

*Original Article*

# Socio-Economic, Husbandry and Constraints of Baggara Cattle under Extensive and Semi- Extensive Systems in South Kordofan State, Sudan

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**ABSTRACT**

This study was conducted to evaluate the husbandry practices, impact on socio-economic status of the herders and contribution of Baggara cattle in South Kordofan State in milk production, in addition to the constraints facing its production. Information about management practices was collected via a questionnaire and direct interviews with cattle owners, the data include 80 herders from the extensive and semi-extensive production systems. The results indicated that the age of majority of cattle owners (48.75 %) was more than 40 years and the family members are more than 5 persons. Illiteracy among the herders was 25.0%, and 12.5% of the herders had university education. Significant ( $P \leq 0.05$ ) differences were found between possessions of the herds and sources of fund. Only 15.0% of the cattle herders offer supplementary rations to their cows during the late pregnancy in semi-extensive system compared to 80.95% in the extensive production system. The water offered to the cattle herds was from rain, pipes and wells. Most of the herds (95%) were under health supervision. Moreover, twice a day milking was the common practice in all the herds. The main constraints facing the herders are low productivity, marketing, feeding and managerial problems. However 97.5% of the cattle herders practice the sale of traditional dairy products. The present study recommended initiation of milk collection and processing centers for sustainability and livelihood. Also marketing attitudes should also be encouraged within the traditional production systems.

**KEY WORDS:** Baggara Cattle, Constraints, Production Systems, Dairy Products

**INTRODUCTION**

In general the systems of production for cattle in Sudan are not well characterized. The traditional range grazing system that includes the pastoral and semi-pastoral types is considered to be the most common as under which more than 80% of livestock is raised (Yousif and Fadl El Moula, 2006). The local Sudanese cattle breeds belong to *Boss indicus* species referred to as Zebu type or indigenous cattle which is estimated as 40 million heads (Elniema et al. 2011). Kenana and Butana are milk producing, while western Baggara is the major beef-producing cattle breed in Sudan (MARF, 2008). About 90% of the cattle population is owned by pastoralists mainly concentrated in three major regions, namely Western Sudan, the homeland for Baggara cattle, Mid-Sudan, the homeland for the Kenana and Butana breeds and Southern Sudan where the Nilotic breed is dominant (Yousif and Fadl El Moula, 2006).

Baggara cattle are horned with cervico-thoracic hump and have a large and prominent dewlap (Willson and Clarke, 1975). ElKhalifa et al. (1985) concluded that Baggara cattle is not a uniform type of cattle, the name is given to cattle that belong to a certain geographical area, they observed that the dark red and black colored cattle of Messiriya and Hawazma tribes are smaller in size than the whitish Nyalawi type. Baggara or Baggarah are a nomadic bedouin people inhabiting Africa from between Lake Chad and the Nile, in the states of Sudan (particularly Darfur), Niger, Chad, Cameroon, Nigeria, and the Central African Republic. They are also known as shuwa Arabs. They are cattle- herders, migrating seasonally between grazing lands in the wet season and river areas in the dry season (De Waal and Julie, 2006). Yousif and Fadl El Moula (2006) reported that Baggara cattle usually pass through a very long and tough migratory process. Those cattle come from the Western grassland of the Baggara belt that comprises Southern Darfur, Southern Kordofan and White Nile States and they are owned by transhumant tribes in the grass-acacia savannah (ElKhalifa et al., 1985).

As feed availability changes rapidly, milk production is a function of season rather than the length of lactation. In the wet season there may be a surplus of milk, while in the dry season a precarious balance has to be established

between the calf's intake and the off-take for humans. Milk off-take by pastoralists has been established to be the order of 25-35% of total production during the first months of lactation (Nicholson, 1984).

Baggara cattle herds should have an important role in the socio-economic life of their owners, so the objectives of this study are to evaluate:

1. Management and husbandry practices for raising the Western Sudan Baggara cattle in Southern Kordofan State.
2. The role of Western Sudan Baggara cattle in sustainability of livelihood and milk security.

## MATERIALS AND METHODS

### Study area

The study area is Elfoula in Southern Kordofan State. This area is located between latitude 9° 12' and 12° 30' North and longitude 15° 27' and 18° 30' east (Ministry of Agriculture, Livestock and Natural Resources, 2006). The survey covered about 55000 km or 40 % of the whole South Kordofan State area. The production systems that dominate in the area of study is extensive and semi- extensive production system.

### Climate

The area has two climates, one is semi-desert climate (latitude 10' North) which is hot and dry, while the second is savanna climate (latitude 10' South). The important features of this climate, is that the temperature is less than 18°C, as a minimum temperature is in December and January, while it raises during summer seasons during the period from 15 March to 25 November. The rain's rates ranged between 450 and 650 mm in year (Ministry of Agriculture, Livestock and Natural Resources, 2008).

### Data collection

This study was carried out during the period from July to December. A questionnaire was prepared for data collection. Also direct interviews and groups' discussion were conducted.

### Statistical analysis

Statistical Packages for Social Sciences (SPSS 17.00) were used to analyze all data using ANOVA test and Chi-square test for mean separation.

## RESULTS

### Family information's about cattle herders

The ages of cattle herders in Elfoula ranged between age 20 - 30, 31 - 40 and more than 40 years were estimated as 15 %, 36.25 % and 48.75%, respectively. Their family members were found as less than 5 (6.25 %), 5-10 (56.25 %) and more than 10 (37.5 %) (Table 1). The same table also showed that 61.25 %, 17.5 % and 21.25 % of the cattle herders were married to one, two and three wives, respectively.

Illiteracy among the cattle herders was found to be high (20, 25.0%), while herders of the cattle with primary and secondary school level certificates were reported to be 28 (35.0%) and 22 (27.5%), respectively. However, this study found that only 10 (12.5%) of herders are university graduates (Table 1).

**Table 1.** Family information on cattle herders in Elfoula, South Kordofan State, Sudan

Parameter	Frequency	Parameter	Frequency
<b>Owners age</b>		<b>Number of wives</b>	
20 – 30	12 (150 %)	One	(6125%)
31 – 40	29 (3625 %)	Two	(175% )
> 40	39 (4875 %)	Three	(2125%)
<b>Family size</b>		<b>Educational level</b>	
< 5	5 (625 %)	Illiterate	20 (250%)
5 - 10	45 (5625 %)	Primary	28 (350%)
> 10	30 (375 %)	Secondary	22 (275%)
-	-	University	10 (125%)

### Possession of the herds and sources of fund

The filed visits and the questionnaires conducted during the present study revealed that the individual and family possession of the herds were 51 (63.75%) and 29 (36.25%), respectively. However, there was no cooperative possession type (Table 2). Cattle herders, depending on their own, family (trust) and bank loans, as a source of fund were reported to be 37 (46.25%), 30 (37.5%) and 13 (16.25%), respectively.

Moreover, this study showed highly significant differences ( $P \leq 0.05$ ) between the possession of the herds and the source of fund (Table 2). Also, the present data revealed that 28 (35.0%) of the women have cows.

**Table 2.** Possession of the herds and sources of fund for cattle herd in Elfoula, South Kordofan State, Sudan

Possession of the herd		Source of fund	
Parameters	Frequency	Parameter	Frequency
Individual	51 (6375%)	Own	37 (4625%)
Family	29 (3625%)	Family (Trust)	30 (375%)
Cooperative	-	Bank loan	13 (1625%)
Possession type x Source of fund		P ≤ 0001	

### Baggara cattle feeding programs

Table 3 shows feeding and watering. It is clear that 6 (15.0%) and 21 (52.5%) of the cattle herders in extensive and semi-extensive system are offering supplementary rations to their cows. Of those 5 (83.3%) and 12 (57.144%) offer concentrate as supplementary rations to their cows, while 1 (16.7%) and 8 (38.1%) offer concentrate + forage to their cows, respectively in extensive and semi- extensive system. However, there was no one who offers forage to his cows. The data also showed that 6 (100.0%) and 17 (80.95%) of the cattle herders respectively, offer supplementary rations to their cows at the end of the pregnancy. However, only 3 (15.0%) of them offer supplementary rations during the lactation period and they were in the semi- extensive system (Table 3).

The water offered to the cattle herds was from rain (19, 47.5%), pipes (8, 20.0%) and other sources (13, 32.5%) in the extensive production system. The sources of water represent 6 (15.0%), 3 (7.5%), 24 (60.0%) and 7 (17.5%) for rain, well, pipes and other sources in the semi-extensive production system. However, drinking frequencies of the herds were found as 8 (20.0%) once a day, 32 (80.0%) other time in extensive system. They were found as 5 (12.5%) ad libitum, 22 (55.0%) once a day, 6 (15.0%) after two days and 7 (17.5%) other time for the herds in semi- extensive production system.

**Table 3.** Feeding programs of Baggara cattle herds in Elfoula, South Kordofan State, Sudan

Parameters	Extensive	Semi- extensive	Total
<b>Supplementary feeding</b>			
Yes	6 (150%)	21 (525%)	27 (338%)
No	34 (850%)	19 (475%)	53 (663%)
<b>Supplementary type</b>			
Concentrate	5 (833%)	12 (57144%)	17 (654%)
Forage	-	-	-
Concentrate + Forage	1 (167%)	8 (381%)	9 (346%)
<b>Supplementary time</b>			
Beginning of pregnancy	-	-	-
End of pregnancy	6 (1000%)	17 (8095%)	23 (885%)
Lactation period	-	3 (150%)	3 (115%)
<b>Water source</b>			
Rain	19 (475%)	6 (150%)	25 (313%)
Well	-	3 (75%)	3 (38%)
Pipes	8 (200%)	24 (600%)	32 (400%)
Other	13 (325%)	7 (175%)	20 (250%)
<b>Drinking frequency</b>			
Ad libitum	-	5 (125%)	5 (63%)
Once a day	8 (200%)	22 (550%)	30 (375%)

### Health programs

Most of the studied herds in extensive and semi- extensive system were under health supervision (37, 92.5% and 39, 97.5% respectively) as shown in Table 4. The common diseases from which the herds are suffering include: black leg (7, 17.5% and 3, 7.5%), tick- borne diseases (16, 40.0% and 14, 35.0%), anthrax (7, 17.5% and 4, 10.0%) and hemorrhagic septicemia (2, 5% and 1, 2.5%), respectively in extensive and semi- extensive system. Contact of livestock brought from various localities through the use of communal pastures and watering as well as marketing places play an important role in the transmission of economically significant infectious and parasitic diseases.

The treatment was done by the veterinarians in 30 (75 %) and 32 (78.0%), the owners themselves in 10 (25 %) and 7 (17.5%) or labours in 0 (0%) and 1 (2.5%) respectively, for the herds in extensive and semi- extensive system. Moreover, only 5 (12.5%) and 6 (15.0%), respectively of the herders were found to use the traditional medications (Table 4).

### Main constraints facing Baggara herds in Elfoula

Table 5 showed that the main constraints facing the herds include low productivity (15, 31.3% and 17, 41.5%), marketing problems (17, 35.4% and 11, 26.8%), feeding (11, 22.9% and 12, 29.3%) and managerial problems (5, 10.4% and 1, 2.4%), in the extensive and the semi- extensive system, respectively.

From this survey it was noticed that all the cattle herders sell only the males. Sale of milk was found to be practiced only in two herds (5.0%). However, 40 (100.0%) and 38 (95.0%) of the herders in the extensive and the semi-

extensive production system were found to sell the traditional dairy products that include roub; sour butter milk, (12, 30.0% and 21, 52.5%) and ghee; butter oil, (28, 70.0% and 19, 47.5%) respectively.

**Table 4.** Health programs of cattle herds in Elfoula, South Kordofan State, Sudan

Parameters	Extensive	Semi- extensive	Total
<b>Health supervision</b>			
Yes	37 (925%)	39 (975%)	76 (950%)
No	3 (75%)	1 (25%)	4 (50%)
<b>Main diseases in the herds</b>			
Black leg	7 (175%)	3 (75%)	10 (25%)
Tick- borne diseases	16 (400%)	14 (35%)	30 (75%)
Anthrax	7 (175%)	4 (100%)	11 (275%)
Hemorrhagic septicemia	2 (50%)	1 (25%)	3 (75%)
<b>The treatment is done by</b>			
Veterinarians	30 (75%)	32 (78%)	62 (775%)
Owners	(25%)	7 (175%)	17 (2125%)
Labours	-	1 (25%)	1 (125%)
<b>Method of treatment</b>			
Drugs	35 (875%)	34 (850%)	69 (863%)
Traditional methods	5 (125%)	6 (150%)	11 (138%)

**Table 5.** Marketing procedures and the main constraints facing Baggara cattle herds in Elfoula, South Kordofan State, Sudan

Parameters	Extensive	Semi- extensive
<b>Main problems facing the herd</b>		
Low milk productivity	15 (313%)	17 (415%)
Marketing problems for milk	17 (354%)	11 (268%)
Feeding	11 (229%)	12 (293%)
Management	5 (104%)	1 (24%)
<b>Marketing procedures</b>		
Sale of milk	-	2 (50%)
Sale of traditional dairy products	40 (1000%)	38 (950%)
<b>Traditional dairy products</b>		
Roub	12 (300%)	21 (525%)
Ghee	28 (700%)	19 (475%)

## DISCUSSION

In this study, age for some (48.75 %) of cattle herders were found to be more than 40 years. Illiteracy was relatively high among the cattle herders (20, 25.0%). Moreover, primary (35.0 %) and secondary (27.5 %) school level of education were also high and 10 (12.5%) of the herders are with university level of education (Table 1). However El Zubeir and Mahla (2011) found 36% of illiteracy level among dairy farms owners in the in Khartoum State and that 22% of them had informal education. African dairy farmers are in most cases of low educational background and need to acquire this knowledge through a simple and understandable approach (Ndambi et al., 2007).

An individual possession of the herd represents the highest frequency (51, 63.75%) compared to the family (29, 36.25%), however cooperative possession is not reported during this investigation (Table 2). In Burundi, Rwanda and parts of Uganda, livestock keepers are sedentary and herds are small, whereas in the other areas Ankole cattle are kept in large herds, some of them still under a (semi-) nomadic system. Milk is the main product in all areas, and is partly for home consumption and partly for sale. Although the production systems vary in many aspects, the selection criteria for cows are similar (Wurzinger et al., 2006) Most (75%) of the cattle owners were adult males and were more involved in herd management than adult females and youths. Moreover, family (trust) represent 37.5% compared with own (46.25 %) and bank loans (16.25 %) as a source of fund. This might be due to smallholding may persist as legacy of historical land ownership practices (Bunnett, 2002). Similarly Nyariki et al. (2009) reported that livestock are the living bank for most of these people and in some areas have an important role in the agricultural intensification process through provision of capital for investment. The reasons for keeping cattle in pastoralist and agro-pastoralist households in south-east Kenya and the breed/trait preferences identified reflect the multiple objectives of the livestock keepers, with both adaptive traits and productive/reproductive traits rated as important (Mwacharo and Drucker, 2005).

Most of the cattle herders (34, 85.0%) in the extensive system did not offer any type of supplementary rations (concentrate or forage) to their cows compared with 19, 47.5% in the semi- extensive system (Table 3). Similarly Musa et al. (2006) reported that Kenana and Butana cattle herders stressed the lack of livestock feed as the most important limiting factor for productivity of their cattle. These might be because of increasing prices of concentrates. Similarly Mapiye et al. (2009) reported that shortage of feed and diseases/parasites were ranked by farmers as the most important constraints. However, Bebe et al. (2008) reported that the dual purpose zebu (Sahiwal and Boran) responded well to

feeding intensification with improved reproduction and production, suggesting that feed quality and quantity in these systems meet their nutrient requirements well.

The frequency of drinking is once a day in 20.0% and 55.0 % of the studied herds in extensive and semi- extensive system, respectively (Table 3). Cows produce more milk when they have continuous free access to water; hence fresh water should be available to dairy cattle at all times. Wilson (2007) reported that adequate water supplies are essential to efficient livestock production. Moreover Næss et al. (2011) showed that increased space and improved access to water is beneficial to primiparous cows, whereas layouts without dead-end alleys and improved water capacity is beneficial for all cows in free stall systems.

Most of the studied herds in extensive system (92.5%) and semi- extensive system (97.5%) are under health supervision. This because the veterinary centers including well trained personnel are located in areas of cattle concentration, while mobile clinics seasonally follow the migratory routes of livestock (Yousif and Fadl El Moula, 2006). However some health problems were stated by the cattle herders' e.g. tick-borne diseases which represent higher occurrence among other diseases (Table 4). Similarly Mapiye et al. (2009) reported that tick-borne diseases were the common causes of cattle mortality, especially in summer. From the same table it was observed that the treatment was done by veterinarians (76.3%). This also was found to improve reproduction and health performance of the cattle. Moreover, most of cattle herders were reported to use drugs (87.5% in extensive system and 85.0% in semi- extensive system), compared to few (12.5% in extensive system and 15.0% in semi- extensive system) who used traditional methods for treatment (Table 4). This might be because veterinary services are available in different forms to fulfill the requirements of the large animal population in the country (Yousif and Fadl El Moula, 2006).

The low milk productivity represents one of the main constraints. This is mainly due to the reason that Baggara cattle provide the bulk of meat consumed locally and contribute considerably to the export trade of beef and cattle (MARF, 2008). The milk yield of dairy cow depends on four factors including genetic ability, feeding program, herd management and health (Bebe et al., 2003). Moreover the availability of natural pasture during the rainy season results in slightly higher milk production of lactating cows compared with the dry season (Sidibé-Anago et al., 2004). Few producers sell the milk in the extensive systems (Table 5), which supported Nyariki et al. (2009) who reported that selling of milk is rarely done, as milk is a staple foodstuff and its production is to meet household demand. From the results it was clear that the majority of the producers sell traditional dairy products like ghee (70.0% and 47.5 % in extensive and semi- extensive system) and roub (30.0% and 52.5% in extensive and semi- extensive system) as shown in Table 5. This supported Ndambi et al. (2007) who reported that only about 15% of the total milk produced is processed to standard products (cheese, yogurt, butter, etc). More than 70% of total production goes through informal markets or is consumed on the farm. This mainly because milk supply and marketing are influenced by many factors such as environmental (season), location of the farm with regards to marketing points and the availability of means of transportation (Mustafa et al., 2011). Elkhider et al. (2011) concluded that traditional cheese manufacturing should be encouraged and improved to utilize the surplus milk in rural areas. This study supported Nyariki et al. (2009) who reported that livestock have a multi-purpose contribution in meeting food security, agricultural production and social/cultural obligations. In many cases dairy production contributes as much as 60% of the total income of the household (Delgado et al., 2001).

From the present study it was concluded that Western Sudan Baggara cattle have positive contribution to household food and consequently contribute to food security by providing income sources by selling male, fresh milk or dairy products. Hence it is recommended that the introducing of extension services and basic information to the cattle herders to improve husbandry practices and animal health care. Establishment and encouragement of ranches that contains good stock with improved productivity for conservation of natural range is needed, It is also important to ensure pasture sustainability by the establishment of forage collection and milk processing centers to be used in scarcity seasons.

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