

SMALLHOLDER DAIRY PRODUCTION SYSTEMS OF KENANA AND BUTANA CATTLE IN SUDAN

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One hundred one dairy small holders, of both Kenana and Butana cattle in nine villages in the homeland of Kenana and Butana cattle in Sudan were randomly selected, with the objective of characterizing dairy production systems, adopted management practices, breeding objectives and constraints, for dairy development in this area. The average age of household heads in study was 54.92 ± 7.78 and 56.73 ± 12.0 years for Kenana and Butana, respectively. With regard to educational status, the proportion of Khalwa (Quranic schools) was high among both Kenana (56%) and Butana (62.7%) herders. The average herd size of Kenana and Butana cattle was 10 and 6 animals, respectively. Sale of milk was the main source of income in Kenana area (100%) while it was up to 50% of the total income in Butana area. Forty eight percent of Kenana herders bred their cow to their own bulls, while most Butana owners relied bulls from other sources such as neighbors. The criteria for selection of breeding bulls were body conformation (72%) and (80.4%) for Kenana and Butana owners, respectively. The disease reported most by Kenana owners was Trypanosomosis (61.8%), while tick problems was the major concern among Butana herders. Constraints for dairy development in Kenana area included, poor pastures. Unavailability and high costs of feeds and shortage of water predators,

disease, poor animal health and extension services were the major constraints in the Butana region. Dairying in the studied area can be improved through the provision of services related to feed supply, use of non-conventional feed resources, improving access to water, allocating land for semi intensive farms. A sustainable genetic improvement program and the provision of veterinary and extension services are also central to development.

Key words: breeding, production, characteristics, Kenana, Butana cattle

Livestock is the largest subsector of the Sudanese domestic economy and is a growing contributor to exports. The great bulk of all livestock production – possibly 90% of the total, though the actual figure is not known – comes from small holders and migratory producers. Cattle population in Sudan was estimated to be 29,840,000 millions head (MARFR, 2012). Local cattle are well adapted to the local environmental conditions and they are able to survive long periods of feed and water shortage but show correspondingly poor performance levels as exemplified by low milk yield, delayed first calving and long calving intervals. Among the Sudan cattle population Kenana and Butana are the most promising indigenous milk breeds, which under improved feeding and management in research stations yield more than 1500 kg milk per lactation (Saeed

et al., 1987; El-Habeeb, 1991 and Musa et al., 2005). Kenana cattle are mainly kept by the Kenana tribe in the southern central plain of the country between the Blue Nile and White Nile. Rege (1999) reported that the Kenana cattle population size was 1.5 million head and that the status of the population was not at risk. He also mentioned that the breed has been extensively crossed with other breeds during the past 20 years. The Kenana cattle habitat is a low rainfall savanna region (300 - 800 mm) with a dry season from November to April. This zone hosts some large scale irrigated agricultural schemes such as Gezira scheme. Butana cattle are found in the Butana plain of central Sudan (between the River Nile, Atbara River and Blue Nile), a typical semi-arid ecological zone (300 mm rainfall, 8 months dry period). This breed is also found in the Gezira between the Blue Nile and the White Nile and along the River Nile in the northern region. The population size as reported by Rege (1999) was one million heads and thus, the breed is not at risk. However, the population shows a decreasing trend due to extensive crossbreeding with European cattle (since 1956) and due to effects of recurrent droughts in 1972/73, 1983/84 and 1989/90. Many herdsmen understand that the best results are obtained by crossing the best local cattle (usually Butana and Kenana) with exotic breeds (usually Friesian) (Musa et al 2005). This process of fast upgrading aimed at increasing local milk production in response to the rising demand in urban areas. There is concern regarding the fate of local ecotypes under this extensive crossbreeding since the genotypes of the improved indigenous breeds may be required to upgrade or replace low producing cattle in harsh nomadic environments where exotic cattle cannot survive. In addition to the phenotypic characterization of the breeds, this study aims at understanding the conditions of production systems, identify breeding objectives, and production constraints as a first step toward development of a sustainable breeding programme.

MATERIALS AND METHODS

Small holders were interviewed using a structured formal questionnaire. Two major dairy production systems, namely traditional nomadic system and transhumance system were identified for Kenana and Butana cattle. The main production activity for smaller holders in Kenana region was livestock rising, while in Butana region mixed Crop-livestock production was the main activity. A structured questionnaire was prepared and used to collect information from a total of 101 owners in both Kenana and Butana area (50 Kenana and 51 Butana). The villages selected for the survey in Kenana and Butana cattle areas as follow:

Kenana area

- Um-Benein
- Near Um-Benein
- Alingaz
- Um-Biaga

Butana area

- Near Atabara
- Alzadabsharag
- Um-Alteor
- Barber
- Algadawab

Sampling and questionnaire methodology

The questionnaire was pre-tested to check clarity and appropriateness of the questions. Some of the information collected during interviews was supported by observation. The questionnaire was designed to obtain information on general household characteristics, management system, farming system, purposes of keeping cattle, selection of breeding bulls, breeding practices, mating organization, animal health and production constraints.

Data analysis

The SPSS statistical computer software (Statistical package for social sciences, ver. 17) was used to obtain descriptive statistics. Chi-square contingency tables were used for tests of independence.

RESULTS AND DISCUSSION

Household characteristics

Socio- economic characteristics of households in study area are shown in Tables 1 and 2. The mean herder age in Kenana and Butana areas was 55 and 57

Table1. Educational level of owners in Kenana and Butana area

Study area	Educational level %				Total
	Illiterate	Primary	Graduate	Khalawi	
Kenana	2.0	42.0	0.0	56.0	50
Butana	5.9	29.4	2.0	62.6	51
Total					101

Table2. Owner age in Kenana and Butana area

Study area	Mean	Number
Kenana	55	49
Butana	57	51
Total	56	100

Table3. Management system in Kenana and Butana areas

Management system	Kenana area	Butana area	Total
Traditional nomadic	98	0	48
Transhumant	2	100	51
Total	100	100	100

Table4. Major activities of owners

activities	Kenana owners %	Butana owners %
Livestock only	2	3.9
Crop farming only	0	0
Livestock and farming	98	96.1
Total	100	100

years, respectively. The results also showed that 42% and 29.4% of Kenana and Butana owners, respectively had primary education, only 2% of Butana and none of Kenana herders had university education. About 2% and 5.9% of Kenana and Butana herders respectively were illiterate. The majority of Kenana and Butana respondents (56% and 62.6%, respectively) received informal education (Khalawi). This presents a challenge to extension services and makes the introduction and adoption of new technologies difficult. Education is an important factor which if lacking can negatively impact on future improvement of livestock production.

Management system

Different management systems (Table 3) were identified in the two areas. The traditional nomadic system was more prevalent in Kenana area (98%), while all Butana owners used a transhumant system (100%). In Kenana area the owners moved with their animals to the northern parts in the wet season and during the dry season they move to the vicinity of irrigated agricultural

schemes such as Gezira scheme, Elsuki, ELrahad and the Blue Nile State where water and pasture are available.

Farming system

Mixed crop-livestock production system is the dominant farming system (98% and 96%) in the study area (Kenana and Butana, respectively). Livestock species kept by farmers comprise cattle, sheep and goats. Cattle are the dominant species, mainly used for draught power followed by milk production (Table 4). Kenana farmers grow alfalfa (*Medicago sativa*), sesame, sorghum (abu70) and Sudan grass in the wet season only, while Butana farmers grow crops all year round. Butana farmers practice a cereal dominated cropping system with wheat as the most important crop in addition to some fruits and dates. Vegetables and *Lawsonia inermis* (henna) are of increasing importance, and are grown by farmers in home gardens. The major sources of feed for cattle in Kenana area were natural pastures, crop residue, conserved hay and non-conventional feeds, while Butana cattle graze on the banks of the Nile and are fed

Table 5. Production objectives of keeping cattle

Study area	Production objectives %			Total
	Income from sale of milk	Social reason	Income + social reason	
Kenana	100	0	0	100
Butana	52	27	21	98

Table 6. Replacement of breeding sires

Items	Own herd %	Purchased %	Total
Kenana	100	0	100
Butana	0	100	100

Table 7. Selection criteria of breeding bulls

Characteristics	Kenana owners %	Butana owners %
Pedigree	20	2.0
General appearance	72	80.4
Daughter performance	2.0	0
Performance of other relative	6.0	17
Total	100	100

Table 8. Herd improvement plan

Study area	How do you improve milk production?		
	Ration+ exotic blood %	Good sire%	Good sire +ration%
Kenana	0	70	28
Butana	100	0	0

some concentrates and minerals when they return home. Market oriented dairy production opportunities exist in some parts of the study area. This requires investing in active forage production and conservation methods. Feed sources such as legumes, browse trees and agro-industrial by products (e.g. Molasses, bagass and sugar cane tops) can be integrated into improving crop residue utilization for complementing dry season feeding. In addition supplementation with concentrates can be used only if it is economically viable.

Purpose of keeping cattle

All of Kenana breeders and 52% of Butana breeders questioned considered that the primary reason of keeping cattle was to generate income from the sale of milk. Butana herders stated that social reasons (27%) and income from milk + social reasons (21%) were important objectives (Table 5).

Breeding practices

Bull owners in Kenana and Butana selected villages provide mating services to cattle owners. Kenana bulls were generally

selected from own herd while Butana bulls were mostly purchased. Breeding bulls were kept on average for 6.5 years in service; Cows were kept for production in Kenana areas on average about 10 years (Table 6).

Most Butana owners do not keep a breeding bull because of the high cost of keeping a bull in small herds and the need to sell bull calves to solve recurrent financial problems. Butana owners unlike Kenana owners tend to use in crossbreeding with exotic breeds to improve milk production. This may be due to the more settled nature of Butana production system compared to Kenana.

Selection of breeding bulls in Butana and Kenana cattle areas

The preferences of Kenana and Butana owners with regard to the characteristics of bulls chosen as sires are shown in table 7. The most important criterion taken into consideration by both Kenana and Butana owners (72% and 80.4%, respectively) was general appearance (body conformation, vigour, health and color). Kenana owners prefer steel grey colors while reddish is favoured by Butana owners.

Table 9. Prevalent diseases as reported by owners (within the last 12 months)

Items	Kenana cattle area %	Butana cattle area %	Total
Trypanasomiasis	61.8	6.1	34.3
Trypanasomiasis+Babesiosis+Thaleriosis+Black quarter	5.9	0	3
Tryp+Babes+Thaler+Type worm Skin disease	5.9	6.1	6
Tryp+Rinder past+Babesiosis	2.9	0	1.5
Tryp+Babes+B.B	2.9	0	1.5
B.B+Trypana+Skin disease+Ticks	5.9	0	1.5
Ticks	5.9	75.8	40.3
Tickts+Trypanasomiasis	5.9	0	3
Ticks+ Skin disease	5.8	3	4.4
Tryp+Rinder	2.9	9.1	6
Total	50.7	49.3	100

Table 10. Production constraints

Study area	Lack of pasture%	High cost of feeds%	Lack of water in summer%	Veterinary service%	Predators	Total
Kenana	75	2	19	4	0	100
Butana	0	0	0	20	80	100

Mating organization

All of Kenana and Butana owners reported that they planned to improve their herd. The options suggested for improving milk production by Kenana owners were the choice of a good sire (70%) and good feeding regime and good sire (28%). Butana owners suggested that good feeding regime and exotic blood (crossbreeding) was their main plan for improving milk production (Table 8).

Animal health and feeding management:

All Kenana and Butana cattle owners reported disease incidences within the last 12 months (table 9). Trypanosomosis and ticks were the main problems reported by Kenana herders while Butanan owners complained mainly of ticks. Trypanosomosis was reported more in Kenana (61.8%) compared to Butana (6.1%). The results show that tick infestation was the most important problem (75.8%) in the Butana area, while only 5.9% of Kenana owners thought it was a major problem. Veterinary services in the country at large have declined in recent years and in some areas have witnessed a degree of collapse. This is probably attributed to the liberalization policy of the economy and the sudden shift from complete government sponsorship to

private veterinary services which provide care at market prices (El-Sammani et al 1996). As a result, the high cost of veterinary services and drugs placed the service beyond the reach of poor herders in rural areas. Most cattle breeders in both areas used the services of private veterinarians. Cattle trypanosomosis is endemic inside and outside the tsetse belt (Yagi 1968). Nomadic cattle movements maintain the transmission cycle between the parasite and the vector. All cattle keepers in Kenana area recognized trypanosomosis as the most important disease. This result was in agreement with the results reported by Abdalla et al (2005). As a result of the decline in annual rainfall and the increase in intensity, frequency and duration of droughts in the Western Sudan region, particularly the drought of 1983, a large number of displaced people of Baggara cattle keepers moved with their animals and settled in Kenana cattle area in the southern central part of the country. The Baggara tribes normally encroach deeper into the tsetse habitat; this could have compounded the problem of trypanosomosis in the Kenana area. Butana cattle are found in a relatively rich area with abundance of cultivated fodder and water

but the absence of veterinary services made the tick problem worse.

Production constraints

Production constraints defined by cattle owners in both areas, are presented in table 10. Lack of pasture and shortage of water in summer (75% and 19%, respectively) were mentioned as the most important constraints by Kenana cattle owners. This is because Kenana cattle reside in a poor savannah region and herders migrate during the wet and dry season. Predators (such as dogs) and lack of veterinary services (80% and 20%, respectively) were the most important constraints for Butana cattle owners. They had no problem of lack of pasture since Butana area is bounded by three rivers, the Nile, Atbara River and the Blue Nile. Over all, most Kenana farmers were constrained by lack of pasture and water. Free-range is the mainstay of the production system in Kenana area. Grasses grow rapidly during the short wet season producing abundant biomass, and the body condition of cattle improves. In the dry season both quantity and quality of the pasture decline, and cattle lose body weight and compensate the loss during the next rainy season (Ryan 1990 and Barash et al., 1994). Although the two ecotypes are phenotypically distinct they are similar in productivity and adaptability to harsh environments. There are differences in the production systems adopted by Kenana and Butana herders which appear to be designed to make the maximum use of the environment in the two regions.

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