Characterisation of Kenana cattle breed and its production environment

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Summary

The Kenana cattle breed originates from *Bos indicus* or humped cattle. The name Kenana came from the traditional owners, the Kenana people, who are mainly nomadic and semi-nomadic tribes. The light blue-gray coat is the characteristic color of Kenana cattle. Calves are frequently born with a brown-red coat that tends to change to a permanent gray at three to six months of age. At maturity the average body weights of males and females range from 300-500 kg and 250-350 kg respectively. The total population of Kenana and Butana cattle as major milk producers comprises 25% of the whole cattle population of Sudan. The Kenana homeland is the delta between the White Nile and the Blue Nile. The main system of production is the range system which includes the pastoral and semi-pastoral types. The nature of the nomadism in Kenana is relatively mild. The average milk production per lactation (198-257 days) varies between 1 400 kg and 2 100 kg respectively and maximum production is attained at seven to eight years of age.

Resumen

La raza vacuna Kenana proviene del Bos indicus o vacuno con joroba. El nombre Kenana le fue dado por los propietarios tradicionales, los Kenana, que pertenecen a tribus principalmente nómadas o semi-nómadas. El color azul-gris pálido es la característica del manto de esta raza. Las terneras suelen nacer con un manto marrón rojizo que tiende a cambiar hacia un gris permanente a partir de los tres a seis meses de edad. En la madurez el peso medio corporal de los machos y hembras varia entre 300-500 kg y entre 250-350 kg, respectivamente. La población total de Kenana y Butana como mayor producción lechera comprende el 25% de la población total de vacuno de Sudan. La zona de Kenana se encuentra en el delta entre el Nilo Blanco y el Nilo Azul. El principal sistema de producción es el mixto, que incluye los tipos pastoral y semi-pastoral. El nomadismo en la zona de Kenana es relativamente bajo. La media de producción de leche por lactación (198-257 días) varía entre 1.400 kg y 2.100 kg respectivamente y la producción máxima se obtiene a los siete u ocho años de edad.

***Keywords**: Population, Systems of production, Milk performance, Genetic improvement.*

Introduction

Sudan possesses a wealth of cattle with a population estimated at 39.5 million head and exhibiting an average annual growth rate of 3.6% (Table 1). Livestock plays an important role in the livelihood of a large sector of the population. 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.

Even though the Kenana breed has been exposed to a degree of inter-breeding with

Table 1. Estimates of animal population (in 1 000 head) in Sudan from 1997 to 2002.

Year	Cattle (no.)	Sheep (no.)	Goats (no.)	Camels(no.)
1997	33 102	39 835	36 037	2 936
1998	34 584	42 363	36 498	2 974
1999	35 825	44 802	37 346	3 031
2000	37 093	46 095	3 848	3 108
2001	38 325	47 043	39 952	3 203
2002	39 479	48 136	41 485	3 342
A.A.G.R %[1]	3.6	3.9	2.9	2.4

[1]A.A.G.R = Average annual growth rate.
Source: State Ministry of Animal Resource (Statistics and Information Department, 2002).

the Western Sudan Zebu and probably the Nilotics, in addition to the crossbreeding with exotic breeds, it is still believed that this process has not seriously endangered the true breed. Therefore the objectives of this study were to discuss the characteristics of the Kenana breed including information about its origin, description, population, system of production and performance and to emphasize attempts for improvement.

History and Description of Kenana cattle breed

The Kenana breed has originated from the humped *Bos indicus* or Zebu. It has been suggested by Payne (1964) that Zebu cattle were historically imported into Africa following the movement of migratory people into the continent, and represent the ancestry of the vast majority of cattle breeds found there today. Other sources consider that Kenana cattle are the result of inter-breeding the Nilotic Sanga cattle with the short-horn Zebu during tribal migration before recovered history (Rouse, 1970). Sanga cattle are a cross between the Hamitic and the long horn *Bos indicus*. The name Kenana came from the owners also called the Kenana, who are mainly nomadic and semi-nomadic tribes. Mason and Maule (1960) described Kenana as a sub-type of the Northern Sudan Shorthorn Zebu.

The characteristic colour of the Kenana is light blue-gray, with gradation from nearly white to steel gray. Shading to nearly black is common on the head, neck, hump, hind quarters and legs. Black points are also seen on the muzzle, horns, tailtip and eyes. Calves are frequently born with a brown-red coat that tends to change to the permanent gray at three to six months of age. The head is long and coffin-shaped with a thin face (Figures 1 to 4). The horns are short and seldom exceed 30-35 cm, and they are relatively shorter in males than in females. Even though a total lack of horns is exceptional, animals with loose horns are very common. The hump is cervico-thoracic in position, it is large in males and tends to hang over at the rear, but is less developed in females. The dewlap is large and prominant in males. At maturity (about five years) the average body weights of males and females ranges from 300 kg to 500 kg and 250 kg to 350 kg respectively depending on the managerial conditions (Saeed *et al.*, 1987).

Population

Among the northern Sudanese breeds, the Kenana and Butana are considered the major milk producers. The estimated numbers of the two breeds comprise 25% of the total cattle population in Sudan (El-Taher, 1999). The homeland of the

Figure 1. A typical mature Kenana bull.

Figure 2. A typical mature Kenana cow.

Figure 3. Kenana cow with loose horns.

Kenana is the delta between the White Nile and the Blue Nile. It has also spread along the western and eastern banks of the White Nile and the Blue Nile respectively in a triangular area bounded by the cities of Sinnar, Singeh, Rosiris and Kusti (Figure 5). The breed is also found in northern Kordofan state and as far as the area of the Abbassiya in the eastern part of the Nuba mountains. The general description of this habitat is of semi-arid desert scrub with rainfall ranging between 336 mm and 457 mm per year. Under traditional management, the size and composition of herds are influenced by a number of factors such as seasonal availability of water and feed, high market prices and infectious diseases.

Generally herds under nomadic systems tend to include a higher proportion of bulls than those required for breeding purpose and this is related to the social and traditional behaviour of the nomads who put much more emphasis on the number of cattle in a herd as a sign of prestige rather than the proportion of males to females. It is also expected that a large size herd will contain relatively more bulls at different ages than those of a small size because the smaller herd owners seek to replace excess male calves with females bought from the nearby markets. For breeding purposes owners select the larger sized bulls to serve the cows in a ratio of approximately 1:25. At Umbanein Research Station situated on the western bank of the Blue Nile approximately 10 km from Singeh city (Figure 5), workers suggested a herd structure composed of 42% adult cows, 33% heifers (1-4 years), 23% calves and 2% breeding bulls (Saeed *et al.*, 1987). Generally there is no specific breeding season, however most of the cows conceive during the rainy season when pasture is rich and abundant.

Systems of Production

In general the systems of production for cattle in Sudan are not well characterized. The traditional range grazing system is considered to be the most common and is the system under which more than 80% of livestock is raised. It includes the pastoral and semi-pastoral types. The pasture zone in the country extends in a wide belt between the northern desert and the southern forest

for a distance of 1 600 kilometres from east to west and 800 kilometres from north to south. Annual rainfall varies from 250 mm in the north to 875 mm before the humid areas in the south are reached. Kenana region is located in a semi-arid zone which is characterized by three marked seasons, namely winter (November-February), hot or dry summer (March-June) and wet summer (July-October). The latter is considered to be the rainy season. According to meteorological data in Kenana region, the average annual rainfall is 356 mm, while the peak of the rainy season occurs in August (114 mm) and the least wet time being in October (10.6 mm). There are also some rains in May and June. Humidity is relatively high in the wet summer (80.0-63.0 %) and low in the dry summer (60.0-27.0 %). The mean daily temperature is 27.4°C with the highest and lowest temperatures of 45°C and 10.8°C recorded in May and January respectively.

Generally the types of natural vegetation in Sudan vary with the rainfall, however in Kenana region they are predominantly herb and some types of grass of the genus *Aristida*. Acacia trees are also commonly seen. Cattle owners who are mostly nomads or semi-nomads seasonally migrate with their herds and gather around the areas rich in water and grass. Milk production excess to the calves' needs is taken to the nearest town or dwellings to be sold as a source of cash. Seasonal cheese plants may be established by merchants in association with cattle owners' settlements. Nomadism for the Kenana breed is milder than that experienced by the cattle in western Sudan where the Baggara cattle usually pass through a very long and tough migratory process. The Kenana homeland partially extends into an irrigated area of the Elgezira scheme where a variety of crops are grown. Therefore the post harvest crop by-products provide a better chance for settlement during this period of time. This system could be described as transhumance where pastoralists return to their villages and spend the rainy season cultivating their lands.

More than 80% of milk production in big cities and towns in Sudan is still provided by the traditional sector. Most of the dairy farms

Figure 4. Polled Kenana bull.

Figure 5. Sudan map showing Kenana homeland. The delta between the white and blue niles extended along the triangular area bounded by cities of Sinnar, Singa, Roseries and Kosti.

include small or mid-size herds (2 050 milking cows) which are mainly Kenana and its crosses with exotics. Feeding regimes in these farms rely on roughage and concentrates. A number of fodder crops such as sorghum bicolour (locally called Abu-Sabeen), pioneer (a variety of hybrid sorghum) and sweet potato are grown in irrigated lands as cash crops. Clitoria and cowpea (*Dolichos lablab*) are also available in winter and the dry summer. Concentrates (a mixture of sorghum, wheat bran, ground nut cake, minerals and vitamins) are provided to lactating cows in proportion with their milk production. A traditional housing system constructed from iron bars, corrugated iron sheets and other local materials such as wood and hay is common. The houses are partially shaded to accommodate animals and to protect lactating cows from excessive sun and rain. Small herd owners may keep their animals in yards surrounded with fences made of wood and hay only (locally called zareebeh). Although A.I centres are found in big cities, natural mating using superior Kenana or crossbred bulls is predominantly practised.

In general farmers do not pay much attention to the importance of keeping records, thus the recording system is poor. The commonly recorded diseases include mastites, babesiosis, theileriosis, fasciolasis and cocidiosis. Vaccination against brucellosis is not common, however it might be administered to calves of more than six months of age. Veterinary services are available in different forms to fulfil the requirements of the large animal population in the country. Veterinary centres including well trained personnel are located in areas of cattle concentration, while mobile clinics seasonally follow the migratory routes of livestock. Vaccination against infectious diseases such as rinderpest, black quarter, anthrax, haemorhagic septicemia and contagious pleuro pneumonia is freely and routinely practiced. Recently the government has established a national vaccination program, in collaboration with regional and international organizations aiming to declare Sudan free of animal infectious diseases (Category A).

Even though Kenana cattle are characterized by a good body conformation, they are not considered as a major source of beef in the country. Occasionally bull calves (one to two years) may be kept in yards and fed regularly on agricultural by-products for a few weeks to improve their carcass characteristics.

Performance

The Kenana breed has been classified as among the highest milk producing northern Sudan Zebu. According to several reports (Alim, 1960; El Amin and Osman, 1971; Saeed *et al.*, 1987; and Abdalla *et al.*, 1990) the average milk production per lactation (198-257 days) varies between 1 400 kg and 2 100 kg. Data analysis included 1 626 observations from University of

Table 2. Means and standard deviations of some productive and reproductive traits of Kenana cattle.

Parameters	No.	Average±S.D	C.V %
TMY (kg)	1 056	1 695±776	45.8
210-d (kg)	1 056	1 270±580	45.7
MPD (kg)	1 056	6±2.5	41.2
LL (days)	1 056	289±92	31.8
AFC (month)	233	57±16	28.1
CI (days)	947	467±133	28.5
DP (days)	74	167±23	_
BW (kg)	_	23.7±0.7	_

TMY = total lactation milk yeild; 210-d = standerized 210 days yeild; MPD = milk per day lactation; LL = lactation length; AFC = age at first calving; CI = calving interval; DP = dry period; BW = birth weight.
Source: University of Khartoum and Abu Na'ama Dairy Farms.

Khartoum Dairy Farm (Table 2) showed that the total lactation milk yield (305 days) and the standardized milk yield (210 days) were 1695 kg and 1270 kg respectively (Ageep, 2002). Results from Nisheisheiba Research Station showed that milk fat and solid not fat (SNF) varied with lactation season in a range of 4.2% to 5.4% and 8.7% to 9.0%, respectively. In general, data on the reproductive and productive performance of the Kenana breed under nomadism is very scant, therefore the results which were obtained from the research stations are considered as the most available. The average birth and weaning (120 days) weights of Kenana at Umbanein Research Station was found to be 23.0 kg and 52.0 kg respectively (Saeed *et al.*, 1987; El-Habeeb, 1991) whereas the dressing percentage was 55%. Traditionally Kenana is used for milk, meat and hide production. Bulls are also used as draught animals during the migration season.

Figure 5. Kenana calf three months old.

As for the reproductive performance of Kenana cattle, a slight seasonal difference in the number of births has been observed at Umbanein Research Station. Most births take place in December and January and the least between July and September. Under traditional management practices, the seasonality is very marked, with more than 60% of all calving taking place in a three-month period related to conception in the previous rainy season. A relatively great age at first calving has been reported at different research stations, ranging between 38.4 months at Gezira Farm (Alim, 1960) to 50 months at Umbanein Station (Saeed *et al.*, 1987). There is no data for the age at first calving under nomadic systems, however it is believed to exceed the range reported at research stations because of poor and fluctuating managerial conditions in the traditional sector. The range for the number of services per conception at different seasons was estimated to be 1.4-1.8 (Saeed *et al.*, 1987). Researchers have suggested a slightly higher number of services per conception under the pastoral system (2.5 for Western Baggara cattle). The calving interval at Umbanein Station was found to be 485 days which is longer than those reported at Gezira Farm (368-405 days). The reproductive life-span is reported to be within the range of 4 to 5.4 years. The reproductive efficiency of dairy cattle depends upon the regular production of offspring. As for Kenana cattle, the reproductive efficiency seemed to be characterized by the late age at first calving, and long calving interval. Therefore, the peak of production is expected to be attained relatively late (seven to eight years).

Calf mortality data at Umbanien Station demonstrated that the greatest risk was experienced during the neonatal period and up to the age of one week. Figure 6 and 7 show calves at the age of three and six months old, respectively. The overall mortality rate to one year was found to be 16.6% (Saeed *et al.*, 1987), however for calves of more than one year the mortality rate was much more reduced such that 75.6% of all animals born survived to ten years of age. Most of the deaths during pre- and post-weaning periods are due to pneumonia, digestive problems and general weakness (Table 3).

Under traditional management calf and adult mortality are considerably higher.

Current Effort for Genetic Improvement of Kenana

The governmental effort to genetically improve the indigenous cattle breeds of

Table 3. Pre and post-weaning deaths of Kenana calves by season and sex.

	Winter			Dry summer			Wet summer			Overall	
	M	F	T	M	F	T	M	F	T	M	F
Pre-weaning											
N born	246	237	483	306	307	613	216	244	460	768	788
Death	18	18	36	28	27	55	35	36	71	81	81
Percentage	7.2	7.3	7.3	8.8	8.5	8.7	14.5	13.6	14.0	10.0	9.7
Post-waning											
N weaned	181	208	389	228	219	447	278	280	558	687	707
Death	8	12	20	12	9	21	56	23	79	76	44
Percentage	4.3	5.9	5.2	5.2	3.7	4.7	20.3	7.8	13.4	8.9	5.7

Pre-weaning = 1-4 month, post-weaning = 4-8 month.
M, F, T = male, female and total.
Source: Umbanein Research Station.

Figure 6. Kenana calf less than six months age.

Sudan and conserve the endangered ones has been going on since the early 1940s, and has consequently led to the establishment of a number of research centres in the areas of livestock concentration. Umbanein Research Station was established in 1957, with the primary objective of improving the Kenana breed for milk and beef production through a continuous selective breeding programme. In the early 1960s a multi-purpose research centre was established at Kuku district in Khartoum North province. It includes several animal production units, among which an A.I. centre is considered to present the hope of imminent progress in animal breeding. At the same time the research effort which was carried on at Khartoum and Gezira University farms indicated the probability of achieving some genetic progress in the milk production of Kenana cattle (Alim, 1962; Osman, 1972). However because of the small herd sizes in these farms, in addition to financial barriers to sustaining such a long term selection programme, progress in genetic improvement has not been attained.

A main goal of these research centres is to maintain small purebred nucleus herds of Kenana and other local breeds, and they have proved to be successful in this respect. Very recently joint efforts between the government and the private sector have led to the establishment of financial institutions for agriculture, some of which are entirely devoted to livestock development such as the Animal Resource Bank. These institutions are supposed to play an important role in improving the socio-economic life of the nomadic tribes and promoting animal production research.

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