The Characteristics of Sheep Production in Gadarif State, Sudan

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Abstract

This study was carried out at Gadarif state in eastern Sudan to characterize sheep production practices in the state using a questionnaire for 100 owners in livestock markets in the state localities. Data was statistically analyzed using SPSS package. Results revealed that Ashgar was the main sheep breed followed by Garag and Dubasi breeds. The animals mainly reared extensively (96%) . Puberty was mainly at 10 month in males and 12 month in females and age at first mating was mainly 12 month. Most flocks lamb twice/ year. The animals relied mainly on rangeland and crop residues and grazing far from residence. Most animals grazed all the year and most owners (76%) didn't feed concentrates due to high cost. Hafeers (Sudanese water harvest form) were the main water source. Lack of water, rangeland and extension were the main problems.

Keywords: Sheep characteristics, Gadarif state, Sudan.

1. Introduction

Gadarif State is located in the Butana plain in Eastern Sudan and it is an important agricultural state. It is a main site for mechanized and traditional rain fed agriculture producing huge amounts of sorghum, sesame and millet and agro-industrial by products. Animal production is important in the state with over 6 million heads, Ministry of Animal Resources and Fisheries, Gadarif State, (2010). It includes 2.613 million sheep, 0.92 million goat, 1, 9 million cattle and 0.6 million camels. The role of animal production in the state economy is increasing. Sheep production is very important in the state due to high population, suitable environment, abundant feeds, reputed breeds and closeness to the main consumption sites in the country and abroad. However, the animals are mainly reared in traditional systems Fadlalla and Ahmed, (1997) based on rangeland with low inputs and outputs. Sudan Desert sheep production characteristics reflected seasonal nutritional and husbandry Elhag *et al*, (2001). There were no significant differences in reproductive performance between sedentary and nomadic flocks and mortality rates were higher in the latter. The breeding season had a significant effect on all parameters. The sector has many problems hindering its development. Mufarrih (1991) stated that sheep production in the semi-arid areas of the Sudan is hampered by water shortage, complicated grazing problems, diseases and parasites, reduced range land area, successive drought and migratory camels and sheep penetrated into the savannah belt in the dry season. Lack of precise data on sheep population, distribution, breeds, labour, health, marketing and obstacles are scare and not sufficient for precise planning and decisions.

Water shortage is a major problem and animals depend mainly on Hafeers. Nutrition is a main constraint due to rangeland deterioration for many factors and seasonal variations in feeds quantity and quality associated with seasonal rainfall with serious shortages in the dry season affecting animal's health and performance. Crop residues are used to fill the nutritional gap, but generally have low nutritive value depressing animal's performance. Animal health is an important problem due to difficulties in providing veterinary services in remote areas. Animal production extension is too weak and ineffective. There is no available recent information on sheep production characteristics in Gadarif State. Consequently, this study was conducted to investigate sheep production, nutrition, performance, health and problems in different localities in Gadarif State.

2. Materials and Methods

2. 1. Study Area: The study described below was conducted in the Gadarif State in eastern Sudan. The

State is about 72000km in area and lies between latitudes 12-17°N and longitudes 34-36°E, Wikipedia (2015). The climate is semiarid in the north and north- west, annual rainfall is 500-1000ml, and the east and south have 500-900 ml rainfall.

2. 2. Conduct of the experiment: A questionnaire including information about the owners and shepherds,

Production systems, animal's performance, nutrition, health and problems was designed and distributed to 100 sheep owners selected randomly from ten localities that covered all directions of the state.

2. 3. Statistical analysis:

The SPSS (Statistical package for social sciences, ver.17) was used to obtain descriptive statistics and analysis of variance.

3. Results

3. 1. Sheep owners and shepherds personal information. Table.1.

Table 1. Sheep Owners personal information in Gadarif State, Sudan.

Parameters	%	**Chi square**
Owners Residence: Villages	74	87.33
Towns	26	
Age (Years): 20-30	20	283.57
31-40	32	
41-50	19	
51-60	16	
61-70	09	
71-80	04	
Basic occupation: Agriculture	62	183,42
Trade	20	
Employee	08	
Herders	05	
Retired	02	
Butchers	01	
Drivers	01	
No. shepherds/ herd: 1	27	118.64
>1	73	

Showed that most owners were live in villages. Animal owners had 6 different age groups and were mainly 31-40 years old followed by 20-30 years and least at 71-80 years. Age group percentages generally decreased with age. The owners were from 18 tribes and Gaalyeen was the main tribe. Animal owners' main occupation was agriculture followed by trade and the least was butchers and drivers. Shepherds belonged to 5 age groups and were mainly 20-30 years old followed by 41-50 years old. They were mainly 20-50 years old and not above 70 years. They were from 14 tribes and mainly Lahween and Arakieen followed by Beni Amer and least for Dabania, Mahass and Shaygia. Most herds employed more than one shepherd.

3. 2. Herds characteristics in Gadarif State

Table 2. Sheep flocks characteristics in Gadarif State, Sudan.

Parameters	%	Chi square
Herd structure: Sheep	83.57	59.74
Goat	10.35	
Cattle	03.29	
Camels	02.79	
Sheep flock structure: Mature females	66.50	125.0
Mature males	02.70	
Lambs	15.60	
??	15.20	
Sheep breeds: Ashgar	69	122.44
Garag	13	
Ashgar and Garag	06	
Dubasi	05	
Dubasi and Ashgar	02	
Dubasi and Garag	04	
Ashgar, Wattish and Garag	01	
Preferred sheep breeds: Ashgar	71.00	64.48
Dubasi	06.00	
Garag	09.00	
Dubasi and Ashgar	02.00	
Wattish and Kabashi	01.00	
Dubasi and Garag	05.00	
Ashgar and Garag	06.00	
Males age at puberty (Month): 12	01.00	137.98
10	38.00	
09	06.00	
08	04.00	
07	08.00	
06	35.00	
05	08.00	
Females age at puberty (Month)): 12	32.00	78.59
11	03.00	
10	07.00	
09	10.00	
08	08.00	
07	20.00	
06	16.00	
05	04.00	
Age at first mating (Month): 12	39.00	197.06
11	08.00	
10	16.00	
09	02.00	
08	16.00	
07	16.00	
06	03.00	
No. of lambing/ Year: 1	32	79.52
2	68	
Age at weaning (Month): 2	8.00	167.06
3	48.00	
3-4	07.00	
4	05.00	
4-5	26.00	
5	06.00	
Ewes longevity (Years): 5	32.00	157.09
6	20.00	
7	08.00	
8	09.00	
9	08.00	
10	10.00	
12	07.00	
12-15	06.00	
Rams longevity (Years): 3	03.00	125.37
4	13.00	
6	33.00	
7	06.00	
8	28.00	
9	08.00	
10	09.00	

Revealed that sheep dominated herds followed by goats, cattle and then camels. Adult females were the main component of sheep flocks followed by lambs and were least for adult males. The main sheep breed was Ashgar followed by Garag and then Dubasi. There were 4 types mixed breeds and were dominated by Ashgar and Garag followed by Dubasi and Garag and was least for Ashgar, Wattish and Garag. Sheep owners preferred breed was Ashgar followed by Garag and the least preferred were Wattish and Kabashi.

Males' age at puberty was mainly 10 month followed by 6 month and was least at 12 month. Females' age at puberty was mainly 12 month followed by 7 month and was least at 11 month. Age at first mating was mainly at 12 month followed by 7, 8 and 10 month and was least at 9 month. Most flocks lamb 2 twice/ year. Age at weaning was mainly 3 month followed by 4-5 month and was least at 4 month. Ewes' longevity was highest at 5 years followed by 10 years and was least at 12-15 years. Rams longevity was highest at 6 years followed by 8 years and was least at 3 years.

3. 3. Sheep nutrition in Gadarif State

Table 3. Sheep production system in Gadarif State, Sudan.

Parameters	%	Chi square
Production system: Extensive	96.00	175.91
Semi-intensive	04. 00	
Intensive	00.00	
Feeds: Rangeland	21.00	150.55
Crop residues	13.00	
Range land and crop residues	62.00	
Rangeland and concentrates	02.00	
Crop residues and concentrates	02.00	
Rangeland location: Adjacent	10.00	200.29
Close	18.00	
Far	72.00	
Grazing period (Month): 12	54.00	105.61
9	05.00	
8	06.00	
7	10.00	
6	09.00	
5	06.00	
4	02.00	
3	03.00	
2	05.00	
Concentrates feeding: Yes	76.00	92,26
No	24.00	
Feeding concentrates according to Body weight and age:		141.44
Yes	24.00	
No	76.00	
Water sources: Hafeer	73.00	201.88
Dam	02.00	
Stream	01.00	
Hafeer and others	15.00	
Others	09.00	
Males fate: Breeding	04.00	124.07
Sold	94.00	
Breeding and sold	02.00	
Sheep fattening	No	

Animals was mainly reared in the extensive system (96%) and the intensive system was not used. The animals relied mainly on rangeland and crop residues followed by rangeland and were least for crop residues and concentrates. Grazing was mainly far from residence followed by close and then adjacent. Most animals grazed all the year followed by 3 month and was least for 4 month.

Most owners (76%) did not use concentrates due to high cost and was mostly (76%) not fed according to body weight and age. Hafeers were the main water source alone and with other sources and was least for stream (Khour). Males were mainly sold (94%) and not fattened (100%).

3. 4. Animal health in Gadarif State

Table 4. Sheep health in Gadarif State, Sudan.

Parameters	%	Chi square
Vaccination: Yes	97.00	114.24
No	03.00	
Diseases: Heart water	15.00	174.73
Jaundice	16.00	
Pox	12.80	
Rinderpest	11.90	
Parasites	08.60	
Diarrhea	05.30	
Inflammations	06.30	
Bloat	03.60	
Anthrax	03.60	
Mange	02.30	
Foot and mouth	01.60	
Black quarter	01.30	
Contagious caprine pleuropneumonia	01.00	
Poisoning	00.66	
treatments: Veterinarian	78.00	189.20
	16.00	
arian and healers	06.00	
Mortality causes: Diseases	44.00	190.81
Malnutrition	23.00	
Diseases and malnutrition	33.00	

Shows that most animals were vaccinated (97%) and the others were not vaccinated due to lack of veterinary services and expensive vaccines (100%). The main disease was heart water followed by jaundice, pox and rinderpest while poisoning was least. Veterinary treatment was mainly used for diseases followed by healers and was least for veterinary treatments and healers. Mortality rate was 11.8% and was mainly due to diseases followed by diseases and malnutrition and least for malnutrition.

3. 5. Sheep marketing in Gadarif State

Table 5 . Sheep marketing in Gadarif State, Sudan.

Parameters	%	Chi square
Marketing site: Production area	5	190.55
In the State	91	
Production area and in the State	03	
Outside the State	01	
Livestock transportation: Vehicles	80	222.27
On hooves	15	
Vehicles and on hooves	05	
Age at selling males (Years): <1	87	137.44
1	05	
<1.5	06	
2	02	
Sales mode: Wholesale	39	225.47
Retail	47	
Wholesale and retail	14	
Sales season: Summer	58	273.51
Autumn	05	
Winter	22	
Summer and winter	12	
Summer, autumn and winter	03	
Production aim: Investment	77	267.11
subsistence	12	
Social prestige	03	
Investment and subsistence	08	

Shows that animals were mainly sold in the state and few outside it. They were mainly transported by vehicles (80%) followed by walking on hooves and was least for vehicles and walking on hooves together. Males were mainly sold at <1 year old and mainly sold on wholesale basis followed by retail. The animals were mainly sold in summer followed by autumn. The animals were mainly reared as investment followed by subsistence and least for social prestige.

3.6. Sheep problems in Gadarif State. Table 6

Table 6. Sheep production problems in Gadarif State, Sudan

Parameters	%	Chi square
Problems: Lack of water resources	23.5	294.6
Neglected animal wealth	17.6	
Lack of rangeland	11.7	
Lack of vaccines	08.8	
Taxes	08.8	
Expensive crop residues	05.9	
Lack of security	05.9	
Lack of routes services	02.9	
Lack of shepherds	02.9	
Available extension services: Yes	15	176.86
No	85	

Shows that the main problems were lack of water followed by animals' negligence and lack of rangeland than Butana plain. The least problems were the lack of routes services and shepherds. Lack of extension was a main problem.

4. Discussion

4 .1. Sheep owners and shepherds personal information

Most sheep owners were live in villages as animals are mainly in the extensive system as reported by Kamal (1983) and Fadlalla and Ahmed (1997). Most sheep owners were 20-40 years old and hence active and keen to improve production and adopt modern techniques. Owners' different occupations showed the importance of animal production and it will remain important for a long time. Animals were kept as investment. Agriculture was the main occupation showing the integration between the two sectors which will improve them. Animals are usually sold to finance agricultural operations. Livestock and farming were the main occupation in Butana area (Mohammed *et al.* 2014). Trade was the second occupation and animals are a subsidiary business. Shepherds were mainly young at 20-30 years old as the job requires more efforts. Subsistence breeders' young work for the rich nomads and agro-pastoralist for the high earnings and accumulating their own herds (Abu Sin, 1991). Shepherds tribes were less than that for owners indicating that some tribes don't work as shepherds. The main tribes were Lahween and Arakieen and were also among owners. Most herds employ more than one shepherd indicating that they are large in size and may be shared by many owners.

4 .2. Herds characteristics in Gadarif State

Sheep and goat herds dominance showed small ruminants importance in the state due to environmental adaptation, easy integrated with agricultural systems and high demands and should be the core of agricultural strategies in the state. The dominance of adult females and lambs and least adult males is a positive change in sheep flock structure by keeping productive animals for better resources exploitation. A similar trend was reported for Shorani sheep in Elabassia Tagali area in Nuba Mountains in south Kordofan State, Sudan . It was also found in Tagger goats in Eldaleng area in South Kordofan State, Sudan (Mudaw i *e t al.*, 2012). Ashgar was the main sheep breed in the area as reported by Devendra and McLeroy (1992). Dubasi was among the main breeds in the state and is highly demanded in markets. Ashgar and Garag dominated mixed breeds as they were the main breeds in the area. Wattish and Kabashi were least preferred because they were away from their habitat, not adapted to the area and not preferred in local markets. Males and females main age at puberty (10 and 12 month, respectively) was reasonable in extensive systems. Most flocks lamb twice/ year indicating no seasonal breeding, high fertility and good management. The main weaning age was reasonable in extensive systems indicating better nutrition and management. The highest ewes' longevity was less than rams.

Longevity higher in ewes and lower in rams. The variations among areas in the Sudan in different parameters showed the variations in sheep husbandry and were mainly due to environmental, nutritional, managerial and economical factors. .

4 .3. Sheep nutrition in Gadarif State

Sheep were mainly reared in the extensive system (96%) as in traditional systems in the Sudan (Kamal, 1983; Devendra and McLeory, 1992). Absence of the intensive system in the area showed that there were no changes in traditional systems. The animals main dependence on rangeland and crop residues was associated with traditional systems and showed that rangeland deteriorated and crop residues were exploited refill the nutritional gap. Concentrates were not fed as the animals were in traditional systems depending on rangeland and crop residues. Grazing was mainly far from residence and seasonal migrations were requited. Most animals grazed all the year showing rangeland importance as animal feed and seasonal variations in feeds quantity and quality and animals performance associated with seasonal rainfall. Most owners (76%) didn't use concentrates due to traditional systems and high cost. Hafeers were the main water source due to availability and was least for stream (Khour) due to the short autumn. Males were mainly sold and not fattened as they were mainly in traditional systems and concentrates not fed.

4 .4. Animal health in Gadarif State.

Most animals in the area were vaccinated due to availability of veterinary services in the public and private sectors and owners awareness. The few not vaccinated flocks were attributed to lack of veterinary services and expensive vaccines and were not justified.

Heart water was the main disease due to poor management and ticks control. Jaundice was important due to ticks and blood parasites. Poisoning was the least ailment due to poisonous plants eradication from rangeland in the area. The diseases in Gadarif State differed from those in the Veterinary Teaching Hospital in Shambat (Aradaib *et al.*, 1985). Heart water was not a main problem in Shambat. Veterinary treatment was mainly used due to availability and owners' awareness and healers were used to a lower extent. Mortality rate was high (11.8%) and could be reduced by better disease control and nutrition which were the main factors for mortality in this study.

4 .5. Sheep marketing in Gadarif State

The animals were mainly sold in the state due to available markets and high demand. They were mainly transported by vehicles due to availability, fast markets reach and to avoid tracking effects on animal health and condition. Males were mainly sold at <1 year old because they were preferred at this age (lambs). They were mainly sold on wholesale basis due to availability of large markets. They were mainly sold in summer as they were born in late summer for better survival and rangeland deterioration. They were least sold in autumn due to available feeds at low cost. The animals were kept mainly for investment and not for social prestige indicating major changes in owners attitudes confirmed by keeping producing females and culling most males.

4 .6. Sheep problems in Gadarif State

Sheep production main problem in Gadarif state was lack of water which is a serious problem for humans and animals. Animals' negligence was due to poor infrastructure and is changing due to increasing animals' role in the economy and rearing it as investment. Lack of rangeland was due the deterioration due to reduced area, reduced rainfall, droughts, poor management and overgrazing. The least problems were lack of routes services due to hazard agricultural expansion. Lack of shepherds was due to searching easy jobs and urbanization. Lack of extension was a main problem due to poor budgets and capacity building.

5. Conclusions

It could be concluded that the extensive system was the dominant animal production system in this Agricultural state. Ashgar is the main sheep breed in Gadarif state. Small ruminants (sheep and goats) were well adapted to the environment of the state. Lack of water, veterinary services and lack of extension was a main problems facing sheep production in Gadarif state.

6. References

Abu Sin, M. E. (1991). Transformation of camel breeding in the Sudan. Nomadic Peoples 29, 53-60.

Aradaib, I. E. E. and Abbas, B. (1985). A retrospective study of diseases diagnosed at the University of Khartoum Veterinary Medical Teaching Hospital. Sudan Journal of Veterinary Science and Animal Husbandry 25, 55-66.

Devendra, C. and McLeory (1983). Goat production in the tropics Tech. Comm. No. 19. Farnham Royal, UK, Commonwealth Agricultural Bordeaux.

Elhag, F. M, Fadalalla, B., and Mukhtar, H. K. (2001). Some Production Characteristics of Sudan Desert sheep under range conditions in North Kordofan, Sudan **.** Tropical Animal Health and production 33, 229-239.

Fadlalla, B. and Ahmed, F. A. (1997). Sudan country paper. Pages 77-83. In Global agenda for livestock research. Proceedings of the consultation for the South-East Asia region. ILRI, Addis Ababa, Ethiopia.

Kamal, A. (1983). The prospect of dairy farm developed in Khartoum Province . Diploma Thesis, University of Khartoum, Sudan.

Ministry of Animal Resources and Fisheries, Gadarif State, (2010). General Administration for Planning and animal Resources Economics, Gadarif, Sudan.

Mohammed, S. A., Rahamtalla, S., Ahmed, S. S., Ishag, I. A., Dousa, B. M. and Ahmed, M. K. A. (2014). Small holder dairy production systems of Kenana and Butana cattle in Sudan. Wayamba Journal of Animal Science – ISSN: 2012-578X; P992-P997.

Mufarrih, M. E. (1991). Sudan desert sheep: Their origin, ecology and production potential. World Animal Review 66, 23-31.

Wikipedia (2015). Gadarif State, Sudan States, https ://ar. wikipedia. org/ w/ index. Php ? title = القضارف ولاية_& oldid = 15089736