

The unique Kuri cattle of the Lake Chad Basin¹

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Background

The Kuri cattle breed is found on the shores and islands of Lake Chad. Its main habitat is in southern Chad and north-eastern Nigeria but the breed is also found in northern Cameroon, in Niger and, to a limited extent, in the Central African Republic. The Kuri are also known as the Baharie, Bare, Borrie, Boudouma, Dongolé, Koubouri, Buduma or White Lake Chad. The importance of the Kuri lies not only in its unique physical characteristics but also in its meat and milk production potentials. The breed is so acclimatised to the environs of Lake Chad that it is unable to survive elsewhere. This unique African breed is being threatened by extinction.

A rare breed

Population estimates have been given in the countries where the breed is found and they suggest that the breed is threatened. However, there are some inconsistencies in the reported figures and most of the population estimates are outdated. Figures as low as 7000 head have been reported for Nigeria (Adeniji 1985; Ngere 1990) and higher figures (50 thousand) have been reported for Chad (Queval et al. 1971). The Kuri population in the whole Lake Chad Basin was estimated at 45 thousand in 1947–48 and 200 thousand in 1972 (Renard 1972). The inconsistencies in population estimates in different countries are primarily due to difficulty in differentiating between pure Kuri and its crossbreds; the effects of livestock movements between countries; and differences in methods of estimation. Although the extent to which Kuri is being crossbred with zebu is not known, it is believed that the actual number of pure Kuri is much lower than has been reported. The remaining Kuri population is estimated to be approximately 10 thousand head. A systematic survey is needed to ascertain the population of the breed.

The major causes of the declining number of Kuri cattle include the retreating waters of the lake and the resulting reduction in the sole habitat of the Kuri. The resulting rangelands have become populated with zebu cattle, thereby providing greater opportunity for interbreeding. As a result, the Kuri is in the process of being absorbed by the zebu breed. Kuri owners have developed preference for Kuri × zebu type cattle primarily because of the reputation of the crosses for higher milk yield and greater fertility. Zebu-owning tribes in mixed crop farming areas prefer the crossbred because of its large size and, hence, enhanced abilities as a draft animal. Additionally, protracted civil wars, drought and rinderpest threaten the Kuri population. A deliberate programme of crossbreeding the Kuri with the zebu is also occurring. These factors are responsible for an increasing number of Kuri crosses. As a large human

population in the region depends on the Kuri, principally in pure form but also its crosses with the zebu, its extinction could pose a potential threat to the region's animal agriculture.

The characteristics of the breed

Physical characteristics

Kuri cattle are predominantly white although various colours are often present. Kuri owners seem to have a general preference for white breeding bulls. The distinguishing characteristic of the Kuri breed is its horns: they are immense, consisting of a lightweight fibrous material with a spongy interior and a very thin external shell. It is believed that the backward sweep of the horns may be responsible for the convexity of the forehead. Kuri horns have highly variable lengths, basal circumferences and horn diameters. Length of horns may be between 60 and 150 cm, basal circumference between 20 and 100 cm and diameter between 20 and 55 cm. However, there are even horns whose dimensions exceed the measurements given above. Although the horns are generally very light, approximately 1% of Kuri cattle have such heavy horns that their heads are, to some extent, tipped up by the weight. It has been suggested that, by tipping back the head, the weight of the horns keeps the nostrils out of the water when swimming. The bulbous base and spongy interior of Kuri horns are assumed to be an adaptation to aid buoyancy when swimming. Some selection within the Kuri has resulted in other horn shapes such as lyre- or crescent-shaped horns.

On the basis of thickness of the horn, there are two distinct types of Kuri cattle: those with long horns of moderate to normal width and 20–30 cm basal circumference and those with long, bulbous or conical horns with a large basal circumference that can exceed 60 cm or the spectacular buoy-shaped horns which are only 15–25 cm in length. The first group has horns typical of longhorn cattle; the ‘normal horns’ being found mainly on those animals living around the shores. The latter are typical of the majority of the Kuri animals on the islands. They are thought to be some form of adaptation for swimming in the aquatic milieu. Some people consider Kuri animals with this type of horns as the only pure Kuri. Although the buoy-shaped horn type is almost completely restricted to the islands, even on the islands, it is rare compared with the long, bulbous type. The argument that buoy horns are critical in an aquatic milieu is, therefore, not tenable. The ‘inflated’ horns are uncommon, occurring perhaps in only 5% of animals. Some reports suggest that the Buduma and Kuri people prefer animals with lyre- or crescent-shaped horns to those with ‘buoy’ or bulbous horns because the latter tend to have least longevity. However, there are also anecdotal claims that cows with pointed or floating horns are reputed to be good milkers.

Linear body measurements reported for mature Kuri show a wide variation, which may partly be attributed to differences in the definition of maturity. Nevertheless, the results suggest that Kuri cattle are taller than most indigenous African cattle. Height at the withers can reach 180 cm in the bulls. Cannon bone length is, on average, 24.8 cm in bulls and 24.5 cm in cows. Body length is greater (152–165 cm) in bulls than in cows (145 cm). Head, tail, ear and horn measurements in the cows are much smaller than in the bulls. On the other hand, girth:height ratios suggest that cows are wider bodied than bulls. This structural conformation may be considered as an adaptation for mating which enables the cow to withstand the heavy weight of the bull at mounting. Mature body weights range from 360 to 750 kg with bulls weighing between 500 and 650 kg, oxen from 500 to 750 kg and cows from 360 to 450 kg.

Production environment

The Kuri breed is adapted to production environments around Lake Chad. The environment is hot, humid and tropical around the lake and semi-arid and tropical away from the lake. Temperatures range from 14 to 39°C with an average of 28°C. Mean annual rainfall ranges from 93 to 520 mm. The vegetation of Lake Chad is typically aquatic or semi-aquatic. The best pastures are on the lowest islands, which have been levelled by erosion. Various grass species are found on temporarily flooded areas and on sandy banks. In addition, there is floating edge vegetation. The highlands (or shores) of the lake are comprised of Sahelian pastures.

The Kuri cattle are raised in a unique production system that integrates livestock production with flood-retreat farming and fishing. Because of the usual abundance of pastures, little use is made of crop residues despite extensive farming on the islands and shores of the lake. The management system on the islands is basically traditional and extensive where the animals depend entirely on range pastures. In the wet season, there is maximum vegetation and animals have surplus pasture. However, flooding of entire low-lying islands during the rains causes herds to migrate to the highlands and return to the lowlands in the dry season.

The production systems tend to vary with location around the lake. Some Kuri herds are usually found in both nomadic and settled production systems. In both systems, cattle are grazed almost exclusively on pastures and receive very little or no supplementary feeding. A small number of islands or coastal sections is grazed in irregular rotations by various cattle owners. There is transhumance in some areas where cattle owners also own croplands. Some tribes accompany their cattle yet some are usually pre-occupied with crop farming or fishing and, thus, allow their cattle to forage freely and return to the village on their own at sunset. In the dry season, the animals follow their herdsmen in swimming through the waters from island to island in search of waterweeds as feed. This practice has been described as 'aqueous transhumance'. There are tribes who move their cattle to upland areas during the peak of the wet season and return them to the lowlands in the dry season. This practice may be referred to as 'upland transhumance'. Animals are generally divided into transhumant and non-transhumant herds. The latter are comprised of lactating cows and their calves which are left to provide milk to the children and older people who stay behind to fish and farm. Transhumance is, however, limited to the environs of the lake, probably because of the susceptibility of the Kuri to sunlight and heat and its limited ability to trek long distances.

Adaptive characteristics

The Kuri has been living in the hot aquatic milieu of Lake Chad for thousands of years and is well adapted to this specific environment. Breeding herds flourish on the natural rangelands in and around the Lake. They are excellent swimmers, a characteristic they need to survive in their environment. Kuri animals get tired easily, are intolerant to heat and sunlight and are unable to stand extended periods of drought. Consequently, they are fond of wallowing in water and usually spend a considerable part of the day immersed in water, with only their nostrils lifted above the water surface. Indeed, they will graze in water up to their stomachs. However, they are reputed for tolerance to insect bites and preference for fresh pastures. In the hot humid regions of the lake, swarms of biting insects are often found during the greater part of the year but the Kuri hardly seems to notice their attacks. In contrast, the zebus in Lake Chad Basin are usually moved out before the peak of the biting insect swarms because of their intolerance to these flies.

The Kuri is rustic and well adapted to its habitat, but is unable to thrive outside the environs of the lake. For example, between 1953 and 1957, attempts were made to acclimatise a herd of 70–90 head of Kuri cattle on a government station in northern Chad. Their inability to adjust to

these conditions resulted in the abandonment of a programme aimed at crossbreeding it with N'Dama breed to create a trypanotolerant dairy breed. The grazing habits of the Kuri, especially their selective preference for fresh grasses and an aquatic environment, as well as their intolerance to continuous dry heat and sunlight, account for the inability of the breed to survive beyond the shores of Lake Chad Basin, except around the Yobe River Valley where conditions are similar.

The Kuri is relatively immune to indigenous parasitic infections. The major blood-borne parasitic diseases limiting the productivity of the Kuri are trypanosomiasis and piroplasmiasis. Trypanosomiasis has caused big losses in Kuri cattle. The breed's poor tolerance to trypanosomiasis can only be attributed to the absence of tsetse flies in the lake environment. The Kuri is also reported to be highly susceptible to rinderpest and contagious bovine pleuropneumonia (CBPP), with CBPP being reported to have caused huge losses in the breed.

Serum characteristics of the Kuri show a greater proportion of total globulins than albumins. Relative abundance of globulins may be a major factor in the adaptation of the breed in its aquatic milieu and may be implicated in the Kuri's immune response. However, the relationship between the immunological response and the adaptive behaviour of the breed is not clear and, therefore, requires further investigation.

Production characteristics

Available information indicates that females reach puberty early and are very fertile. Age at first calving ranges from 36 to 48 months. The females have an active productive herd life of 11 to 12 years during which they produce an average of 6 to 8 calves, but up to 12 calvings in a productive herd life are common. Calving intervals range from 15 to 18 months with about 75% of calvings occurring between October and April (the dry season) which implies that most conceptions occurred during the previous wet season. The bulls are sexually mature at 3 years of age.

The Kuri is reputed to be a good milker and has always been milked by its tribal owners who also use it rather sparingly as a pack animal. The Kuri has an average (on-station) daily milk yield of about 3–6 kg in a 6–10 month lactation period, although yield levels of up to 2400 kg per lactation have been reported. Lactation milk yield of the Kuri increases progressively from the first lactation to the fourth lactation and then declines in subsequent lactations. Reliable estimates of lactation milk yield are limited and not much work has been done on their milk composition. Results of analyses carried out in 1950, showed that the Kuri produced milk with butterfat, solids-not-fat and lactose contents of 4.2, 8.3 and 48.3%, respectively.

The Kuri, on average, weighs 22 to 25 kg at birth, 125 to 130 kg at 12 months, and 225 and 200 kg at two years of age (males and females, respectively). Feeding trials in Chad in which animals were supplemented with fresh Napier grass, cottonseed and sodium bicarbonate during the dry season showed that Kuri cattle respond well to supplementary feeding. Daily weight gains of 0.62–0.65 kg have been reported. Steers achieve between 200 and 250 kg of carcass at five to six years of age on natural pasture alone, and when stall-fed, frequently weigh more than 700 kg (live weight) at slaughter. Kuri meat is tender, juicy and well marbled. Some workers have reported poor conformation, while others have documented excellent beef conformation in the Kuri. The apparent contradiction may be the consequence of the genetic background (e.g. pure vs crossbred) and nutritional environment of the animals that went into the different feeding experiments.

The genetic relationship of Kuri cattle and other African breeds

African cattle are believed, from prehistoric artistic representations, to have been *Bos taurus* (taurine) in morphology. The *B. indicus* (zebu) breeds, that now dominate, entered the continent some few millennia later (Epstein 1971; Smith 1986). Morphologically, European and African taurine are similar resulting in a widely accepted assumption of a single common origin for the taurines. There are differences between indigenous African taurine breeds and European taurines in economically important traits such as adaptive and production traits. However, the overall difference between European and African taurines is not as marked as those between either of these and zebu animals.

The predominant breeds in West Africa are zebu breeds while the Kuri breed has been characterised as an African taurine breed. Hanotte et al. (2000) studied the frequency of a taurine *B. taurus* and an indicine *B. indicus* Y-specific allele amongst sub-Saharan cattle breeds. A total of 69 breeds were studied including the Kuri. The indicine allele was observed in all West African breeds (including taurine breeds like the N'Dama, Muturu, Somba, Kapsiki and Namchi) except the Kuri and shorthorn Lagune breeds. Other African breeds in this study in which only the taurine allele was found included: the Afar, Danakil and Raya-Azebo of Eritrea and Ethiopia; the Ankole, Watusi and Kigezi of the Lake Victoria region; and some southern African breeds, e.g. Kavango, Ovambo, Nguni, Pedi, Tuli, Nkone and Mashona. However, geographically, the Kuri breed is surrounded by zebu breeds and widespread crossing between the Kuri and zebu breeds has been reported. An earlier study by Meghen et al. (1998) using autosomal microsatellite *loci*, revealed a 50:50 genetic admixture between the Kuri and surrounding zebu. This could mean that substantial zebu presence in the Kuri gene pool is predominantly of zebu female origin.

Conclusion

The Kuri breed is a productive breed well adapted to the environment where it is found. The inability of the Kuri to thrive outside its present ecological niche implies that its rate of decline will accelerate as the level of the water in Lake Chad continues to retreat. Crossing with zebu breeds also poses a threat to the Kuri. As the Kuri breed plays a major role in the livelihood of most tribes in the region, a decline in its population poses a serious threat to the livestock industry in the area. Thus, there is urgent need for immediate action to halt and possibly reverse this trend. A suggested approach is the setting up of a nucleus breeding scheme on the islands. The breeding scheme would not only facilitate the characterisation and enhancement of the breed but its conservation as well. A parallel action might be to set up multiplication/breeding centres on the islands and/or along the shores of Lake Chad for the benefit of the countries in the region.

Knowledge gaps

1. Characterisation of the Kuri cattle breed is not complete. Further characterisation is needed for milk and beef production traits, as well as adaptive traits. The evaluation of the breed (comparing it with other breeds) for productivity and other traits is also necessary. There is also a need to determine the population size for the breed within and across countries and to compare it with that of other breeds or genotypes.
2. The Kuri has been crossed with the zebu over many years and this is one of the reasons given for the decline in numbers. The extent of zebu introgression into the Kuri has to be determined.

3. Physical characteristics of the Kuri cattle suggest that there could be subtypes within the breed. These physical characteristics may also be associated with various production characteristics. There is a need to establish whether these physical differences actually denote useful subclasses or not.

Discussion questions

1. What traits should be selected for in a Kuri breed improvement programme?
2. The waters of Lake Chad are shrinking and the Kuri population is declining in parallel as the breed is not adapted to conditions outside the lake area. Conserving the Kuri would, therefore, involve conserving its environment as well. How could conservation of the Kuri habitat be achieved? What would be the cost of such a programme and can it be justified?
3. The Kuri has survived in the Yobe River Valley where the environment is similar to that in the Lake Chad Basin. Is there a place for this breed in other tropical areas with similar environments, which are difficult for other cattle breeds to thrive in — e.g. the lake area in northern Zambia, the pans in northern Botswana and Namibia, the drier shores of Lake Victoria? What environmental (biotic and abiotic) factors may constrain introduction of the Kuri breed into these areas?

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