%	100%

Owners differed in the method they used to wean lambs (Table 4). For most owners Sorar (Tying up the nipple) was the ideal way to wean lambs. There were no significant difference between different sheep ecotypes regarding weaning method (P>0.05).

Table 4. Weaning method[1]

| Weaning method | Ecotypes | | | | | | Total | |
| | Dubasi | | Shugor | | Watish | | | |
	N	%	N	%	N	%	N	%
Separate lamb from dam	10	20	6	12	6	12	22	14.7
Sorar	39	78	42	84	44	88	125	83.3
Other	1	2	2	4	0	0	3	2.0
Total	50	100	50	100	50	100	150	100

[1]N= Number of owners of different sheep ecotypes

Feeding management

Free grazing of communal rangelands and supplementation were the most commonly adopted feeding system (Table 5). The agricultural residues were the most important source of supplementary feeds on which most owners depended. The adoption of a specific feeding system by owners was not significantly (P > 0.05) influenced by ecotypes, but the rams and lambs feeding systems were highly significantly (P < 0.01) relate to the ecotype raised.

Table 5. Feeding management.

| Items | Ecotype | | | Total |
	Dubasi	Shugor	Watish	
Feeding system				
Grazing	30%	14%	20%	20.7%
Grazing and supplement	70%	86%	80%	79.3%
Type of supplement				
industrial residues	0%	2%	2%	1.3%
agricultural residues	90%	98%	94%	94%
Concentrates	10%	0%	4%	4.7%
Ewes feeding				
Grazing	16%	10%	24%	16.7%
Grazing and supplement	84%	90%	76%	83.3%
Rams feeding				
Grazing	26%	8%	26%	20%
Grazing and supplement	74%	92%	74%	80%
Lamb feeding				
Grazing	24%	12%	32%	22.7%
Grazing and supplement	76%	88%	68%	77.3%

Sources of water and watering frequencies:

Table 6 presents sheep watering sources in the different states. In the Gezira state the most important source was the canals, while in Sinnar and Blue Nile Hafirs (Ponds) were more important. The sheep of all three ecotypes were given water daily. There were significant differences between owners of different sheep ecotypes regarding the water sources (P<0.001) and insignificant differences regarding watering frequencies (P>0.05).

Table 6. Sources of water and watering frequencies

Items	State			Total
	Gezira	**Sinnar**	**Blue Nile**	
Source of water	**%**	**%**	**%**	**%**
Wells	9	0	8.7	7.3
Hafirs (Ponds)	15	55.6	52.2	28
Canal	76	44.4	39.1	64.7
Watering frequencies	**%**	**%**	**%**	**%**
Daily	100	100	100	100

Housing system:

The types of shelters used for the three ecotypes are presented in Table 7. About 84.7% of owners did not have a designated place for keeping animals, 8.0% of them used a Corral and 7.3% used open sided sheds. The differences between the three ecotypes in housing types were insignificant (P>0.05).

Table 7. Housing systems[1]

Housing system	Ecotypes						Total	
	Dubasi		**Shugor**		**Watish**			
	N	%	N	%	N	%	N	%
Corral	4	8%	6	12%	2	4%	8	8%
Open side shed	4	8%	4	8%	3	6%	11	7.3%
None	42	84%	40	80%	45	90%	127	84.7%
Total	50	100%	50	100%	50	100%	150	100%

[1]N= Number of owners of different sheep ecotypes

Sheep health and Veterinary services:

Table 8 presents the evaluation of owners for their flock health and access to veterinary services. About 68.7% of owners reported excellent flock health, 28% of them reported good health and a few of them reported poor health. With regard to veterinary service 44% of owners stated that it was sometimes accessible and 32% said it was accessible and 24% of them said it was not available. There were significant differences between interviewees of surveyed states in flock health (P < 0.001) and accessibility of veterinary services (P < 0.001).

Table 8. Sheep health and access to veterinary services

Items	State			Total
	Gezira	**Sinnar**	**Blue Nile**	
Flock health	**%**	**%**	**%**	**%**
Excellent	56	60	87	68.7
Good	39	40	13	28
Weak	5	0	0	3.3
Veterinary Service	**%**	**%**	**%**	**%**
Accessible	43	3.3	17.4	32
Sometimes	31	74.1	65.2	44
Not available	26	22.2	17.4	24

The prevalent and important diseases:

Table 9 presents the prevalent and important sheep diseases in the studied areas. The owners revealed that Pneumonia was an important disease in all studied states (46.5%), followed by Pasteurellosis, Fasciola, Mastitis, Hydatic cysts, Sheep Pox and Ring worms. There was no significant prevalence of Anthrax. The result indicated that, there was a significant association found between type of disease prevalence and States (P < 0.001).

Table 9. Prevalent of important sheep diseases in the study areas

Prevalent diseases		State		Total
	Gezira	**Sinnar**	**Blue Nile**	
Bacterial diseases%				
Pneumonia	54	33.3	52.2	46.5
Mastitis	11	18.5	4.3	11.3
Pasteurellosis	3	7.4	43	17.8
Anthrax	1	0	0	0.33
Viral diseases%				
Sheep pox	0	7.1	13	6.7
Mycotic diseases%				
Ring Worm	3	0	4.3	2.4
Internal parasites%				
Fasciola	11	11	21.7	14.6
Hydatic cysts	11	7.4	0	6.13

Discussion

Sheep are the most important component of the agro-pastoral systems in arid and semi-arid zones of Sudan, as well as other species (goats, cattle and camels). Sheep play a remarkable role in the livelihoods of Sudanese people, providing food security, animal by-products and income at times of need. In addition, sheep contribute significantly to the country's foreign exchange earnings as the main livestock export (Elrasheed *et al*, 2010).

This study revealed that the majority of interviewees (87.4%) were farmers, followed by business men (11.3.0%), and only a few were public sector (1.3 %).This indicates that the actual owners of livestock are farmers, which makes this finding more compatible with both free grazing of communal rangelands and supplementation with agricultural residues were the most commonly used feed sources. This reflects that sheep production systems in Central Sudan are largely of the agro-pastoral type. This is not in accord with the findings of Eltahir *et al*, (1999); Omer, (2011) and Dahab *et al.,* (2014) who reported that Hamari sheep of Western Sudan were reared under a traditional pastoralist system. This is a result of the difference in climate between central and Western Sudan. The most important source of water was the canals of the Gezira scheme and that allowed daily watering and there was no shortage of water in the studied area. Different results were

reported by Omer, (2011) and Dahab *et al.*, (2014) in Western Sudan. They found that, there were seasonal movements of animals in search of food and water during the dry season.

About 84.7% of owners did not have a specific designated place for housing their animals; a possible result of the limited movement in search of pasture. El-Hag *et al*, (2001) reported that husbandry systems including housing had important effects on production characteristics of Sudan Desert sheep. They found that mortality rate in sheep was lower in sedentary flocks than in nomadic ones.

Forty three percent of respondents said that the most accessible veterinary service was that of the Gezira State. About (87%) of respondents in the Blue Nile State said the health of their flocks was excellent. The Blue Nile interviewees reported that, the absence of veterinary services provided by the government made them reliant on private sources. This is attributed to the economic policy which caused a sudden shift from complete government sponsorship to private veterinary services. This led to a rise in market prices for drugs and services (El-Sammani *et al*, 1999). Pneumonia was an important disease in all studied States according to 46.5% of respondents, followed by Pasteurellosis (17.8%), Fasciola (14.6%) and Mastitis (11.3%). In order to decrease the incidence of prevalent diseases it is necessary to adopt regular feeding especially in the dry summer season and vaccinate against infectious diseases. Similar findings were observed by Dahab *et al*, (2014) who reported that Pneumonia was the main reason of death in North Darfur state.

Conclusions and Recommendations:

Sudan is one of the main exporters of sheep among African countries. However, sheep production is still undeveloped due to weakness of infra-structural facilities. The study concluded that, flock size and structure differed between Dubasi, Shugor and Watish ecotypes and between states. The production system is a semi resident agro-pastoral system. Feeding depended on natural pasture, which is affected by seasonality of rainfall, and that reflects negatively on meat production. It is required to raise both animal's nutrition level and management to take full advantage of the ecotype's genetic potential for sustainable meat production. It is important to give a high priority to extension services and rural development to achieve progress in areas of education, health and infrastructure. Effective and far reaching veterinary services are also significant in this respect.

Acknowledgments:

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