Group II

ADAMAWA

Origin

These cattle are of a medium-sized zebu type found mainly in the Adamawa territory in the Cameroons under French mandate, as well as in Bamanda Province in the Cameroons under British mandate and in parts of the British mandated territory which are administered as part of Adamawa Province of Nigeria. Gates (1952) described the Ngaundere, Banyo and Yola cattle under the heading " Adamawa. " Mandon (1948, 1953) described this type as " Zébu Peul " of Adamawa, probably because these cattle are kept by the Fulani in the same way as the M'Bororo are kept by the M'Bororo tribes in Adamawa Province in the French Cameroons. It is probable that Gates (1952) referred to these cattle as Ngaundere, in recognition of the fact that they originate from the district of that name in the French Cameroons. The Banyo and Yola cattle may be regarded as being varieties of the main type. Gates (1952) considered that the Banyo cattle had some M'Bororo ancestry, a contention which is supported by the general conformation of the cattle and, in particular, that of the hump which, in the Banyo is markedly different from that of the Ngaundere, or Zébu Peul, as described by Mandon. He also put forward the suggestion, which would appear to be corroborated by the hump, dewlap, horn and ear conformation of the cattle, that the Yola subtype is derived from the interbreeding of the Adamawa, White Fulani and West African (Nigerian) shorthorned cattle.

Conditions in the native home of the breed

Location, topography and soils

The area where the Adamawa cattle are bred lies approximately between 6° and a little north of 8° north latitude and between 10° and 15° east longitude and is situated in the Adamawa Province of the French Cameroons, Bamanda Province in the British Cameroons, and the Membila district of Adamawa Province in Nigeria. These

two latter areas are high plateaus ranging from 3,500 to 6,000 feet above sea level and composed of granitic and basaltic rocks. The soil is of varying depths and consists of strongly leached porous and sandy clays of a reddish color.

The Yola variety is found only in central Adamawa Province in Nigeria, which is about 700 feet above sea level, the soils being mainly sandy with black cotton soil and laterite in some areas.

Climate

The climatic conditions of the Adamawa plateau in French territory and Bamenda Province in British territory vary according to altitude.

The average rainfall in the French Cameroons area is about 1,600 mm. (60 to 65 inches), while in the British Cameroons area it is 80 to 100 inches. Rains begin in March or April, the heaviest precipitation being in the months of June to September. Light showers,

TABLE 4. – CLIMATOLOGICAL DATA FOR THE NGAOUNDERE, BAMENDA AND YOLA AREAS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
NGAOUNDERE													
Absolute maximum temperature, °C.	33.2	35.2	35.0	32.1	32.2	30.5	29.5	28.8	30.7	31.4	32.2	33.9	32.0
Absolute minimum temperature, °C	9.5	10.2	11.2	14.9	15.2	14.0	14.5	14.6	14.7	14.6	10.9	10.2	12.9
Rainfall, mm	4.5	1.0	30.9	152.9	198.2	290.7	285.7	261.8	233.1	153.7	17.7	4.3	16.32
BAMENDA													
Mean temperature, °F.	70	71	72	71	70	68	65	65	67	69	69	70	68.9
Humidity, % ...	69	69	73	80	83	84	89	91	89	85	81	76	80.8
Rainfall, in.	1.14	1.72	6.31	8.86	9.46	13.55	15.17	15.99	17.79	10.63	3.75	1.30	105.7
YOLA													
Mean temperature, °F.	80.2	83.9	88.8	90.9	86.6	82.0	79.9	79.4	79.4	81.5	82.2	80.6	83.0
Humidity, % ...	16	15	17	26	39	61	66	68	69	60	29	19	40.4
Rainfall, in.	0.03	0.00	0.33	1.82	4.87	6.35	6.77	7.56	7.92	3.23	0.22	0.00	39.0

SOURCE: Bamenda: McCulloch J., *Personal Communication.*
Yola: Usher-Wilson, J.M.S., *Personal Communication.*

however, occur throughout the year. The central region of Adamawa Province of Nigeria is drier, with a lower average rainfall.

Climatological data for the Ngaoundere (Adamawa, French Cameroons), Bamenda (Bamenda Province, British Cameroons), and Yola (Adamawa Province, Nigeria) areas are given in Table 4.

Vegetation

Where the altitude of the Cameroons is between 4,000 and 7,000 feet there is montane vegetation, including dwarf moss and lichen-bearing trees and mountain grassland. The area is dissected by deep gorges.

The hill grazing is generally a clumpy mixture of *Sporobolus* spp. and clover. Fairly common grasses in the Bamenda area are *Melinis minutiflora*, *Pennisetum purpureum*, *Eleusine indica*, *Paspalum* spp. *Setaria* spp., and *Imperata* spp. On the lower slopes coarser grasses, principally *Andropogon* spp., *Cymbopogon* spp., *Imperata* spp. and *Pennisetum purpureum*, are encountered.

Mandon (1953) lists the following varieties of grasses in the Adamawa region of the French Cameroons: *Pennisetum polystachyon*, *Pennisetum subangustum*, *Chloris pycnothrix*, *Eleusine indica*, *Rhynchelytrum repens*, *Paspalum scrobiculatum*, *Sporobolus granularis*, *Hyparrhenia rufa*, *Setaria pallidifusca*, *S. communis*, *Andropogon gayanus*, *Pennisetum purpureum* and *Brachiaria mutica*.

Management practices

Almost all the Adamawa cattle are owned by sedentary members of the Fulani tribe. The herds are, however, with the exception of small numbers of milch cattle which are kept near the villages, placed in the charge of either a section of the stock-owning family or professional herdsmen and are kept in constant movement in search of grazing and water. During the rains, from May to October, the cattle are widely distributed throughout the area where the tsetse fly is not prevalent. In the dry season the shortage of water elsewhere in the area makes it necessary for the herds to concentrate near the main rivers where they graze the riverain swamp grasses. Some of the smaller herds, however, remain on the higher land throughout the year and appear to thrive under these conditions.

Where the main herd is of the wilder M'Bororo (Rahaji) type, a small herd of the more docile and, by comparison, fairly productive Adamawa cattle is often maintained for the supply of milk to the village.

The semi-nomadic system of animal management results in there being little co-ordination between animal and crop husbandry, except

that cattle are allowed to graze crop residues on cultivated land after the harvest, and cultivators who themselves have no livestock often establish a garden on the site of an abandoned cattle camp.

Apart from this limited use of crop residues and a little sorghum bran which may be fed to calves and milch cows, the cattle subsist entirely on grazing which is, however, under the nomadic system, normally sufficient for their needs. Most stock owners provide their cattle with local or imported salt at intervals which may vary from two weeks to three months according to the wealth of the herd master.

Physical characteristics of the breed

The Adamawa (Figure 17) are medium-sized cattle with the long narrow convex-profiled head, sloping pelvis and upright hind legs typical of the subsaharan zebu. While their general conformation is similar, there are differences between the Ngaundere, Banyo and Yola subtypes, especially in size, hump conformation and coat coloration.

The true Adamawa, or Ngaundere, measures about 110 to 125 cm. at the withers, with a heart girth of between 150 and 160 cm. and a liveweight of between 350 and 500 kg. These cattle are distinguished by their characteristically flaccid humps. The most usual coat colors are brown, roan, red and white, and black and white.

The Banyo has an average height at withers of between 120 and 130 cm. The hump is firmer, more erect and higher above the withers, and the horns are slightly longer than in the Ngaundere. The coat coloration is red or red and white with, in the latter, prominent white

TABLE 5. – DATA ON BODY MEASUREMENTS OF ADAMAWA CATTLE (YOLA)

	Male			Female		
	1 to 1½ years	2 to 2½ years	mature	1 to 1½ years	2 to 2½ years	mature
Weight, lb.	326	417	776	306	420	742
Length from shoulder point to pinbone, in..	24.0	27.0	35.7	24.3	26.0	30.3
Height at withers, in.	40.0	42.5	48.2	38.5	47.5	47.2
Depth of chest, in.	18.0	20.0	24.5	17.3	21.0	24.5
Width of hips, in.	10.2	12.0	16.5	10.5	13.2	16.7
Heart girth, in.	46.0	50.0	63.7	45.5	53.5	63.5

SOURCE: Usher-Wilson, J.M.S., *Personal Communication.*

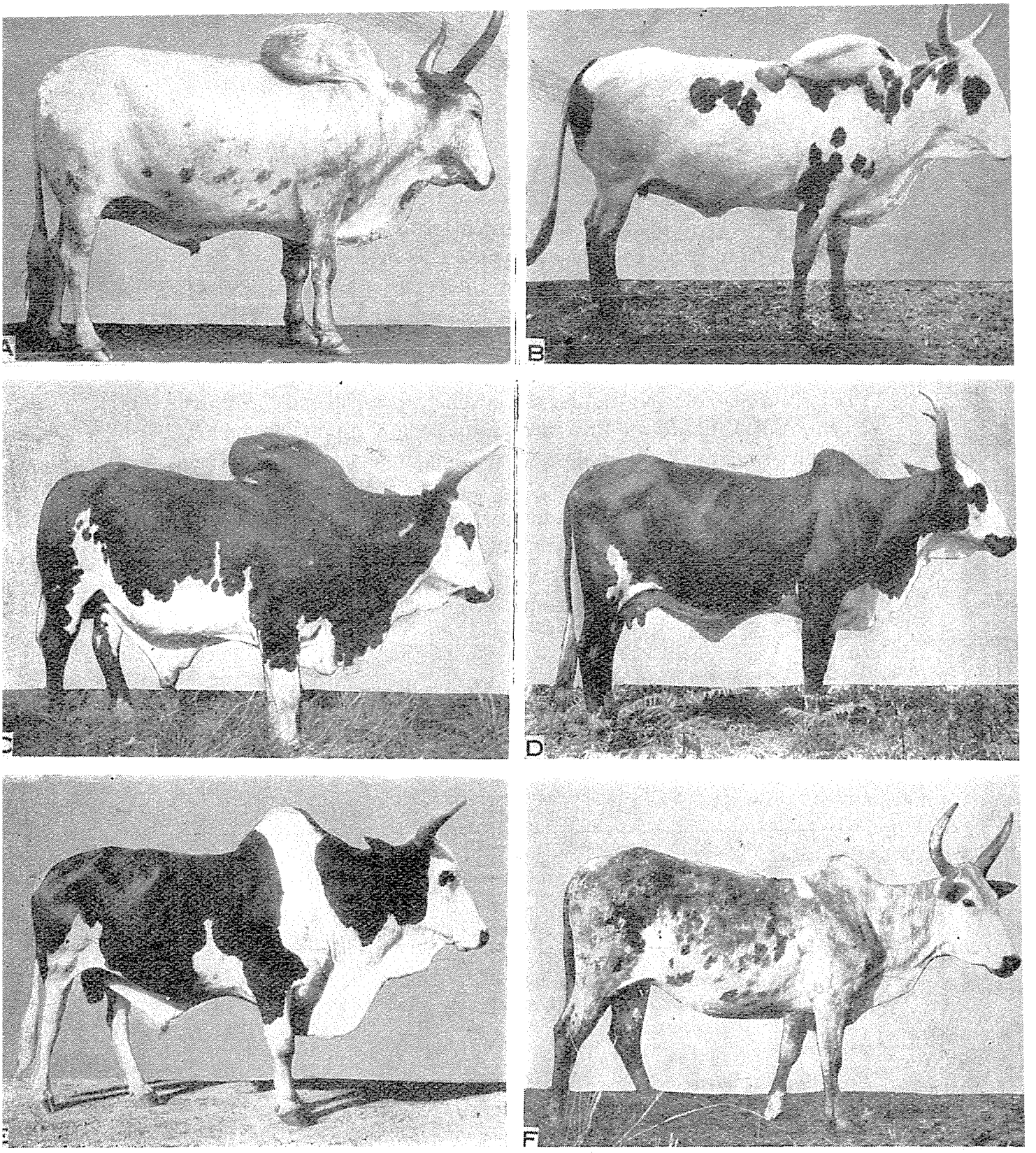


FIGURE 17. *Adamawa cattle.* (A) *Ngaundere steer*; (B) *Ngaundere cow*; (C) *Banyo bull;* (D) *Banyo cow;* (E) *Yola bull;* (F) *Yola cow.*

Courtesy of G. M. Gates

patches on the face and underline, bearing some resemblance to the coat pattern of the Hereford breed.

The Yola is smaller than the two other subtypes, with short horns, a hump which is medium to small in size, and a less well-developed dewlap. The coat coloration includes combinations of red, black, brown, dun and white either in patches or in a speckled pattern which has resulted in these cattle being sometimes known locally as *Tatta-bareji*.

Records of liveweights and body measurements of Adamawa cattle (Yola variety) from the herd established at Kofare Experimental Farm, Yola, Adamawa Province (Nigeria) are summarized in Table 5. The birthweights of 20 male and 26 female calves at this Station were 48 and 45 lb. respectively.

Liveweight records of Adamawa cattle (Banyo and Ngaundere) maintained at Jakiri Veterinary Station, Bamenda Province, are reported in Table 6. The birthweights of male and female Ngaundere calves were 53 and 52 lb. respectively, while those of Banyo calves were 60 and 55 lb. respectively.

TABLE 6. – LIVEWEIGHTS IN POUNDS OF ADAMAWA CATTLE (BANYO AND NGAUNDERE) AT JAKIRI VETERINARY STATION, BAMENDA PROVINCE

Variety	Male			Female			Ox
	1 year	2 years	mature	1 year	2 years	mature	mature
Adamawa (Banyo)	250	400	900	200	350	800	1 000
Adamawa (Ngaundere)	275	425	1 000	225	375	900	1 100

SOURCE: Banyo: McCulloch, J. *Personal Communication.*
Ngaundere: Agricultural Officer, Bambui, Cameroons, *Personal Communication.*

Functional characteristics of the breed

Adamawa heifers calve down for the first time at between 3 and 4 years of age and young bulls are usually first used for service when they are about 3 years old. The annual calving percentage of the Adamawa herd at the Zootechnical Station at Wakwa, French Cameroons has been reported to be about 88. Although there is no definite breeding season in Adamawa herds the majority of calvings occur at the end of the rains in October and November.

Adamawa cattle are of a very docile temperament and give evidence of being potentially good milk producers. Milk performance records

of the different varieties of Adamawa maintained at the Government Farms in Nigeria (Kofare near Yola in Adamawa Province, and at Bambui and Jakiri in Bamenda Province), are summarized in Table 7.

TABLE 7. – MILK PRODUCTION OF ADAMAWA COWS AT BAMBUI STOCK FARM, BAMENDA; JAKIRI VETERINARY STATION, BAMENDA; AND KOFARE EXPERIMENTAL FARM, YOLA, ADAMAWA PROVINCE

Variety	Average production, lb.	Days in milk	Best yields, lb.	Days in milk	Calving interval, days
Ngaundere	1 500	100–300	3 000	200–300	365
Banyo	1 630	217	3 800	285	365
Yola	2 120	216	2 978	299	435

SOURCE: Ngaundere: Agricultural Officer, Bambui, *Personal Communication.*
Banyo: McCulloch, J. *Personal Communication.*
Yola: Usher-Wilson, J.M.S. *Personal Communication.*

As meat-producing animals, the Adamawa in Nigeria are reported to be well adapted to fattening on grazing alone, though no records are available. Mandon (1953) reports from records in the French Cameroons that good slaughter cattle weighing 520 kg. at 4 years of age gave a dressing percentage of 51, while animals at 5 years of age weighing between 580 and 680 kg. yielded 52 percent dressed meat. Ordinary cattle from breeding herds at 4 years weighed 400 kg., while liveweights at 5 years varied from 410 to 460 kg.

The animals are reported to be good as draft animals. They are utilized in Nigeria for farming operations on moderately easily worked soils. They are also used for the transportation of farm produce in small carts. On an average they are worked for six to seven hours a day.

Sources of breeding stock and information regarding the breed

The Adamawa region in the French Cameroons is the chief source of breeding stock.

The following authorities could provide further information:

The Chief of the Zootechnical Station, Wakwa, French Cameroons.

The Director of Agriculture, Kaduna, Northern Nigeria.

The Director of Agriculture, Enugu, Eastern Nigeria.

The Director of Veterinary Services, Kaduna, Northern Nigeria.

The Principal Veterinary Officer, Enugu, Eastern Nigeria.

AZAOUAK

Origin

The Azaouak cattle obtain their name from the Azaouak country in the eastern French Sudan. Ryall (*Personal Communication*) and Ross (1944) give Adar as the commonly used name for the cattle in Nigeria. Other names listed are Azawal and Azawaje. They are included in the Shorthorned Zebu group of cattle bred by the Arabs and Tuaregs of the Azaouak basin in the eastern French Sudan. They are also found in the Azah valley to the west and the Dallol Basso to the south and in central Niger Colony and in the northern border area of Nigeria. The type is under study at Filingué Farm in Niger Colony, French West Africa. The foundation herd was purchased from Tuareg pastoralists in the Tahona region.

Conditions in the native home of the breed

Location, topography and soils

The Azaouak basin, where the cattle originate, lies between 3° and 7° east longitude and 15° to 20° north latitude. In Nigeria, Azaouak cattle are found north of 12° north latitude and between 4° and 9° east longitude in north Sokoto, Katsina and Kano Provinces.

The area is undulating plateau land with an average elevation of 1,600 to 1,800 feet above sea level. The soil is light and sandy with more or less sedentary sand dunes. During the rainy season many of the depressions between the sand dunes are flooded. During the dry periods when the water evaporates these swamps produce excellent vegetation.

Climate

The habitat of the type has a tropical climate marked by a long dry period from October to May, and a relatively short rainy season from May to the end of September. The average rainfall, which is about 30 inches in the south of the area, decreases to the north. March to June are the hottest months, when maximum temperatures may reach 105° to 110° F. January is the coolest month.

Climatological data from two stations in Nigeria and one in the French Sudan are given in Table 8.

TABLE 8. – CLIMATOLOGICAL DATA FOR SOKOTO, KATSINA IN NIGERIA AND GAO IN THE FRENCH SUDAN

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Sokoto													
Mean temperature, °F.	79	82	87	93	93	88	82	80	82	86	86	83	85.10
Humidity, % ...	43	28	29	34	59	62	79	87	83	56	40	31	52.60
Rainfall, in.	nil	nil	0.05	0.45	2.32	4.11	6.25	8.72	5.35	0.66	nil	nil	27.91
Katsina													
Mean temperature, °F.	71	76	82	87	87	84	80	77	80	83	79	73	79.90
Humidity, %	29	25	24	38	62	70	82	87	84	62	32	30	52.10
Rainfall, in.	0.01	nil	0.03	0.26	2.44	3.61	6.03	10.9	4.63	0.42	0.01	nil	28.36
Gao													
Mean temperature, °F.	73	76	84	90	95	95	90	86	89	90	84	75	86
Rainfall, in.	0.1	0	0.1	0.1	0.3	1.2	2.9	3.6	1.0	0.1	0	0	9.3

SOURCE: Sokoto and Katsina: Ryall T.E., *Personal Communication*.
Gao: Kendrew, 1953.

Vegetation

The dominant vegetation of the area is of the savannah shrub type. The trees have small leaves and there are a number of *Acacia* spp. The scrub vegetation consists largely of *Combretum micranthum* and *Guiera senegalensis*. Such areas are used for rough grazing. The following are some of the grasses found in the area: *Cenchrus ciliaris*, *Chloris prieuri*, *Digitaria gayana*, *Eragrostis senegalensis*, *E. ciliaris*, *Echinochloa colona*, *E. stagina*, *Panicum laetum*, *Hyparrhenia raynechtii*, *Aristida mutabilis*, *Dactyloctenium aegyptium*, etc. Some leguminous plants, such as *Zornia diphylla* and *Alysicarpus vaganalis* also occur. Leaves from *Acacia tortilis*, *A. seyal* and *Ziziphus lotus* are utilized as fodder.

Cereal by-products, mainly the stovers of maize, millet, *Eleusine coracana* and *Digitaria exilis*, are also used as cattle feed.

Management practices

Azaouak cattle in the Nigerian area are maintained by the Fulani tribe. While these people were originally nomadic (Figure 18) a considerable proportion of them have now become sedentary agriculturists.

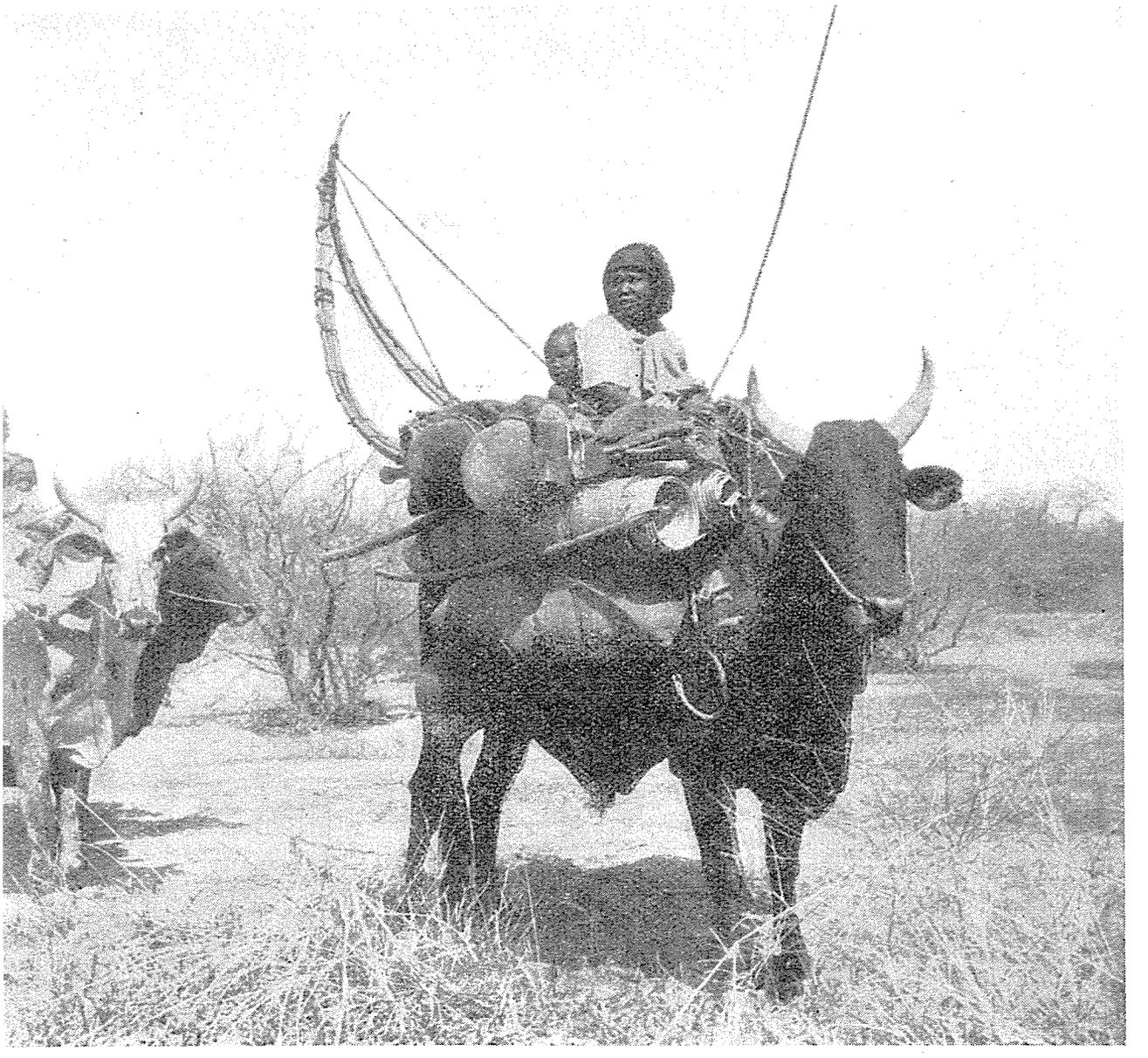


FIGURE 18. *A bull of Azaouak type used as a pack animal for the transportation of a Tuareg encampment.*

Courtesy of Henri Lhote

Cattle, however, even in the crop-growing areas continue to depend very largely on pasture, although some crop products, including sorghum straw and grain, cottonseed, palmkernel meal and groundnut cake, are utilized as supplementary feeds. The practice of pasturing the cattle in large herds, in which a number of bulls serve the cows indiscriminately, precludes any constructive breeding planning. Cattle are taken to water once daily. Some cattle owners, particularly in the Azaouak valley, give their animals Fogha salt and calcium phosphate toward the end of the dry season. Calving, as a consequence of the dependence of the cattle on natural grazing, normally occurs during or slightly before or after the rainy season.

Nowadays cows are being milked for the production of saleable milk products. Cattle owners also derive income from the sale of slaughter stock.

Physical characteristics of the breed

Azaouak cattle (Figures 19 and 20) are medium-sized and compact. The dewlap and umbilical fold are fairly well developed. The hump is well developed but narrow, being about 12 cm. thick in the females and 12 to 16 cm. thick in the males. The horns of the bulls are short and thick at the base, while those of the females are medium-sized and curve outwards, upwards and forwards. The ears are medium-sized, measuring about 21 cm. in length in the females. The skin is slightly loose and of medium thickness. The pigmentation of the skin is dark, as is that of the muzzle. The coat coloration is variable, but is usually a mixture of red and white, black and white, or fawn with white patches.

TABLE 9. – LIVEWEIGHTS AND MEASUREMENTS OF AZAOUAK CATTLE AT FILINGUÉ STATION

	Male			Female
	29-36 months	42-50 months	over 50 months	mature
Weight, kg.	—	—	350–500	250–350
Length from shoulder point to pin-bone, cm.	127.5	134.25	143.6	134.7 (84)
Height at withers, cm.	123.1	127.2	131.4	123.3 (119)
Depth of chest, cm.	61.7	65.8	83.4	62.7 (119)
Width of hips, cm.	37.7	41.6	46.6	43.0 (124)
Heart girth, cm.	158.5	164.6	169.8	155.7 (111)

NOTE: Numbers in brackets show the number of animals measured.
SOURCE: Pagot, 1952.

Attempts have been made to develop a fawn-colored animal with dark extremities at Filingué in French West Africa where a herd of Azaouaks is maintained.

The average liveweight of mature females is about 300 kg. and that of males about 390 kg.

Body measurements of Azaouak cattle maintained at Filingué are given in Table 9. Birthweights of male and female calves are about 30 kg.

Functional characteristics of the breed

The cattle, both in Nigeria and French West Africa, are primarily utilized for the production of milk. As meat-producing animals they are of average quality. The Azaouak is considered to be light for heavy draft purposes, but it makes an excellent pack ox, especially in the sandy areas.

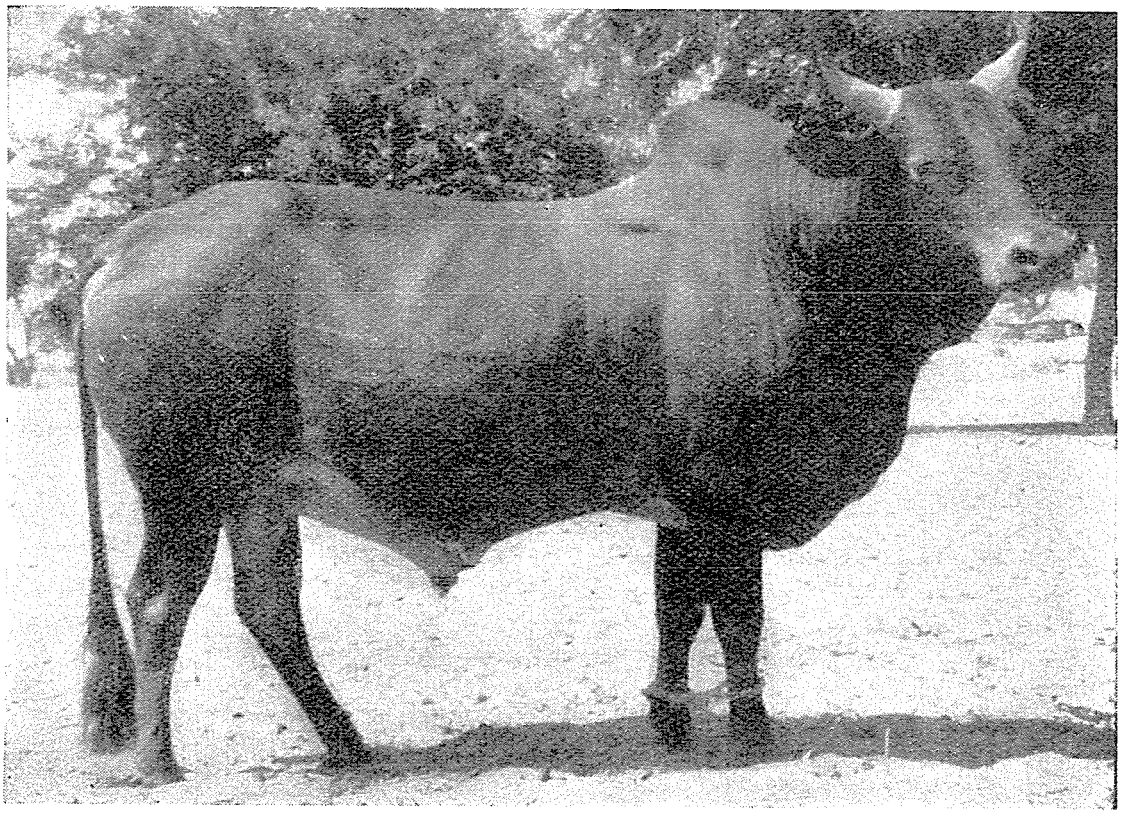
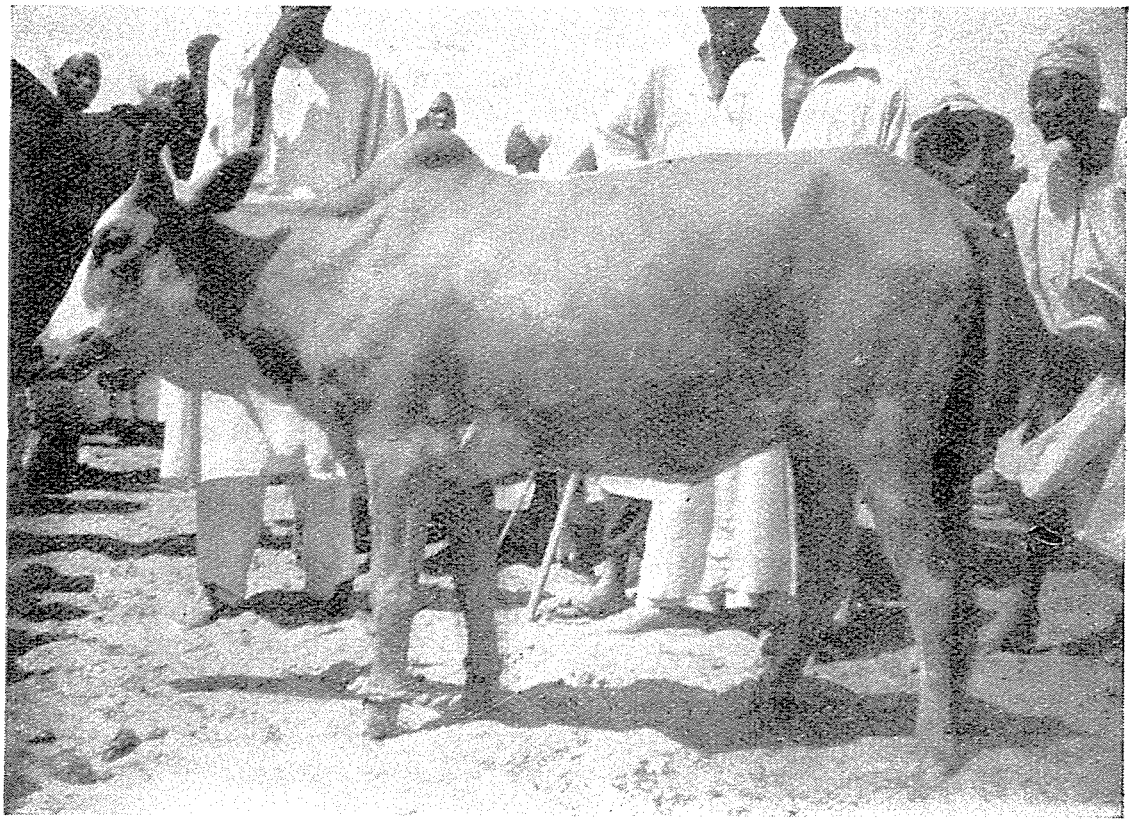


FIGURE 19. *Azaouak bull.*

FIGURE 20. *Azaouak cow.*

Courtesy of G. M. Gates



Pagot (1943, 1952) has studied the Azaouak herd at the Filingué Station in French West Africa. Heifers calved for the first time at an average age of 40.5 months (with a range of 36 to 46 months) and young bulls were sexually mature at about 2 years of age. Most calvings occurred during the months May to September and it was noticed that cows showed a tendency to only take the bull towards the end of the lactation period or when they were dry. The average lactation period was 293 days with a standard deviation of 23 days. Milk production figures calculated for different lactation periods are summarized in Table 10. These are derived from monthly production figures based on 10 test recordings made each month.

TABLE 10. – MILK PRODUCTION OF AZAOUAK CATTLE AT FILINGUÉ STATION *

Lactation	Calculated production in liters	
	in an estimated lactation of 9 months	in an estimated lactation of 10 months
1st	445.56 ± 9.72	484.73 ± 10.45
2nd	477.54 ± 10.99	517.70 ± 11.81
3rd	564.87 ± 14.35	613.54 ± 14.99
4th	624.23 ± 17.76	672.56 ± 19.93
5th	539.91 ± 20.89	585.22 ± 22.61
6th	537.14 ± 32.67	

* Means ± standard error.
SOURCE: Pagot, 1952.

Sources of breeding stock and information regarding the breed

It is estimated that there may be over one million Azaouak cattle in French Niger territory. No estimates from French Equatorial Africa are available, although the number there may be larger.

Further information regarding the type and its availability may be had from the following authorities:

Director, Service de l'élevage et des industries animales, Dakar, French West Africa.

Service de l'élevage et des industries animales, Filingué, Niger, French West Africa.

Director of Agriculture, Kaduna, Northern Nigeria.

Director of Veterinary Services, Kaduna, Northern Nigeria.

MAURE

Origin

The Maure type of shorthorned zebu has developed in Mauritania and the western French Sudan in French West Africa. Mason (1951*a*) lists the following as synonymous names for the type: Arab, Gabaruye, Mauritanian, Moor and Moorish. It has been assumed that these cattle reached their present habitat with the migration of Semitic tribes from the east.

Conditions in the native home of the breed

Location, topography and soils

In Mauritania, Maure cattle are maintained in the Hodh, Assaba, Gorgol and Tagant areas, as well as in part of northern Brakna and Trarza. Lack of water and the scarcity of good pasture limit their spread further to the north. They also occur in the French Sudan, particularly in the Nioro, Nara, Goundam and Timbuktu areas and extend as far east as Macina and to the north of the Niger bend. The topography of Mauritania includes a series of mountain ranges surrounding a vast lateritic plain to the south of which there are numerous streams and lakes bordered by good pasture land. Toward the east, in the French Sudan, there is a great sandy plain with numerous sedentary dunes which are surrounded by areas of sandy loam soils. Good pasture areas are associated with the Niger system in the French Sudan.

Climate

The climate of the area is hot and dry from March to June, but the humidity increases steadily until the advent of the rains which begin in July and continue until September. The winter is dry and cool with a high diurnal temperature range. The annual rainfall is low in the north (5 to 10 inches) but increases toward the south, the average for the whole area being about 20 inches.

Climatological data for the Maure area are given in Table 11.

TABLE 11. – CLIMATOLOGICAL DATA FOR THE MAURE CATTLE AREA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °C.	22.5	25.4	29.4	33.3	34.7	33.1	29.5	27.4	28.7	28.5	27.3	22.6	28.5
Humidity, % ...	27	28	26	25	25	33	47	59	48	33	30	30	34.2

SOURCE: Director, Centre fédéral de recherches zootechniques, *Personal Communication.*

Vegetation

The vegetation in the northern zone is scanty and consists of thorny bushes and woody grasses, which give some green herbage during the wet season. *Cenchrus catharticus* and several species of *Cyperus* are found. Various species of *Acacia* provide supplementary fodder for the cattle. In areas which enjoy higher rainfall, such as the south and the east, and near permanent ponds, lakes and rivers, the grazing is good and the pastures are full of nutritive grass species. Some of the varieties of grass commonly found are *Panicum stagninum, Panicum repens, Paspalum scrobiculatum, Andropogon pseudo pricus, Andropogon gayanus, Cymbopogon giganteus, Digitaria setaria* and *Echinochloa* spp.

Management practices

Maure cattle (Figure 21) are completely dependent on grazing and receive no supplementary feeds. Grazing in Mauritania is limited in extent and each tribe is restricted to its own grazing area which usually includes its own watering points. In the French Sudan the tribes migrate from their grazing areas in the north to the south or east in search of grazing in the dry season, returning to the north in the rains. The cows are milked twice daily and are allowed to go out to graze after milking in the evening. The herds are usually gathered together near the watering points at night.

FIGURE 21. *Maure zebus used as pack animals.*

Courtesy of Musée de l'Homme, Paris

The practice of allowing the young bulls to run with the herd and to serve the cows indiscriminately precludes any effective selective breeding, although some of the bulls are castrated at a later date.

Physical characteristics of the breed

Maure cattle are loosely built, strongly boned animals, lean of musculature and of medium to large size. The head is long and lean with a straight profile and orbital arches which by their prominence give a degree of concavity to the forehead. The horns are fine, short in the male, longer in the female, circular in cross section and grayish or brownish in color. They grow from the poll in a sideways and upward direction and turn forewards at the points. The neck is lean and flat, and of medium length. The dewlap is of only moderate development. The hump is large in the male (it may stand 10 or 20 cm. above the withers) but is small in the female and the castrated male. The chest is long and not deep, with little spring of rib. The topline rises from the withers to the high sacrum and is lean and decidedly roofed. The pelvis is markedly sloping and with a tendency to be triangular in plan with the pinbones close together. The tail setting is high and the tail is long and fine. The limbs are long and tend to be coarsely boned, and the hoofs are large. The udder is of fair development and the teats are long.

The coat coloration of Maure cattle in Mauritania is generally black or black and white, while in the French Sudan a dark red is more usual. In the latter area the appearance of white spotting on the coat of an animal, the hump of which is larger than is to be expected in the true Maure, indicates the presence of Peul (Fulani) in the ancestry. The skin is supple and fine with little folding and the hair is short (Doutressoulle, 1947).

Some liveweights and measurements of Maure cattle in Mauritania and the French Sudan are given in Table 12.

Functional characteristics of the breed

Maure zebus are utilized for milk production as well as for draft purposes and meat production, although the latter quality is not well developed. For draft purposes they are used as pack animals and also for lifting water from wells and for the transportation of water for domestic consumption. The animals calve throughout the year, although a greater proportion show a tendency to come in estrus at the onset of the rainy season. The age at first calving is 3 to 4 years. The males are first put to service at between 2 ½ and 4 years of age. The bulls are slow in service.

TABLE 12. – AVERAGE MEASUREMENTS OF MAURE CATTLE

	Male	Female	Ox	Region
Liveweight, kg.	300–350	260–300	not available	Mauritania
Liveweight, kg.	350–400	250–300	350–400	French Sudan
Length from shoulder point to pinbone, cm. .	112	109	118	Mauritania
Length from shoulder point to pinbone, cm. .	144	140	152	French Sudan
Height at withers, cm. .	130	127	132	Mauritania
Height at withers, cm. .	125–130	125	140–150	French Sudan
Depth of chest, cm. ...	68	65	71	Mauritania
Depth of chest, cm. ...	not available	not available	not available	French Sudan
Width of hips, cm.	41	43	42	Mauritania
Width of hips, cm.	43	47	53	French Sudan
Heart girth, cm.	159	148	164	Mauritania
Heart girth, cm.	163	150	186	French Sudan

Source: Mauritania: Service de l'élevage de la Mauritanie.
French Sudan: Director, Centre fédéral de recherches zootechniques, *Personal Communication.*

In an average lactation the cows produce 600 to 700 liters of milk with a peak daily production of 6 to 7 liters. The lactation period is from 7 to 8 months.

They are reported to be even-tempered but slow in draft work, and when employed as pack animals are able to move at 4 to 5 km. per hour, covering about 40 km. in a 10- to 11-hour day and carrying an average load of 80 to 100 kg. The bullocks are used for work when they are about 4 years of age and weigh about 250 to 300 kg.

Maure zebus are slaughtered for meat at about 4 to 5 years of age with a liveweight of about 350 kg. The dressing percentage is reported to be 45 to 50.

Doutressoulle (1952) gives the following figures for commercial Maure slaughter stock:

Average liveweight	340 kg.	
Dressing percentage	45	
Raw hide	8.2 %	liveweight
Head	2.86 %	"
Feet, etc.	2.28 %	"
Tallow	1.67 %	of weight of quarters
Bones	19.48 %	" " " "
Net meat	29.78 %	" " " "

Sources of breeding stock and information regarding the breed

It is estimated that there are over 100,000 Maure cattle in French West Africa.

Further information regarding the type may be had from:

Inspection générale, Service de l'élevage, Dakar, French West Africa.

Chef, Service de l'élevage et des industries animales, Bamako, Sudan, French West Africa.

Director, Centre fédéral d'élevage et de recherches zootechniques, Sotuba, Bamako, French West Africa.

NORTHERN SUDAN SHORTHORNED ZEBU

Origin

The cattle type, referred to as the Northern Sudan shorthorned zebu, includes the following local populations: Kenana or Rufa'ai, Butana (including Shukria, Batahin, Hadendowa), White Nile, Western or Baggara (Darfur and Kordofan), and Northern Province (including Shendi, Deleigabi, Dongola and Geigarawi).

The type was most probably introduced by immigrant tribes from Asia in very remote times. While there is too much variation within the type as a whole to justify its description as a *breed*, distinguishable subtypes occur, of which the cattle of the Kenana and Rufa'ai tribes in the Fung in Blue Nile Province, Republic of the Sudan (Figure 22) and those of the Shukria and neighboring tribes in the Butana between the Blue Nile and the River Atbara (Figure 23) are examples, which could provide the material from which the future development of breeds would be possible. In much of the area, however, periodical severe depletions of the herds by war and disease and their subsequent replenishment from whatever stocks may have been most readily available, have resulted in the appearance of heterogeneous populations often only distinguishable from one another by environmentally induced differences in size and conformation. Thus, the cattle of Darfur Province are derived to a considerable extent from stocks which have been brought in from territories further to the west with the movement of tribes from that direction, while those of Northern Province are descended in large part from a series of introductions,

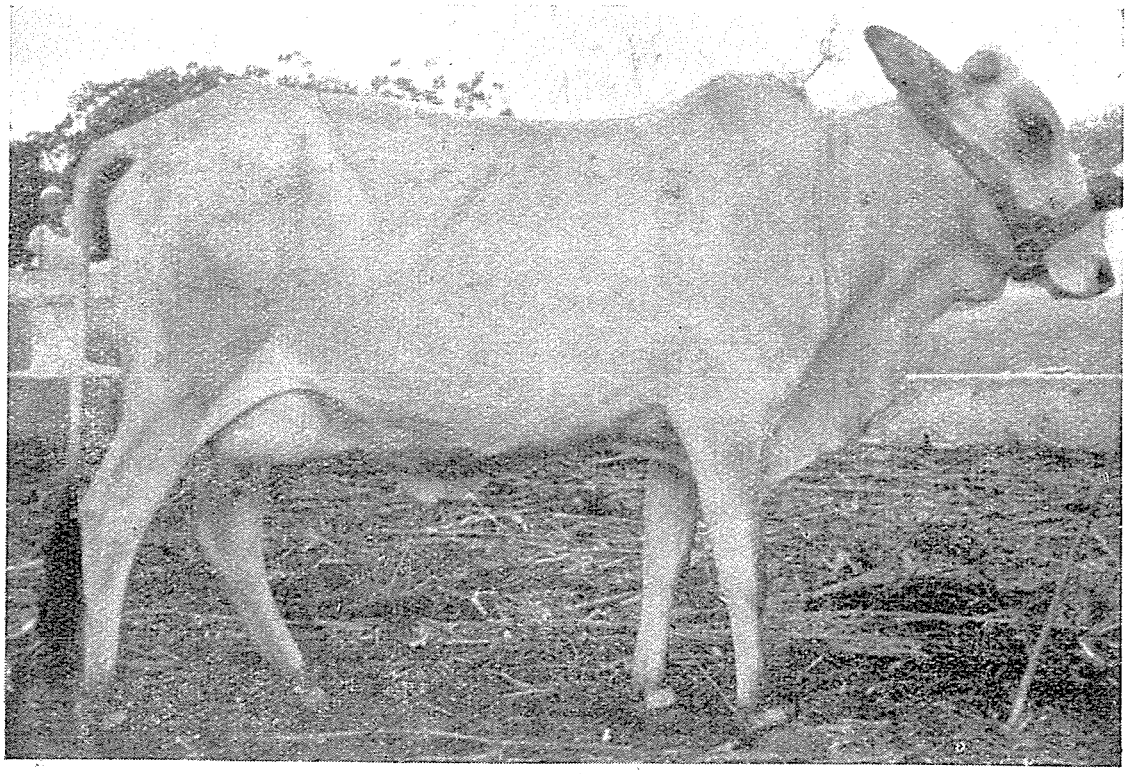
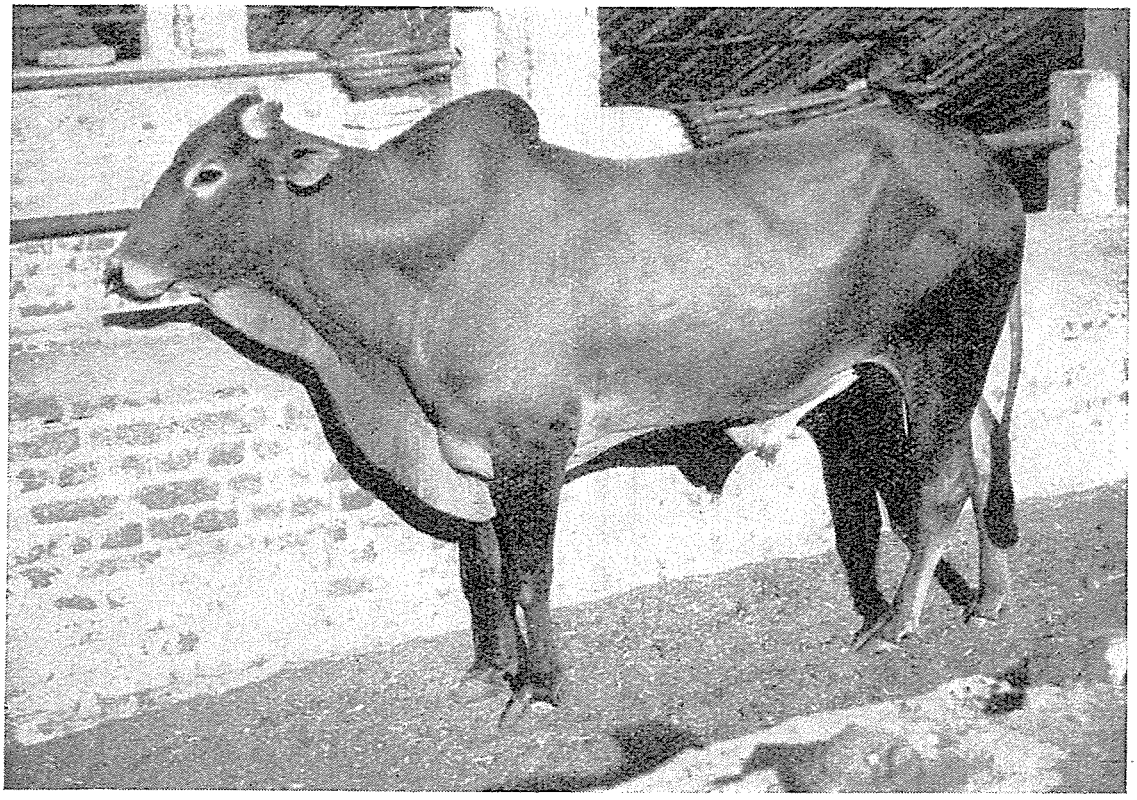


FIGURE 22. *Northern Sudan shorthorned zebu « Kenana » cow.*

FIGURE 23. *Northern Sudan shorthorned zebu « Butana » bull.*

Courtesy of E. A. McLaughlin



each of which followed a severe outbreak of cattle plague and which included red humpless cattle from Upper Egypt in the late nineteenth century and cattle from Kordofan in 1944 and 1945. In the past two decades M'Bororo cattle have been brought as far east as the Blue Nile by migrating West African tribesmen and their influence has been detected in local herds in Kordofan.

While it is thought that there has been little exchange of breeding stock between the Arabs of Darfur and the Nilotes of Bahr el Ghazal Province, the Abialang Dinka further to the east, as well as the Shilluk and Dinka on the White Nile to the north of Malakal, are in closer contact with Arab nomads and it is possible that Nilotic cattle may have entered Northern Sudan herds in these areas.

A tendency towards a more stocky conformation in the cattle to the north of the Nuba mountains may be in part due to interbreeding with the small thickset hill cattle, which have been briefly described by Mills (1953).

Conditions in the native home of the breed

Location, topography and soils

The area occupied by the Northern Sudan zebu can be divided into two parts; first, the savannah belt grazed by pastoral herds and, secondly, the strip of cultivated land bordering the Nile where it traverses the desert from north of Khartoum to the Egyptian border.

The pastoral area is part of the low rainfall woodland savannah belt which extends across Africa south of the Sahara and which, in the Sudan, lies very approximately between 10° and 15° north latitude, and crosses the country for approximately 900 miles from the frontier with Ethiopia and Eritrea in the east to that with French Equatorial Africa in the west.

The topography of the area is that of a flat plain of deposition broken only by isolated rock masses, of which Jebel Mara in Darfur and the Nuba mountains in Kordofan are the most considerable, and transected in its eastern part by the channels of the White and Blue Niles and the tributaries of the latter. Slope is from west and east toward the rivers and altitude varies from 740 meters at El Fasher in Darfur to 380 meters to the south of Khartoum.

The soils of Darfur and Kordofan include large areas of sedentary continental dune sand (Arabic, *qoz*) as well as the medium to heavy brown and black clays which, interspersed by small areas of sand and detrital material near the rock outcrops, cover the remainder of the area. Considerable areas of the clay plain near the White and Blue Niles are irrigated from the rivers.

The riverain lands by the Nile to the north of Khartoum comprise a narrow strip on each side of the river wherever fertile soil occurs and the banks are sufficiently low and free of rocks to be suitable for irrigation. The soils vary from fertile silts to poor soils with a high salt content resulting from the evaporation of irrigation and flood water.

Climate

The climate is that of a tropical continental area with a clearly defined rainy season. Rainfall is generally distributed over the period May to October and varies from little more than 200 mm. in the north of the pastoral belt to over 800 mm. in its extreme south. Rainfall in much of the Northern Province is negligible and near the Egyptian border several years may pass during which no precipitation is recorded. Air temperatures are high during much of the year and there is a considerable diurnal variation.

Climatological data for stations in Darfur, Kordofan, Blue Nile and Northern Provinces are given in Table 13.

Vegetation

The vegetation in the north of the pastoral belt is composed of short annual grasses which are replaced further south by tall annuals including *Cymbopogon nervatus*, *Sorghum purpureo-sericeum* and *Hyparrhenia pseudocymbaria*. In the extreme south of the area the tall perennial grasses such as *Setaria* spp. and *Hyparrhenia* spp. make their appearance. Scattered bushes, trees and woodland occur throughout the area and include *Acacia mellifera*, *A. seyal* and *A. fistula*, as well as other species such as *Balanites aegyptiaca*, *Adsonia digitata*, *Hyphaene thebaica*, and toward the south, *Combretum* spp.

Large areas are devoted to rain-grown crops under forms of shifting cultivation. The main crop is dura (*Sorghum vulgare*) and the middle rainfall part of the area is the traditional granary of the Sudan. Other crops include sesame and groundnuts. On the clays, ground is cleared for cultivation by burning the grass. A successful burn depends on the grass not having been trampled by cattle and there is some conflict of the interests of pastoralists and cultivators in these areas.

The irrigation schemes south of Khartoum on the White and Blue Niles, of which the Gezira is the largest and most well known, are devoted primarily to the cultivation of cotton, with dura and lubia (*Dolichos lablab*) as subsidiary crops in the rotation.

In the riverain lands of the Northern Province, dura, lubia and wheat are the principal crops grown on flood lands and under irrigation.

TABLE 13. – CLIMATOLOGICAL DATA FOR THE NORTHERN SUDAN SHORTHORNED ZEBU AREA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
DARFUR (*El Fasher*)													
Altitude: 740 m..													
Mean maximum temperature, °C.	31.3	33.1	36.4	39.0	39.5	39.1	35.8	33.6	36.1	37.3	34.5	32.0	35.6
Mean minimum temperature, °C.	9.8	11.3	14.2	17.7	20.7	21.9	21.6	20.5	20.1	18.2	13.2	10.2	16.6
Mean relative humidity at 08,00 hr., %	35	28	24	21	31	47	65	74	61	37	31	34	41
Mean relative humidity at 14.00 hr., %	13	11	11	11	14	18	33	42	28	15	13	12	18
Mean rainfall, mm.	—	—	—	1	10	17	109	134	34	5	—	—	310
KORDOFAN (*El Obeid*)													
Altitude: 565 m. .													
Mean maximum temperature, °C.	30.4	32.4	35.7	38.7	39.1	37.5	34.1	32.6	34.6	36.6	34.3	31.4	34.8
Mean minimum temperature, °C.	11.6	12.9	15.8	19.9	22.3	22.9	22.0	21.3	21.2	20.8	16.4	12.6	18.3
Mean relative humidity at 08.00 hr., %	37	28	23	26	41	56	73	79	69	48	33	36	46
Mean relative humidity at 14.000 hr., %	24	20	16	16	22	30	45	52	40	25	21	21	28
Mean rainfall, mm.	—	—	1	2	17	38	98	121	75	16	—	—	368
BLUE NILE PROVINCE (*Singa*)													
Altitude: 430 m.													
Mean maximum temperature, °C.	35.1	36.5	39.6	41.4	40.1	37.6	33.8	32.2	34.1	37.6	37.8	35.7	36.8
Mean minimum temperature, °C.	16.3	17.1	19.6	22.6	24.1	23.0	21.9	21.4	21.2	21.1	19.2	17.2	20.4
Mean relative humidity at 08.00 hr., %	42	39	31	34	45	61	75	81	76	62	44	44	53
Mean relative humidity at 14.00 hr., %	—	—	—	—	—	—	—	—	—	—	—	—	—
Mean rainfall, mm.	—	—	—	5	33	72	160	187	88	27	2	—	547
NORTHERN PROVINCE (*Kareima*)													
Altitude: 250 m.													
Mean maximum temeprature, °C.	29.6	31.2	35.4	39.7	42.7	43.8	42.3	41.7	42.6	40.6	35.1	30.8	38.0
Mean minimum temperature, °C.	11.9	12.7	16.5	20.6	24.5	25.9	26.3	26.3	26.1	23.3	18.3	13.8	20.5
Mean relative humidity at 08.00 hr., %	35	28	22	17	16	16	28	38	28	27	32	36	27
Mean relative humidity at 14.00 hr., %	19	14	11	9	9	9	14	18	14	13	18	21	14
Mean rainfall, mm.	—	—	—	—	1	—	8	14	2	—	—	—	25

SOURCE: Ireland, 1948.

On the larger irrigation schemes lucerne (*Medicago sativa*) may be grown as a fodder crop. Date palms are important economically in the area (McLaughlin, E. A., *Personal Communication*).

Management practices

Except in the Northern Province and in the irrigated areas near the White and Blue Niles where the population is sedentary, the great majority of the cattle are in the hands of nomadic or semi-nomadic Arab tribes. The seasonal movement may extend over as much as 300 miles northwards with the advance of the rains and a similar distance southwards with their retreat in the latter part of the year. In some parts of the area this seasonal movement is occasioned very largely by the necessity for avoiding the swarms of biting flies (Tabanids and *Stomoxys* spp.) which emerge during the rains. In the rains young growing grass provides adequate grazing, but during the dry season the cattle have to rely on dry mature herbage augmented by such swamp and riverside grass as may be available. In most of the area cattle graze from dawn to dusk and pass the night in thorn enclosures as a precaution against wild beasts, but in Kosti district in Blue Nile Province it is reported that cattle are driven out to graze again after the evening milking and remain at large all night. Although the supply of grazing is sufficient to maintain the cattle in reasonable condition during the greater part of the year, serious shortages may develop in April, May and June prior to the onset of the rains. At best, during this period cattle can only exist at subsistence level, while in a bad year there is, in many areas, considerable mortality from famine, especially among young stock. Forage is never conserved by the nomads but village herds may receive some dura, sesame, or groundnut residues during the dry season. In the rains cattle are taken to water once a day but in the dry season, especially if grazing is inadequate, two or even three days may elapse between waterings.

In the irrigated areas lubia and, in Northern Province, lucerne are grown as forage crops. The straw of dura is conserved for feeding to livestock as well as being grazed *in situ*. Concentrates are seldom fed outside government farms.

Calves suckle their dams and are only weaned when the lactation is completed. They are usually allowed the milk from one, or possibly two, teats at each milking. Only in a very few government or private dairy herds are cows milked in the absence of the calf. The calves remain in the camp or village for the first one to three months and are then herded separately until they are between 6 and 12 months old according to their stage of growth, when they join the main herd.

Cattle are maintained in the pastoral areas almost exclusively for milk. Liquid milk forms part of the diet of the pastoral tribes, and is sold by them in the town markets when the seasonal movements bring the herds into their vicinity. Throughout the year a proportion of the milk is converted into clarified butter (Arabic *semn*) for cooking and other purposes within the tribe. During and immediately after the rains — in the four months July to October — when there is a flush of milk surplus to the requirements of the pastoralists, thousands of tons of *semn* are made and brought to the local markets for sale in the towns and for export to Egypt. Beef is very little eaten by the cattle-owning tribes, but considerable numbers of male cattle are sold for slaughter in the larger population centers in the Sudan and Egypt. More recently a meat-processing factory has been put into operation at Kosti on the White Nile which, when it is in full production, is expected to slaughter 100,000 head of cattle a year. The Darfur and Kordofan Arabs use bulls as pack animals (Figures 24 and 25) and they are extensively used for draft work in the irrigated areas (Figure 26) (McLaughlin, E. A., *Personal Communication*).

Physical characteristics of the breed

The cattle are well adapted for existence in the dry tropics, with long straight limbs, very durable hoofs, a short close coat in which the fine undercoat is absent, a loose pigmented skin and the ability to go long periods without water and to thrive on dry mature herbage.

The head is typically long and coffin-shaped with the distance from the poll to the eye approximately half that from the eye to the muzzle. The face is lean and the profile convex. The forehead is flat and the orbital arches are not usually prominent. The ears are of medium size (about 9 inches long and 5 ½ inches wide) and are usually carried approximately horizontally.

The horns seldom exceed 12 to 14 inches in length. They are a broad oval in cross section and grow from a flat poll in an outward and upward direction typically more or less in line with the profile. Unattached horns and scurs occur but truly polled animals have not been observed.

The hump is muscular and is cervico-thoracic in position. It tends to slope from front to rear and there is usually some overhang to the rear in the male. Its height in the male is 4 to 8 inches.

The average depth of the dewlap is about 10 ½ inches (18 samples) in the female and 12 ½ inches (16 samples) in the male. It starts under the chin often as a double fold and continues to the breastbone between the forelegs where it may be continuous with the umbilical

FIGURE 24. *Northern Sudan shorthorned zebu. Baggara cattle camp or* feriq *on the move in Darfur Province, Sudan.*

Courtesy of J. D. M. Jack

fold, the average depth of which in the cow is 3 ½ inches (19 samples) while the sheath and umbilical fold in the male is of an average depth of 5 ½ inches (16 samples). The skin on the side of the neck, single thickness, is about 4 mm. thick in the female and 6 mm. thick in the male (McLaughlin, 1955).

The cattle tend to be deficient in both spring of rib and depth of chest. Bulls, in particular, may appear to be pinched behind the shoulder. The topline rises from the withers to the rump. The pelvis is short with a high prominent sacrum and slopes steeply to the rear. The tail setting is low and the tail long with the switch reaching to the fetlock. The hindlegs are very upright in position.

The udder tends to be of poor attachment and the teats, which vary greatly in size, are commonly close together.

Coat colors vary greatly. Kenana cattle (Figure 22) are predominantly gray with a darkening over the head and shoulders, the hindquarters, the front of the knees and around the coronets. This darkening varies considerably from one individual to another and is usually more pronounced in the male. It is due to a black and white banding of the hairs, the proportions of which vary in different parts of the coat. Kenana calves are generally born with a red coat color-

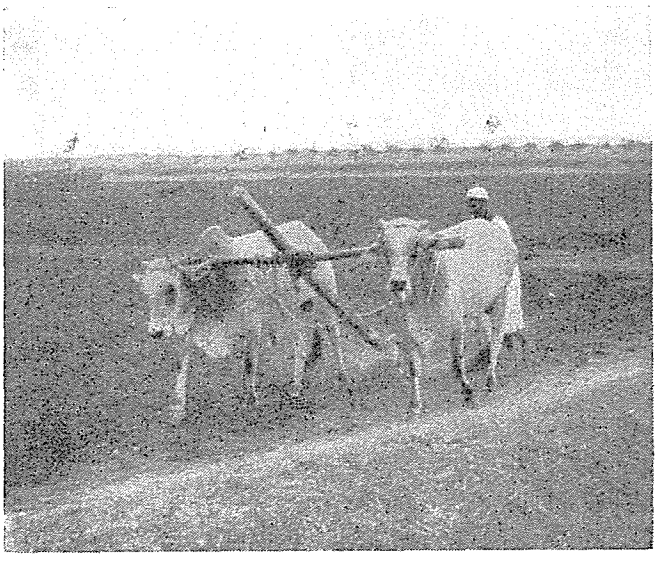
FIGURE 25. *Northern Sudan shorthorned zebu. Baggara pack bull in Darfur Province, Sudan.*

Courtesy of J. H. R. Bisschop

ation which normally fades to gray before the calf is 6 months old. The Butana cattle and the majority of those in the Northern Province (Figure 23) have a full red coat color although Kenana coloration occurs. In the remainder of the area coat colors are mixed and include full reds, browns, blacks, and combinations of one or more of these colors with white.

FIGURE 26. *Northern Sudan shorthorned zebu. Kenana bulls being used for plowing at the Gezira Research Farm.*

Courtesy of E. A. McLaughlin



Measurements and weights obtained in different parts of the area are given in Tables 14, 15, 16 and 17.

The average birthweights of 73 bull calves and 84 heifer calves at the Gezira Research Farm were 52.4 $\pm$ 0.9 lb. and 48.6 $\pm$ 0.7 lb. respectively (McLaughlin, 1955).

TABLE 14. – AVERAGE LIVEWEIGHTS AND MEASUREMENTS OF DARFUR CATTLE

	Male			Female			Ox
	1 year	2 years	mature	1 year	2 years	mature	mature
Liveweight, kg. (estimated)	75	120	400	70	100	280	400
Length from shoulder point to pinbone, cm.	80	98	118	80	90	115	118
Height at withers, cm.	100	112	142	95	108	130	142
Depth of chest, cm.	50	57	85	48	54	65	80
Width of hips, cm.	30	39	53	27	39	51	50
Heart girth, cm.	120	130	180	110	125	170	175

SOURCE: Jack, J.D.M., *Personal Communication.*

TABLE 15. – AVERAGE LIVEWEIGHTS AND MEASUREMENTS OF WHITE NILE CATTLE

	Male			Female			Ox
	1 year	2 years	mature	1 year	2 years	mature	mature
Liveweight, kg. (estimated)	85	150	400	76	110	250	410
Length from shoulder point to pinbone, in.	40	43	60	38	41	55	59
Height at withers, in.	37	41	58	36	42	53	60
Depth of chest, in.	20	21	28	19	19	24	30
Width of hips, in.	10	11	17	9	11	14	18
Heart girth, in.	52	54	68	51	52	60	72

SOURCE: Jack, J.D.M., *Personal Communication.*

TABLE 16. – AVERAGE MEASUREMENTS OF KENANA CATTLE AT THE GEZIRA RESEARCH FARM *

FEMALE	At 13 to 18 months	At 19 to 30 months	Mature
Weight, lb.	401.8 ± 13.2 (14)	528.8 ± 21.0 (5)	883.9 ± 19.0 (28)
Length from shoulder point to pinbone, in.	45.9 ± 0.7 (14)	49.2 ± 0.4 (5)	54.4 ± 0.6 (28)
Height at withers, in.	44.4 ± 0.4 (14)	46.2 ± 0.9 (5)	51.2 ± 0.3 (28)
Depth of chest, in.	20.4 ± 0.4 (14)	22.0 ± 0.6 (5)	27.4 ± 0.4 (28)
Width of hips, in.	13.0 ± 0.3 (14)	14.5 ± 0.4 (5)	18.7 ± 0.3 (28)
Heart girth, in.	51.6 ± 0.5 (14)	56.3 ± 0.7 (5)	67.0 ± 0.7 (28)

TABLE 16. – AVERAGE MEASUREMENTS OF KENANA CATTLE AT THE GEZIRA RESEARCH FARM (*continued*)

MALE	At 13 to 18 months	At 19 to 30 months	Mature
Weight, lb.	449.7 ± 28.4 (7)	604.1 ± 21.7 (8)	1 163.9 ± 31.6 (17)
Length from shoulder point to pinbone, in.	46.7 ± 1.2 (7)	51.6 ± 0.7 (8)	62.4 ± 0.7 (17)
Height at withers, in.	46.4 ± 0.9 (7)	49.4 ± 0.8 (8)	55.6 ± 0.3 (17)
Depth of chest, in.	22.8 ± 0.7 (7)	24.9 ± 0.5 (8)	31.2 ± 0.3 (17)
Width of hips, in.	12.6 ± 0.4 (7)	14.5 ± 0.4 (8)	18.4 ± 0.3 (17)
Heart girth, in.	51.9 ± 1.3 (7)	59.4 ± 0.8 (8)	73.2 ± 0.8 (17)

* Means ± standard error.
NOTE: Numbers sampled shown in brackets.
SOURCE: McLaughlin, 1955.

TABLE 17. – AVERAGE MEASUREMENTS OF NORTHERN PROVINCE CATTLE

	Male	Male	Male	Female
	1 year	2 years	mature	mature
Weight, kg.	—	—	300–500	300–350
Length from shoulder point to pinbone, cm. .	102	126	156	148
Height at withers, cm. .	110	124	145	135
Depth of chest, cm. ...	53	60	72	67
Width of hips, cm.	28	34	45	46
Heart girth, cm.	126	136	181	126

SOURCE: Jack, J.D.M., *Personal Communication*.

Functional characteristics of the breed

Cattle are used by the nomadic Arabs as pack animals as well as providers of milk and, by their sale in the town meat market, revenue. In the settled irrigated areas they are kept for milk and draft, and, to a lesser extent, for meat.

The cattle show a very strong herding instinct and are to a high degree responsive to voice signals from their owners. They are generally docile and are readily trained for draft work and shed milking routine.

The age of a heifer at its first calf is reported to be 4 to 4 ½ years among the pastoral herds. A report from Northern Province suggests that cattle there can be expected to calve down at 2 to 2 ½ years.

At the Gezira Research Farm the average age of 41 heifers at the first calving was 40.6 ± 0.8 months (McLaughlin, 1955). The calving interval among nomad and village herds has been estimated as being between 12 and 24 months and the productive life of a cow from 5 to 12 lactations. At the Gezira Research Farm the average calving interval during the period 1948 to 1954 was 408 ± 9 days (115 records) and the average herd life of 14 cows which had completed their productive life in the herd was 11 lactations. At this station very little difficulty has been experienced in breeding Kenana cattle; 1.4 services have been required for each calf born (121 calvings). Data from the same herd indicated that the average gestation period of Kenana cattle was 286.6 ± 0.6 days, and that there was no significant difference between gestation periods for male and female calves (McLaughlin, 1955).

Among nomadic herds, cows tend to be in the highest condition after the rains in the months of September to December and most conceptions take place in this period, so that the majority of calves are born in the following rains. At the Gezira Research Farm, where the cattle are kept at a level nutritional status, it has been observed that calvings occur regularly throughout the year.

No detailed observations have been carried out on the milk production of cows under pastoral conditions, but its average has been estimated as being about 10 lb. a day in the rains and about 6 lb. a day in the dry season. Lactation duration depends on the time of calving and the availability of grass, but it has been estimated as being generally

TABLE 18. – MILK YIELDS AND DAYS IN MILK OF THE KENANA HERD AT THE GEZIRA RESEARCH FARM, 1948-54*

Year	Number of lactations	Milk production, lb. **		Days in milk***	
		mean ± SE.	range	mean ± SE.	range
1948	14	3 318 ± 278	1 606-4 840	224 ± 9	154-278
1949	21	3 632 ± 269	522-6 603	251 ± 16	58-424
1950	22	3 875 ± 296	672-6 514	232 ± 15	62-367
1951	23	3 677 ± 318	324-6 676	229 ± 14	68-342
1952	26	2 856 ± 276	262-6 165	223 ± 13	58-348
1953	15	3 965 ± 212	2 196-5 143	275 ± 16	152-358
1954	28	4 045 ± 251	902-6 108	260 ± 11	151-414

* The values are for normal lactations (uninterrupted by disease or other causes) ending in each year.

** Milk yields were recorded from the fourth day after calving.

*** Days in milk were measured from date of calving to date of drying off.

SOURCE: McLaughlin, 1955.

between 200 and 300 days. The average lactation yields of the herd of the Faculty of Agriculture, Khartoum University College, in 1952 and 1953 were 4,768 lb. in 309 days (33 records) and 4,647 lb. in 328 days (38 records) respectively. The average lactation yield of Kenana cows at the Gezira Research Farm in the seven years 1948-54 was 3,795 ± 111 lb. in 242 ± 5 days (149 records). A summary of the records obtained at the Gezira Research Farm is given in Tables 18 and 19. In neither the University College of Khartoum herd nor in that of the Gezira Research Farm are calves allowed to suckle the cows.

TABLE 19. – MILK YIELDS AND DAYS IN MILK IN SUCCESSIVE LACTATIONS OF THE KENANA HERD AT THE GEZIRA RESEARCH FARM

Lactation	Number of lactations	Milk production, lb.*		Days in milk**	
		mean ± SE.	range	mean ± SE.	range
1	24	3 707 ± 267	1 462 — 6 240	256 ± 15	131 — 367
2	24	4 150 ± 217	2 174 — 6 426	266 ± 11	152 — 358
3	17	4 330 ± 260	2 746 — 6 744	250 ± 8	190 — 342
4	12	4 073 ± 270	2 676 — 6 096	232 ± 10	167 — 280
5	8	3 951 ± 148	3 512 — 4 601	258 ± 13	213 — 327
6 or over	17	4 142 ± 200	2 370 — 5 822	264 ± 11	211 — 346

* Recorded from the fourth day after calving.
** Measured from the date of calving to the date of drying off.
SOURCE: McLaughlin, 1955.

A study carried out at the Gezira Research Farm with Kenana cattle has indicated that the repeatability between the heifer lactation and second lactation was of a low order, while repeatability between the second and third lactations was significant. At the same station it was found that total lactation yield was more strongly dependent on persistency of lactation than on initial daily high yield.

The average butterfat content of milk from the Gezira Research Farm herd was 4.73 ± 0.09 percent (234 tests) and solids-not-fat content was 9.25 ± 0.05 percent (234 tests) (McLaughlin, 1955).

The highest yield recorded from a North Sudan zebu cow is that given by Boyns (1947) as having been 10,272 lb. milk in 339 days obtained from a Kenana cow.

Northern Sudan zebus are used as draft animals in the irrigated areas in Blue Nile, Khartoum, and Northern Provinces and elsewhere. They have been traditionally used in Northern Province to provide

the motive power for the *saqiya* or Persian water wheel. A pair of bulls turn a *saqiya* for six to eight hours at a stretch each day. *Saqiyas* in Northern Province are operated on a shift system either continuously throughout the 24 hours in four six-hour shifts or from 04.00 to 18.00 hr. in two shifts, one of six hours and the other of eight hours. On the White Nile, bulls are only required to work on *saqiyas* for three hours at a stretch.

Bulls are also used throughout the irrigated areas as draft animals for tillage work and for haulage. At the Gezira Research Farm bulls start training for work at about 18 months of age, do light carting and draft work at 2 years and heavy draft work at between 3 and 4 years. It is usual for a bull to continue working for ten or more years. A pair of bulls can work for five to six hours a day on tillage work. In this time, working on heavy clay, 0.7 acres can be plowed or 2.6 acres ridged (McLaughlin, 1955). In the Northern Province on lighter soils two bulls can plow one acre in a day. Hattersley (1951) has observed that a pair of bulls will walk nine to ten miles in a five-hour day while ridging. Two bulls harnessed to a four-wheeled iron-tired cart can move slightly more than one ton over earth roads and can continue to work for seven hours in a day.

It is reported that a bull used as a pack animal in Darfur can carry a load of about 250 lb. for four to five hours while traveling at three miles per hour and that in Kordofan a bull loaded with 200 lb. can cover 12 to 15 miles in a day. Bulls are also used as riding animals in Darfur, Kordofan and parts of the Blue Nile Province and are capable of traveling at three and a half to four miles per hour for 25 miles in a day.

The meat from Northern Sudan zebus is seldom of good quality. This may be at least in part due to slaughtered animals being almost always mature males and to their having led a very active life before they are sold to the butcher. The dressing percentage has been estimated as being between 40 and 50 percent of liveweight.

Northern Sudan cattle are very tolerant of high air temperatures. It has been observed that both adult animals and calves are able to remain in the full sun for long periods without signs of distress. Kenana cattle at the Gezira Research Farm were exposed to the sun from 07.00 to 16.00 hrs. in unshaded yards with bare soil underfoot. Rectal temperatures were taken before and after exposure and comparisons made. The results of this test are shown in Table 20.

Northern Sudan zebus are highly tolerant of the locally prevalent strains of foot-and-mouth disease. In the past the herds have been periodically much reduced by the epizootic diseases, particularly rinderpest and contagious bovine pleuro-pneumonia. More recently

prophylactic control of rinderpest has been to a large extent successful and severe losses have been rare.

On the only occasion that is reported of a herd test for bovine tuberculosis — at the Gezira Research Farm in 1953 — no positive reactions were obtained. In the same year *Brucella melitensis* was demonstrated in cattle in the Gezira.

Mastitis has appeared in the herds at the Gezira Research Farm and the University College of Khartoum Farm. Both *Streptococcus agalactiae* and *Corynebacterium pyogenes* have been found. No cases of infectious infertility have been reported from the northern Sudan.

TABLE 20. – CLIMATIC ADAPTABILITY OF KENANA CATTLE AT THE GEZIRA RESEARCH FARM

Class	Number of cattle in test	Average body temperature		Adaptability coefficient A*	Mean air shade temperature during test		Mean relative humidity for test at 08.00 hrs., %
		before exposure, °F.	after exposure, °F.		08.00 hrs., °F.	maximum temperature, °F.	
Mature cows	10	101.1	101.8	95.0	79.8	104.7	33.0
Mature cows	5	101.4	102.3	92.0	82.0	99.2	54.5
Heifers: average age 34-3 months	6	102.0	103.0	85.0	82.6	99.0	55.0
Heifers: average age 10 months .	6	102.1	103.4	83.0	82.6	99.0	55.0
Mature bulls	6	101.5	103.2	87.0	82.2	103.1	34.5
Bulls: average age 28.2 months	6	101.1	103.0	89.5	81.7	100.6	55.0

* A = 100 — 10 (BT — 101.0) where BT is the mean of all recordings of all body temperature recordings during the test, and 101.0 is the normal body temperature of cattle (Rhoad, 1944).

Bovine trypanosomiasis accounts for losses in the pastoral herds when they are at the southernmost limits of their seasonal movement in the dry season, and isolated cases — presumably resulting from mechanical transmission by biting flies — occur farther north during the rains.

Liver fluke (*Fasciola hepatica*) is prevalent in the aquatic pastures bordering the White Nile and is a cause of losses among the herds which are taken to them for dry season grazing. *Theileria annulata* is usually present in Northern Sudan cattle and is tolerated by them.

Ticks occur throughout the area and, although there are no serious tick-transmitted diseases, are a frequent cause of injury to the teats

of female cattle in the pastoral herds. Biting flies, in particular the Tabanids, emerge in vast numbers during the rains and make it impossible to maintain cattle in the open during the middle of the day in the central and southern parts of the pastoral belt.

It has been reported that Kenana cattle which were taken to Bahr el Ghezal Province in the southern Sudan appeared to be very susceptible to Demodectic mange (Jack, J.D.M., *Personal Communication*; McLaughlin, E. A., *Personal Communication*).

Performance in other areas

Cattle from the Gezira Research Farm have been exported to Kenya and Tripolitania but, while general reports have been favorable, no details of their performance in those areas are available.

Kenana cattle have the reputation of being better milk producers than those of the western provinces and bulls from the Fung have been imported into Darfur and Kordofan and into the southern Sudan in an attempt to improve the herds there.

Crosses with other breeds of cattle

Only very tentative attempts have been made to breed Northern Sudan zebus with European cattle. A Devon bull was imported into Northern Province early in the present century and some of the local cattle are said to still show his influence. Friesian bulls were used for crossbreeding in Khartoum and a large dairy herd there is mainly composed of cattle, the coloration, conformation and productive ability of which are evidence of their ancestry. This herd is composed of between 450 and 500 head of cattle of which about 260 are in milk at any one time.

Sources of breeding stock and information regarding the breed

It is estimated that there are between approximately 2,750,000 and 3,000,000 head of cattle of this type in the north and north-central Sudan.

The Ministry of Agriculture, Sudan Government, maintains a herd of Kenana cattle at the Gezira Research Farm, and one of Butana cattle at the Atbara Dairy Farm in the Northern Province. The University College of Khartoum has a herd of Northern Sudan zebus, the foundation members of which were obtained from the Northern Province, the Kenana herds and the White Nile district. There is a privately owned dairy herd at Khartoum composed largely of cattle of mixed Northern Sudan zebu and Friesian descent.

Further information regarding these cattle may be obtained from:

The Director, Department of Animal Production, Ministry of Animal Resources, Khartoum, Sudan.

The Director, Department of Agriculture, Ministry of Agriculture, Khartoum, Sudan.

The Chief of the Research Division, Ministry of Agriculture, Wad Medani, Sudan.

The Dean, Faculty of Agriculture, University College of Khartoum, Sudan.

SHUWA

Origin

The Shuwa cattle, which are also known as Wadara, Choa, or Arab zebu, are included by Mason (1951*a*) in his Shorthorned Zebu group. The same author refers to Morton (1943) who expressed the opinion that the Shuwa might have some *brachyceros* ancestry. Both Gates (1952) and Reed, R. L. (*Personal Communication*) maintain that the present Shuwa cattle are derived from the herds which accompanied the nomadic Shuwa Arabs from east of Lake Chad. The latter authority suggests that these cattle are very similar to those of the Baggara Arabs in Darfur and Kordofan in the Republic of the Sudan.

Shaw and Colville (1950) refer to these cattle by the name "Wadawa," but Mason (1951*a*) draws attention to the fact that this term has also been applied to a group including both Shuwa and Azaouak cattle.

Conditions in the native home of the breed

Location, topography and soils

Shuwa cattle are found in the country bordering on Lake Chad; in the Dikwa area to the south and southwest of the lake, in the extreme north of the French Cameroons (where they are known as "Choa"), and in the Ouaddai, Batha and Kanem districts of Chad territory in French Equatorial Africa, where they are referred to as Arab zebus.

The area consists of open elevated plains, draining toward Lake Chad and developed in part from young sedimentary rocks overlain by sandy quaternary drifts which give rise to easily worked soils of good fertility. The average altitude is 1,000 to 1,200 feet above sea level.

Climate

The climate of the area is characterized by a long dry season and a low rainfall concentrated within the months of May to October. The winter months of December, January and February are relatively cool and are dominated by the dust-laden harmattan wind from the northeast. From March until the beginning of the rains, temperatures are high with means of over 90° F. and maxima in excess of 110° F. There is, however, a high diurnal range and the nights are cool. During June the direction of the prevailing wind changes from northeast to southwest and tornadoes are of frequent occurrence. Temperatures fall but the rising humidity results in a feeling of oppression. July and August are months of rain and flooding from the rivers is of frequent occurrence. The rains end in September and, after a month of high humidity and temperatures in October, the cool weather sets in in November.

Climatological data for Maiduguri in Bornu Province, Nigeria, and Abéché, French Equatorial Africa, are given in Table 21.

TABLE 21. – CLIMATOLOGICAL DATA FOR MAIDUGURI* AND ABÉCHÉ STATIONS IN NIGERIA AND FRENCH EQUATORIAL AFRICA RESPECTIVELY

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Maiduguri													
Mean temperature, °C.	23.9	25.0	27.8	31.1	32.2	30.6	28.3	26.7	27.2	27.2	25.0	23.3	27.4
Humidity, % ...	16	16	14	15	35	37	57	66	58	29	17	16	31.3
Mean rainfall, mm.	nil	nil	nil	7.6	40.6	71.1	180.3	221.0	106.7	17.8	nil	nil	645.1
Abéché													
Mean temperature °C.	27.0	28.2	29.9	32.6	33.6	31.7	28.7	25.3	26.9	28.7	28.1	29.0	29.1
Humidity, % ...	55.9	30.8	23.9	23.5	38.0	35.9	54.7	69.5	49.0	30.5	24.2	26.1	38.5
Mean rainfall, mm.	nil	nil	nil	0.5	15.7	12.9	127.7	275.1	69.0	10.7	nil	nil	511.6

* 5-year average.

SOURCE: Maiduguri: Reed, R.L., *Personal Communication.*
Abéché: Troquereau, *Personal Communication.*

Vegetation

The natural vegetation of the area is that which is generally referred to as savannah woodland, the shrub and tree population of which is dominated by *Acacia* spp., and in which the grasses seldom exceed 4 feet in height. The plant population is much influenced by cultivation

FIGURE 27. *A herd of Shuwa cattle on natural grazing.*

Courtesy of G. M. Gates

and burning. Except in the vicinity of towns, where there are permanent farms, shifting cultivation is practiced and the land, after being cleared and cropped for several years, is allowed to return to the natural bush.

The Shuwa Arabs have the reputation of being intelligent farmers and grow a variety of crops including millet, sorghum, maize, groundnuts and sesame.

Management practices

The greater part of the Shuwa cattle are owned by the Shuwa Arabs, a people of nomadic tradition but now very largely devoted to sedentary agriculture. The herds, however, remain semi-nomadic and are moved from one area to another as grazing and water become available. During the rains the cattle remain near the villages and are grazed on uncultivated land and in the bush. In the dry season they move to Lake Chad or to other areas where water is available. Toward the end of the dry season grazing becomes scarce and the cattle browse the leaves of shrubs and low trees (Figure 27). They are normally taken to water once daily. Crop residues, including the straw of millet, sorghum and maize and oilcakes from groundnuts, sesame and shea butter nuts, are fed to the milch herds which are retained near the villages during the dry season.

The bulls, only a few of which are castrated, are allowed to run with the herds, a practice which precludes effective selective breeding.

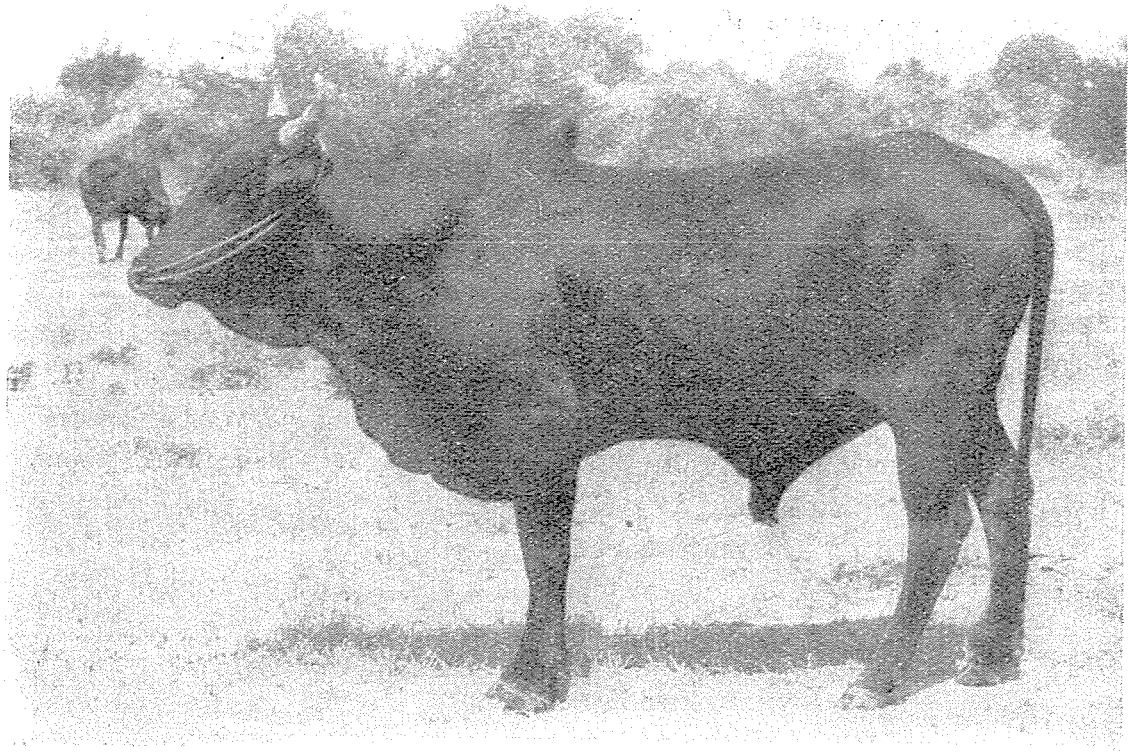
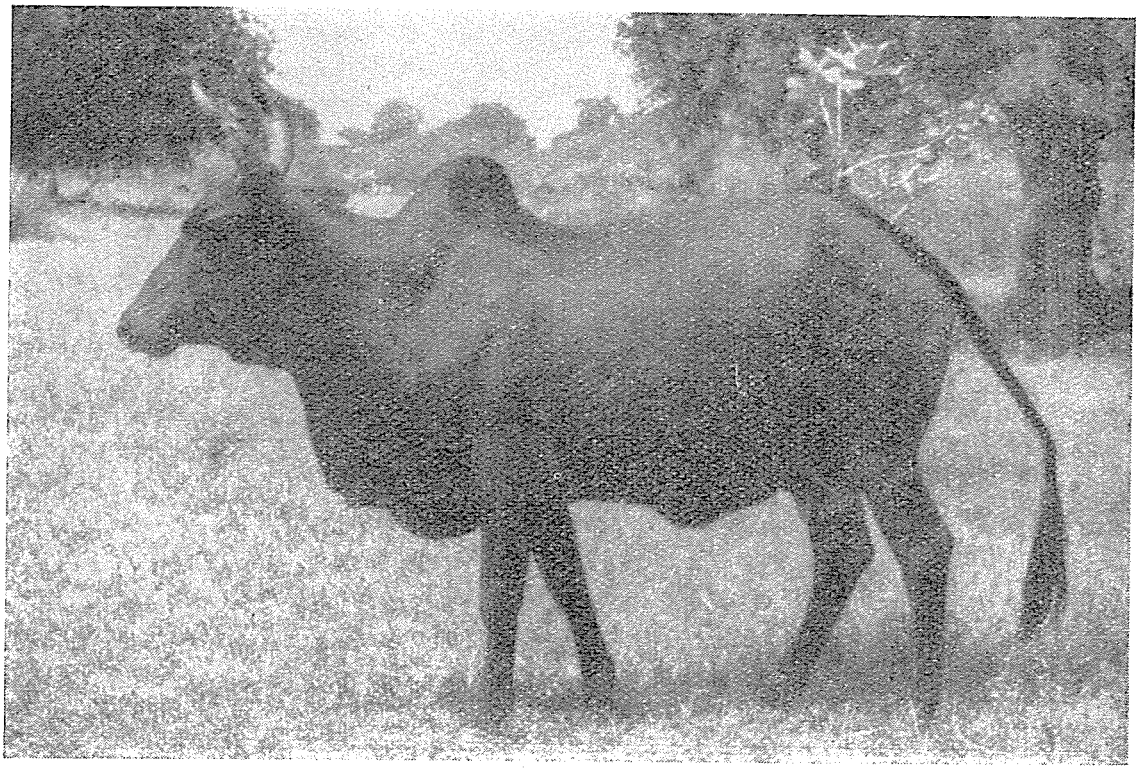


FIGURE 28. *Shuwa bull.*

FIGURE 29. *Shuwa cow.*

Courtesy of G. M. Gates



Physical characteristics of the breed

The Shuwa cattle (Figures 28 and 29) are medium to small in size, averaging about 50 inches in height behind the hump. The head profile is straight and the muzzle broad and the body is compact and well fleshed. The hump in the male is well developed, but is small in the female. The dewlap, although it is not prominent, is fairly well developed. The chest appears slightly narrow and the legs are short and fine. The rump is slightly sloping.

Although there is considerable variation in the development of the horns, it is normal for them to be short, growing outwards, upwards and forwards from the poll. Loose horns, unattached to the bony core, occur.

The majority of the animals are dark red or brown in coat coloration, but pied with black or red on white has also been observed.

TABLE 22. – AVERAGE MEASUREMENTS OF SHUWA CATTLE AT MAIDUGURI GOVERNMENT FARM, BORNU, NIGERIA

	Male			Female			Ox
	1 years	2 years	mature	1 years	2 years	mature	mature
Weight, lb.	320	540	800	300	470	650	—
Length from shoulder point to pinbone, in.	42	47	60	40	45	57	—
Height at withers, in.	39	45	55	38	43	50	—
Depth of chest, in	17	21	30	17	20	26	—
Width of hips, in.	9	13	18	9	13	17	—
Heart girth, in.	47	55	70	47	54	66	—

SOURCE: Reed, R.L., *Personal Communication.*

TABLE 23. – AVERAGE MEASUREMENTS OF SHUWA (ARAB ZEBU) CATTLE IN CHAD TERRITORY

	Mature male	Mature female
Weight, kg.	350–400	250–300
Length from shoulder point to pinbone, cm.	145	135
Height at withers, cm.	135	125
Depth of chest, cm.	70	58
Heart girth, cm.	184	154

SOURCE: Troquereau, *Personal Communication.*

In general, the skin is of medium thickness and loose. The pigmentation of the skin is dark. The hairs are short and of medium softness.

The Agricultural Department of Nigeria has maintained a herd of this breed at Maiduguri in Bornu Province since 1946. The measurements summarized in Table 22 were recorded at this farm. The average birthweight of calves has been 55 lb.

French authorities from Chad territory report the average measurements given in Table 23.

Functional characteristics of the breed

The Shuwa is a triple-purpose breed. It has fair milking qualities and can easily be put into well-fleshed condition on good grazing alone. It has medium draft qualities but is used mainly as a pack animal.

The females calve for the first time at about 45 months of age. They breed throughout the year; the largest number of matings is reported to occur during the months of May to July.

The males are put to service when they are about 3 years old. They are reported to have an active breeding life of 7 to 8 years. They are fairly quick to service.

A herd of Shuwa cattle was started in 1929 by the Government of Nigeria at Samaru Stock Farm in Zaria Province. Average milk performance records from cows maintained at this farm are summarized

TABLE 24. – AVERAGE PERFORMANCE OF THE SHUWA HERD AT SAMARU STOCK FARM, SAMARU, ZARIA PROVINCE, FROM 1929 TO 1940

Year	Numer of lactations	Lactation yield, lb.	Days in milk	Calving interval, days
1929	11	1 606	250	419
1930	16	1 124	264	413
1931	10	1 644	198	398
1932	15	2 156	250	404
1933	26	2 049	250	474
1934	40	2 218	290	410
1935	45	2 292	296	389
1936	52	2 019	262	372
1937	61	1 835	249	373
1938	57	1 598	233	369
1939	45	2 026	280	381
1940	41	2 266	294	396

SOURCE: Nigeria, 1949.

in Table 24. Gates (*Personal Communication*) has observed, however, that this herd is not of pure Shuwa breeding, as both White Fulani and Sokoto crosses have been made, and that, therefore, the production figures obtained from it may not be typical of the Shuwa type.

A herd of the breed was established in its native habitat in Bornu Province at Maiduguri Government Farm in 1946. Performance records obtained at this farm are summarized in Table 25.

TABLE 25. – AVERAGE PERFORMANCE OF SHUWA CATTLE AT MAIDUGURI GOVERNMENT FARM

	All cows	Superior cows
Average milk production, lb.	2 652	3 694
Average days in milk	240	240
Average calving interval, days	370	370
Average number of lactations during life ...	7	7

SOURCE: Reed, R.L., *Personal Communication*.

The best lactation yield of a Shuwa cow was 7,543 lb. (Reed, R. L. *Personal Communication*).

During the years 1949 and 1950 the average lactation yields at the above-mentioned farm were 2,900 lb. and 2,589 lb. respectively.

Authorities from French Equatorial Africa report an average yield from Shuwa cows of 3 to 4 liters per day in a lactation period of 180 days with 18 months' calving interval (Troquereau, *Personal Communication*).

Shuwas show very good adaptability to fattening on good pastures. They weigh about 800 lb. at 4 years of age in Bornu Province, when they are ready for slaughter. Similar figures are reported from French Equatorial Africa where it is estimated that the cattle yield 50 percent dressed meat.

Shuwa males are used extensively for pack transport and for riding, particularly by the Shuwa Arab women. In Chad territory, French Equatorial Africa, it has been estimated that 75 percent of the internal transportation in the area is carried out by Shuwa bullocks. The average load carried by a bullock is about 175 lb.

In Nigeria Shuwa oxen are put to work at about 3 years of age. They are active, even-tempered and willing workers. In an iron-tired cart a pair of bullocks can pull a load of 1,100 to 1,200 lb., at a speed of three to four miles an hour.

Ross (1944) reports that the small size of these cattle limits their usefulness as work animals to areas of light sandy soils.

Sources of breeding stock and information regarding the breed

The veterinary and animal husbandry services in French Equatorial Africa have estimated that there are 3.5 million Shuwa cattle in the area. The population in Nigeria is thought to number about 1 million head (Reed, R. L., *Personal Communication*).

Further information regarding the type may be obtained from the following authorities:

The Director of Agriculture, Kaduna, Northern Nigeria.

The Director of Veterinary Services, Kaduna, Northern Nigeria.

The Officer-in-Charge, Service de l'élevage du Tchad, Fort Lamy, Chad Territory, French Equatorial Africa.

SOKOTO

Origin

The Sokoto cattle are shorthorned zebus bearing a close resemblance to the shorthorned zebus of India and Pakistan with which it is assumed that they have a common origin. Bisschop (1937) has described the migratory routes which these cattle may have followed to reach their present habitat in the west of Africa. Alternative names for the Sokoto type of cattle are: Sokoto Gudali, Gudali, and Bokoloji (Gates, 1952; Ryall, T. E., *Personal Communication*).

Conditions in the native home of the breed

Location, topography and soils

The Sokoto cattle are found in Sokoto Province in Nigeria and the adjoining parts of French West Africa in an area which lies between approximately 12° to 15° north latitude and 3° to 7° east longitude.

The Sokoto basin, with an average elevation of 1,200 feet above sea level, is well watered by the Sokoto and Rimi rivers which later join the Niger, and consists of open elevated plains, the fertile soils of which are developed in part from young sedementary rocks overlaid by sandy drift material.

Climate

The climate of the area is characterized by a long winter dry season during which the prevailing wind is the dry dust-laden harmattan from the northeast and east, and a shorter wet season extending from May to September when the southwesterly monsoon brings rain which

falls in violent thunderstorms during the heat of the day or, less frequently, as steady rain which may fall uninterruptedly for 24 hours or more. Tornadoes (exceptionally violent thunderstorms), occur particularly at the beginning and toward the end of the rains and are most frequent at night between sunset and sunrise.

Temperatures are at their highest in April and May when maxima may exceed 110° F., but, owing to the high diurnal temperature range which can be as much as 30° F., the nights remain relatively cool. Between November and April the relative humidity, which may be about 35 or 40 percent soon after sunrise, commonly drops to 12 percent or less in the afternoon.

Climatological data for Sokoto are given in Table 26.

TABLE 26. – CLIMATOLOGICAL DATA FOR SOKOTO, NIGERIA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °F.	79	82	87	93	93	88	82	80	82	86	86	83	85.1
Mean maximum temperature, °F.	96.1	99.7	103.3	108.6	106.0	99.3	90.2	88.7	92.3	100.5	102.7	100.6	99.0
Mean minimum temperature, °F.	61.2	63.5	71.1	78.2	80.5	76.1	73.7	71.6	72.1	71.8	69.4	65.9	71.2
Humidity, % ...	43	28	29	34	59	62	79	87	83	56	40	31	52.6
Rainfall, in.	nil	nil	0.05	0.45	2.32	4.11	6.25	8.72	5.35	0.66	nil	nil	27.9

SOURCE: Ryall, T.E., *Personal Communication.*

Vegetation

The vegetation of this area is of the Sudan Savannah type. A saltbush vegetation offering rough grazing is available throughout the region, except along the streams and the depressions caused by the fixed sand dunes, where there is a wide variety of short grasses. Guinea corn, millet, groundnuts and cassava are extensively cropped and the by-products utilized for cattle feeding. Bush fallowing, which is commonly practiced, also affords some grazing.

Management practices

These cattle are almost all owned by the originally nomadic Fulani tribe, a proportion of which has now become sedentary. The livestock management practices of the Fulani tribe are described in greater detail in the section on the White Fulani (p. 102). Except that cattle

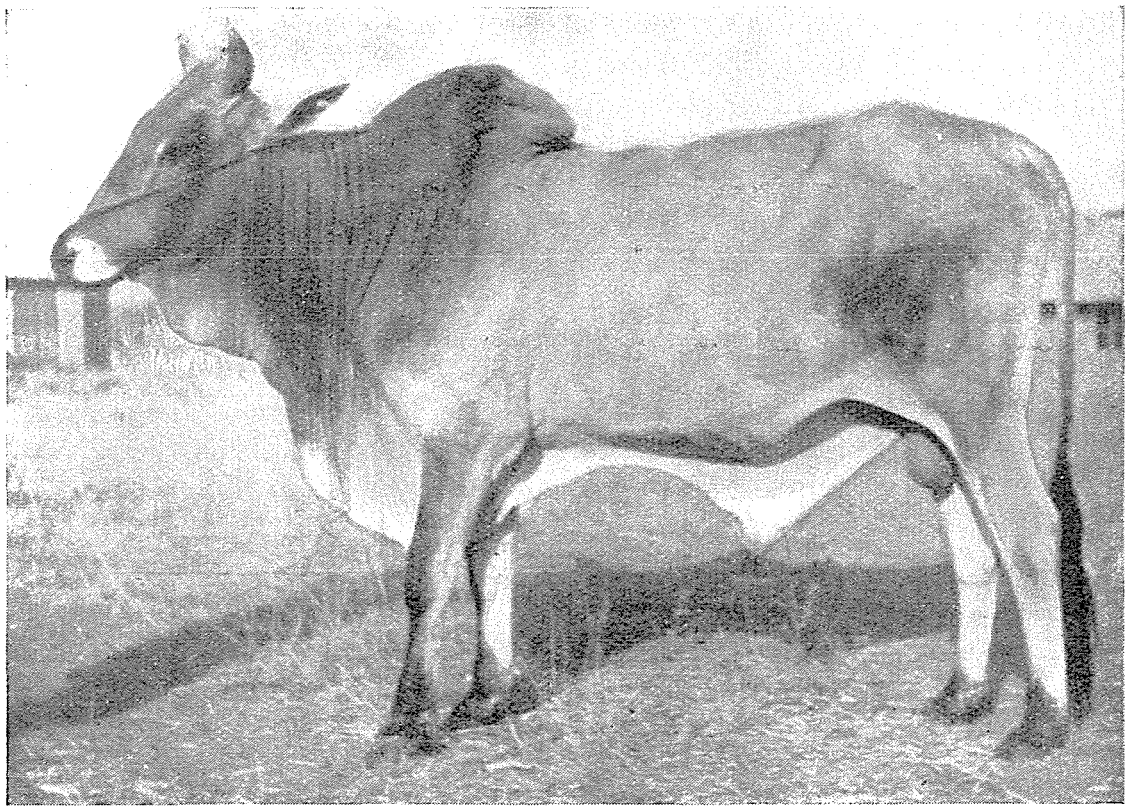
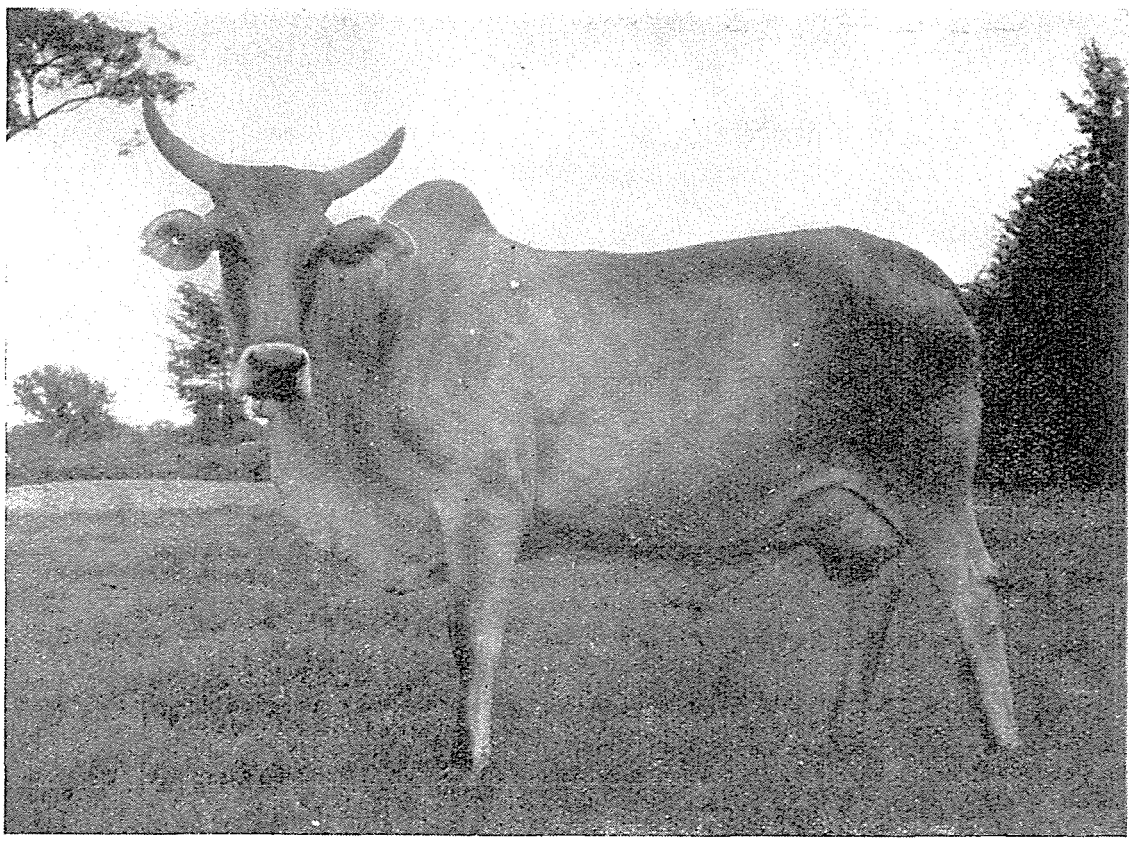


FIGURE 30. *Sokoto bull.*

FIGURE 31. *Sokoto cow.*

Courtesy of G. M. Gates



zaribas are sometimes sited on land intended for cultivation, the cattle are entirely divorced from crop production and depend very largely on grazing. During the dry months, from November to April, however, they live on sorghum stalks and leaves from certain trees. The Fulani people wander about in the area in search of grazing, but do not go south on account of the tsetse fly infestation in that area.

Physical characteristics of the breed

The Sokoto cattle (Figures 30 and 31) are medium-sized deep-bodied animals. The typical animal is broad in front and wide on the back and gives the impression that under favorable conditions it would carry a considerable amount of meat on the more valuable parts of the carcass. These cattle have a characteristic convex profile, slightly pendulous ears and a well-pronounced dewlap and umbilical fold. The sheath in the male is loose. The bulls have short lateral horns which are usually upturned. The females have slightly longer horns than the males. The musculo-fatty hump is cervico-thoracic in position and is well developed in both sexes. On account of the pronounced development of the hump the head appears to be carried low.

The usual color is white or cream in the females and light gray or cream with dark shading at the poll, neck, shoulder and tail in the males. The shading varies in intensity in individuals and dun bulls with blue-gray shading are sometimes observed.

The skin is of medium thickness and loose, with dark pigmentation. Animals with light pigmentation are occasionally seen. The hair is short and of medium softness. The hoofs are strong and possess good wearing quality.

A herd of Sokoto cattle has been maintained at Shika Stock Farm in Zaria Province, Nigeria, since 1932. The location is 11° 15′ north

TABLE 27. – AVERAGE MEASUREMENTS OF SOKOTO CATTLE

	Male			Female		
	1 year	2 years	mature	1 year	2 years	mature
Weight, lb.	336	591	1 190	315	504	734
Length from shoulder point to pinbone, in.	42.00	53.00	61.00	41.00	48.50	57.00
Height at withers, in.	42.00	48.50	54.00	41.75	46.75	50.25
Depth of chest, in.	20.50	24.75	29.75	21.00	23.25	27.00
Width of hips, in.	11.00	13.50	18.25	11.00	14.25	16.75
Heart girth, in.	50.00	60.00	75.00	48.50	58.00	65.50

SOURCE: Ryall, T.E., *Personal Communication.*

latitude and 7° 32′ east longitude and is at an elevation of 2,100 feet above sea level.

Average data on certain body measurements of Sokoto cattle from the Shika Stock Farm herd are summarized in Table 27. Birthweights of males average 55 lb. and of females 53 lb.

Functional characteristics of the breed

Sokoto cattle are used for the triple purpose of producing milk, beef, and draft. They have fair milk-producing qualities and rear their calves very well under grazing conditions. They also show good qualities of fattening on grassland. As work animals they are slow but steady, and quite reliable.

There is no evidence of any particular breeding season, and breeding continues throughout the year. Cows calve for the first time at about 40 months of age. From observations at Shika Farm it is reported that the duration of estrus is often short.

TABLE 28. – AVERAGE RECORDS OF PERFORMANCE OF SOKOTO COWS AT SHIKA STOCK FARM, DURING 1934 TO 1950

Year	No. of lactations	Lactation yield, lb.	Days in milk	Calving interval, days
1934	11	2 061	281	541
1935	19	2 111	285	369
1936	25	2 364	373	245
1937	24	2 998	242	375
1938	27	2 900	243	358
1939	44	2 506	224	356
1940	47	2 100	220	369
1941	32	2 289	240	360
1942	28	2 276	233	357
1943	16	2 196	249	352
1944	18	2 012	256	372
1945	18	2 313	283	429
1946	21	2 727	276	390
1947	46	2 052	249	378
1948	20	2 363	244	407
1949	27	2 842	294	510
1950	25	2 781	283	461

SOURCE: Colonial Office, 1953.

The males are put to service when they are about 3 years old and are active breeders for a period of 10 years.

Average production of milk from cows maintained at Shika Stock Farm, and derived from several hundred lactations, is 2,350 lb., testing 5.75 percent butterfat in a lactation period of 230 days with twice daily milking. It is estimated that on an average, cows have 8 to 10 lactations during a lifetime (Ryall, T. E., *Personal Communication*).

Data from the Sokoto herd at Shika Stock Farm are summarized in Table 28.

The best lactation yield during the year 1950-51 was reported to be 4,276 lb.

Observations at Shika Stock Farm reveal that Sokoto cattle show good adaptability to fattening on grassland. Slaughter weights of 1,100 to 1,450 lb. at 5 to 6 years of age are reported, with a dressing percentage of 50.

The Sokoto cattle are put to work at the age of 3 to 4 years when they weigh about 700 to 900 lb. They are used for field operations and carting. On an average they work for six to eight hours per day, and are able to haul a load of 800 to 1,000 lb. They travel at the rate of about two miles per hour.

Sources of breeding stock and information regarding the breed

These cattle are available in their pure form in the Province of Sokoto, Nigeria, and also occur in the adjoining territories of French West Africa.

Further information regarding the breed may be had from:

The Director of Agriculture, Kaduna, Northern Nigeria.

The Director of Veterinary Services, Kaduna, Northern Nigeria.

FULANI OR PEUL

The pastoral tribe from which these cattle types take their name is referred to in English as " Fulani " and in French as " Peul. " The geographical area occupied by the Fulani or Peul cattle extends from west of the River Senegal to east of Lake Chad and includes parts of Senegal, Mauritania, the French Sudan, the Colonie du Niger, and Nigeria. The cattle are described under four headings:

1. Nigerian Fulani or Peul (Zébu Peul nigérien).
2. Senegal Fulani (Zébu Peul sénégalais).
3. Sudanese Fulani (Zébu Peul soudanais).
4. White Fulani.

NIGERIAN FULANI OR PEUL (ZÉBU PEUL NIGÉRIEN)

Origin

The Nigerian Fulani or Peul forms a distinct variety of the Fulani cattle type. As one proceeds from the Niger eastwards to Lake Chad, however, it is intermixed with other types of cattle in the area and has lost much of its purity. It is called Djelli by the Djermas of the Colonie du Niger and Diali by the Peul tribe.

Historical evidence regarding the type has been collected by many French writers, notably Delafosse, Pierre and Doutressoulle.

Conditions in the native home of the breed

Location, topography and soils

The Nigerian Fulani is found in the areas bordering the Niger in the Colonie du Niger from Gothey to Say on the right and from Tillabéry to Korbou on the left bank as well as in the Dipaga and Fada districts to the west of the river. To the east of the Niger, herds have spread through the areas immediately to the north of the Nigerian border as far as Lake Chad and the neighboring parts of the Cameroons.

The level of the Niger varies seasonally. The rise of the river depends on the rains in its headwater regions and when (in the Nigerian Fulani area) it is at its maximum at the beginning of the year the river is, in places, of considerable width. The water level falls as the year progresses, exposing extensive areas of grazing land. This flood plain is at its furthest extent on the right (Dahomey) bank, to the west of which is rather higher land which, despite areas of salty soil, provides adequate rain grazing.

To the east of the river are the courses of dead tributaries of the Niger which are represented by the Dallols: broad valleys, often bounded by cliffs, where water can be found at a small depth below the surface and the grass remains green for a period after the cessation of the rains. These tributary valleys join the Niger in the reach which lies along the Dahomey border.

Between the Niger and the Dallols, in the Djerma Ganda, similar conditions prevail: water is found at a shallow depth and green growth continues after the rains have ceased.

To the east of the Dallols there is an area of rocky dissected plateaus, the Adar-Doutchi. Grazing is available in fertile valleys, the entrances

to which are often found to be closed by blown sand so that rain water from the surrounding high land accumulates behind the sandbar. These accumulations of rain water may be of considerable extent (that at Keita is 12 km. long and 4 km. broad) and are often perennial.

Slightly to the north, in the Tahoua area, there is a large plateau dissected by valleys, the bottoms of which are filled with accumulated sandy material which holds, at a small depth, a perennial water supply.

The area to the southwest of the Adar-Doutchi is composed largely of sedentary dunes divided by fertile valleys. To the southeast is a stretch of stony and uninhabited desert.

Further to the east a lateritic area, the northern part of the Gober, provides little water and is largely uninhabited. To its north and south, however, there are fertile and well-watered valleys which are utilized by the pastoralists.

In the Zinder area, the sedentary population of Haussa cultivators and the semi-nomadic Peuls move their cattle out to the south in the dry season, and north to the Alakoss in the rains. The Alakoss and the adjacent Koutousse area are great sandy plains through which isolated rounded hills protrude.

Eastwards from the Zinder the Manga is a vast sandy grassland plain in which rain pools accumulate in the depressions between sedentary dunes.

Along the west (French) shore of Lake Chad, the Kadzell clay plain extends as far as the Komadougon, a seasonal watercourse which is in flood in December, after which it falls until February, and is dry, with the exception of pools in its sandy bed, by March (Doutressoulle, 1947).

Vegetation

Eastwards of a northwest-southeast diagonal from Taholia through Zinder the vegetation is tropical savannah woodland, which corresponds to Chavalier's Sudanese zone. A number of plant associations related to varying soil-water conditions are included in this formation. In the low sandy plain south of Zinder to Magariya close to the interterritorial boundary the *Prosopis-Terminalia* association is dominated by *Prosopis africana*. Further to the west, in the Madaua-Zinder-Maradi area the *Combretum-Sclorocarya* savannah woodland is of poorer quality, while in the Dallol area the *Combretum-Terminalia* association is dominated by *Combretum elliotii, Terminalia avicennioides* and *Guiera senegalensis*. A variant of the latter association occurs on the lateritic plateaus in the Niamey-Filingué-Tahoua-Madaoua area in which *Combretum micranthum, Acacia macrostachya* together with *Guiera senegalensis* are the dominant species. In the dead river valleys in this area, the vegetation has been much modified by cultivation.

On the seasonally inundated flood plain of the Niger, borgou (*Pennisetum burgu*) is an important constituent of the vegetation association.

West of the Tahoua-Zinder line there is savannah thornland. In the southern part of the area, between the northern limit of the tropical savannahwoodland formation and the northern limit of unirrigated cultivation, a dense community occurs dominated by *Acacia tortilis* and *Commiphora africana*, together with other *Acacia* spp., *Balanites aegyptiaca* and shrubby species. *Andropogon gayanus* is the principal grass species.

In the north of the savannah thornland there is an open community of lower growth in which *Commiphora africana* and *Acacia seyal* are the dominant tree species, with *Panicum turgidum* as the most important component of the grass association.

In seasonally flooded areas thorn stands, usually of *Acacia stenocarpa*, occur.

The Manga plain has little tree growth. The grasslands are an almost pure stand of *Andropogon gayanus* (Dundas, 1938).

The principal crops grown in the area are *Eleusine coracana* and *Digitaria exilis*.

Climate

The climate of the area is characterized by a long dry season of between 7 ½ and 11 months, during which midday temperatures are high and humidity low. There is a considerable diurnal temperature range at this time of year. The mean annual temperature range is between 45° to 125° F. Precipitation is concentrated in the short rainy season, which is of 1 to 4 ½ months' duration (Dundas, 1938).

The mean rainfall at four stations in the area is summarized in Table 29 and mean monthly and annual temperatures at Zinder in Table 30.

TABLE 29. – MEAN RAINFALL, IN INCHES, AT FOUR STATIONS IN THE COLONIE DU NIGER

	Jan.	Feb.	Mar	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Nguigmi	—	—	—	—	0.05	0.05	2.60	4.00	0.80	0.09	—	trace	7.6
Tahoua	trace	—	—	0.17	0.40	1.86	4.43	5.27	1.45	0.28	—	—	14.0
Zinder	—	—	trace	0.02	0.62	2.37	6.58	7.90	2.28	0.42	0.03	—	20.2
Niamey	—	—	0.03	0.28	1.40	3.53	5.52	9.52	3.48	1.18	0.05	—	25.0

SOURCE: Dundas, 1938.

TABLE 30. – MEAN TEMPERATURES AT ZINDER IN THE COLONIE DU NIGER

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °F	72	77	85	91	93	90	83	81	84	87	81	75	83

SOURCE: Kendrew, 1953.

Management practices

The Fulani (Peul) tribes are, for the most part, semi-nomadic. Seasonal livestock movements tend to be local or between adjoining areas, so that the Nigerian Fulani cattle are not required to travel long distances in search of grazing and water. The dry season is passed on the exposed flood plain of the Niger or on pastures in valleys (such as the Dallols) and depressions where the accumulated rain water permits of an extended season of grass growth and where an adequate supply of drinking water is available. During the rains the cattle are moved to the nearby higher land.

Except for the residues of the locally grown crops, especially *Eleusine coracana* and *Digitaria exilis*, which are utilized *in situ*, the cattle subsist entirely on natural pastures.

The cows are allowed to suckle their calves before and after milking, on their return to the village or encampment from grazing.

Physical characteristics of the breed

The Nigerian Peul or Fulani cattle are medium-sized animals with fine, short limbs. The average height of the animals is 115 to 130 cm. The face profile is long and straight with the forehead sometimes tapering, resulting in a slightly convex appearance. The poll and orbital arches are slightly prominent. The horns vary in size, but are generally longer in the female than in the male. The average length of the horns is 25 to 30 cm. and they are usually crescent-shaped. Loose horns occur, but are rare. Polled animals with very peaked polls also occur. The muzzle is wide with dark pigmentation. The neck and shoulders are short. The chest is broad and deep. The dewlap and hump are prominent. The hump has an " embossed " surface and is of an irregular shape, resting on a wide base along the neck and shoulders and lying over to the right or left. The back dips slightly behind the hump and the ribs are well sprung and round. The hindquarters are of medium length and are slightly inclined to the rear. The thighs

are flat, but well muscled. The tail is long and well placed. The skin is fine and supple and is said to be slightly finer than that of the Senegal and Sudanese Fulanis. The pigmentation of the skin is dark. The coat color is usually white, although black and white, red and white, and roans also occur. The udder is poorly developed and the teats are small.

Functional characteristics of the breed

The Nigerian Peul is a good meat-producing animal and shows quick fattening qualities when it receives a good supply of feed. Well-fed animals give a dressing percentage of 50.

As milk animals they produce about 400 to 450 liters of milk in a lactation, although the lactation period is short (about 160 to 200 days). The average fat percentage of the milk is about 5 (French West Africa, 1950).

In their native home these animals are occasionally used as pack animals. They are not otherwise worked except on some of the government farms in the region, where they have been observed to be poor workers.

Sources of breeding stock and information regarding the breed

Further information regarding the Nigerian Fulani cattle can be obtained from the Director, Service de l'élevage et des industries animales, Colonie du Niger, French West Africa.

SENEGAL FULANI
(ZÉBU PEUL SÉNÉGALAIS)

Origin

Mason (1951*a*) and Doutressoulle (1947) classify the Senegal Fulani cattle as lyre-horned zebus. The latter also suggests that the Zebu Peul cattle came first to the lower part of Senegal in the Fouta-Toro basin with the Semitic migrations during the latter part of the eighth century, and thence spread to the plateau area of Ferlo and further westwards in the ninth century. The type is also known as Foulfoulé. The most important variety which has been described is known as the Gobra.

Conditions in the native home of the breed

Location, topography and soils

The area occupied by the Senegal Fulani cattle lies between 12° and 16° west longitude and between 13.5° and 16.6° north latitude and comprises the lower plateau of Ferlo and the plain of western Senegal, extending from the valley of Sine to the Senegal river and beyond into Mauritania.

The undulating lower plateau of Ferlo lies between the western coastal plain and the Senegal river and has an average elevation of 125 feet. Throughout the area there is evidence of erosion. The old watercourses of Ferlo, Sine and Saloum are now dry and have good alluvial soils, usually of sandy clay in which the content of clay, white, yellow or red in color, varies in amount. Shallow lakes and pools are of frequent occurrence throughout the area. The few wells are from 150 to 250 feet in depth.

Numerous shallow lakes stand on the calcareous gray clay of the coastal plain which elsewhere is overlaid by the red sand which forms frequent dunes throughout the plain. Large areas of the sandy and sandy clay soils are under cultivation.

The valley of the Senegal river, which extends approximately from Matam to the mouth of the river, is about 600 km. long and about 10 to 40 km. wide. Part of the valley is submerged by water during the period when the river is in flood. When the river recedes to its normal bed, it leaves behind rich alluvial deposits and the area yields good crops.

Climate

In the tropical climate of the area there is a distinct division of the year into a dry and a wet season. During the winter the hot dry northeasterly harmattan wind is experienced at ground level while, during the months of the rains, the southwesterly monsoon brings in moisture-laden air from over the Gulf of Guinea. From November to February the weather is cool and dry. From March until the approaching rains bring an increase in humidity, temperatures rise while the dryness continues. During the rains, humidity is high and temperatures lower. Tornadoes, which may cause considerable damage, occur especially at the beginning and toward the end of the rains. The average number of days on which rain occurs varies from 26 to about 43. In general, the diurnal temperature range is from 10° to 20° C.

Climatological data for the Senegal Fulani area are given in Table 31.

TABLE 31. – CLIMATOLOGICAL DATA FOR THE PLATEAU OF FERLO AND THE REGIONS OF SINE, SENEGAL AND GORGOL

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Plateau of Ferlo													
Mean maximum temperature, °C.	34.7	37.0	42.4	42.7	43.3	41.3	39.8	35.5	35.3	39.0	38.4	35.9	38.8
Mean minimum temperature, °C.	14.7	16.5	18.0	19.9	20.4	21.8	23.2	22.4	23.1	22.2	18.2	14.1	19.5
Relative humidity, %	27.1	34.6	26.0	37.1	42.5	55.8	62.4	74.8	75.4	60.7	50.6	40.1	48.9
Vapor pressure, millibars	8.9	13.0	12.2	18.5	21.5	27.0	29.5	29.8	30.4	27.4	21.3	14.2	21.1
Rainfall, mm.....	—	—	—	—	—	4.7	45.4	323.3	122.5	27.5	32.1	—	555.5
Sine													
Mean maximum temperature, °C.	32.9	34.6	40.8	38.5	37.9	36.6	34.9	31.8	32.5	33.9	32.6	32.1	34.9
Mean minimum temperature, °C.	14.5	16.5	17.1	18.9	19.2	21.4	23.9	23.6	23.6	22.9	18.7	16.9	19.8
Relative humidity, %	44.8	52.3	51.5	47.9	59.8	63.7	68.1	80.7	79.0	65.6	52.6	45.0	59.2
Vapor pressure, millibars	12.6	16.2	19.9	18.0	22.9	24.2	27.0	28.0	29.1	25.3	17.5	11.9	21.0
Rainfall, mm. ...	—	—	—	—	—	16.5	98.2	280.0	114.5	9.25	24.7	—	626.4
Senegal river region													
Mean maximum temperature, °C.	30.8	32.5	39.6	40.0	40.2	40.7	38.5	34.4	35.3	38.1	34.8	31.5	36.4
Mean minimum temperature, °C.	14.8	17.5	20.3	21.5	21.8	22.7	24.8	24.2	24.6	24.5	19.3	14.8	20.9
Relative humidity, %	44.3	32.9	28.5	31.7	39.3	40.9	51.3	70.4	67.1	49.3	35.5	28.2	43.3
Vapor pressure, millibars	12.6	10.6	12.6	14.7	16.4	19.9	24.2	29.2	28.7	23.1	13.1	8.4	17.9
Rainfall, mm. ...	—	—	—	—	—	—	20.1	273.6	93.5	—	1.1	—	388.3
Gorgol													
Mean maximum temperature, °C.	33.6	36.4	41.6	42.3	43.8	41.6	38.8	34.1	33.7	38.5	36.0	34.3	37.8
Mean minimum temperature, °C.	14.5	17.0	19.0	23.3	24.6	27.1	26.5	24.9	24.1	24.2	19.4	16.0	21.9
Relative humidity, %	47.1	44.9	44.7	47.0	42.1	49.6	56.4	74.2	76.3	57.3	45.9	41.0	52.2
Vapor pressure.. millibars	14.6	16.3	20.8	24.8	24.5	27.6	28.1	30.5	30.6	26.6	17.6	13.4	23.0
Rainfall, mm. ...	—	—	—	—	—	7.4	21.2	196.8	147.6	0.1	6.5	—	379.6

Vegetation

The area occupied by the Senegal Fulani cattle covers 7 million hectares of pasture land. Most of this area comprises natural pasture. The natural pastures consist of a variety of grasses but include very few legumes. The grasses germinate rapidly with the onset of rain and mature during the months of September and October. They become very dry and coarse during November. The species of grasses commonly found are *Chloris prieuri*, *Brachiaria regularis*, *Digitaria horizontalis*, *Echinochloa* sp., *Cenchrus ochinatus*, *Schoenefeldia gracilis*, *Aristida mutabilis*, *Aristida stipoides* and *Eragrostis pilosa*. These grasses grow to a height of about 50 cm., while some, such as *Aristida stipoides*, grow to 100 cm. Vegetation is more abundant where there is a good cover of trees where the shade also helps to extend the growing period of the grasses. Grasses which grow well under the shade of trees in this area are: *Chloris prieuri*, *Digitaria debilis*, *Tragus racemosus*, *Brachiaria distychophylla*, *Hyparrhenia dissoluta*, *Achyranthes aspera*, *Borreria ruelliae* and *Corchorus olitorius*. In the moist, light soils of low-lying areas various *Andropogon* species are found, especially *Andropogon gayanus*, which grows to a height of 2 to 3 meters. After the recession of the flood waters, the vegetation in the areas which have been inundated is abundant and consists mainly of *Cassia*. The principal grasses in cultivated areas are *Cenchrus biflorus*, *Pennisetum pedicellatum Leptadenia lancifolia*, *Digitaria perroretili* and *Dactyloctenium aegyptium*.

The straws from groundnut vines, millets and beans are of importance among the products of cultivated crops available for use as fodder for cattle. Groundnut oilcake is also used to a limited extent.

Management practices

Cultivated as well as natural pastures are available in the region and migrations take place according to the availability of feed. For example, the cattle move during summer from the plateau area of Ferlo and from the area of Gorgol toward the river valleys of Senegal and Sine where grasses are available, but during the period when the fields are under crops, the cattle are moved to natural pastures. They are brought back after the harvest. It is the practice to milk the cows twice a day. As long as pastures last the cattle are let loose on them all the time, except for short periods when they are brought home for milking.

Physical characteristics of the breed

Senegal Fulani cattle (Figure 32) are tall, well muscled and symmetrical in appearance. The forehead is slightly convex, but the face is long. The eyes are large. The ears are large, wide and erect. The

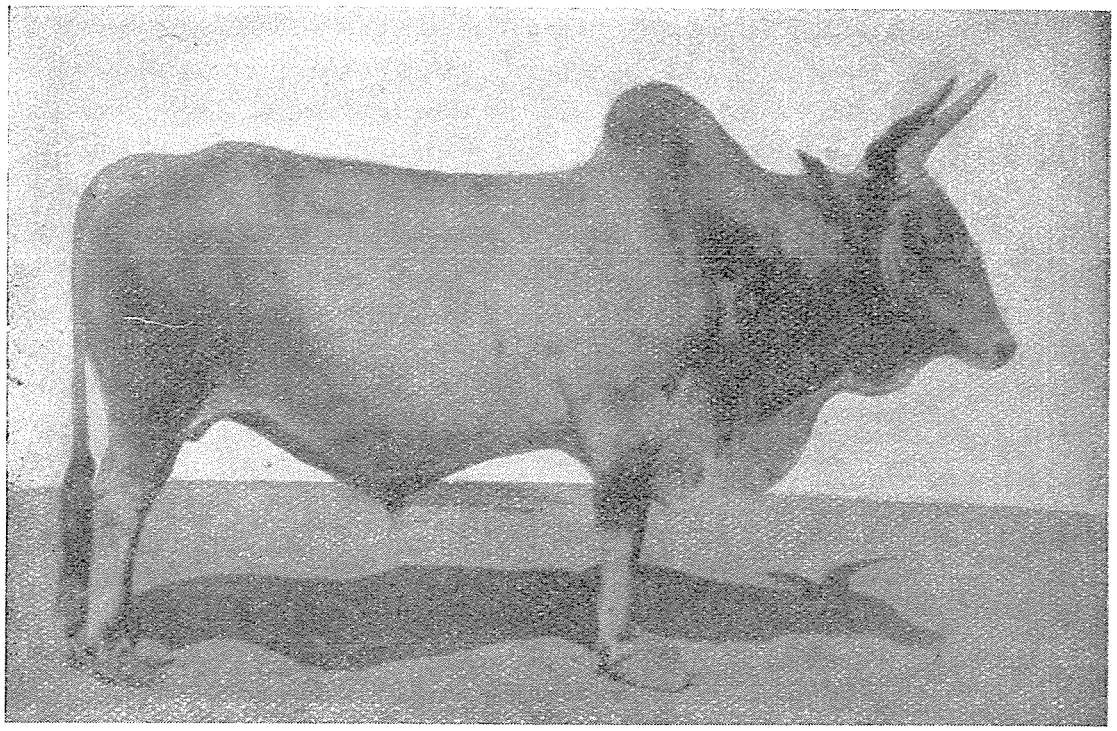
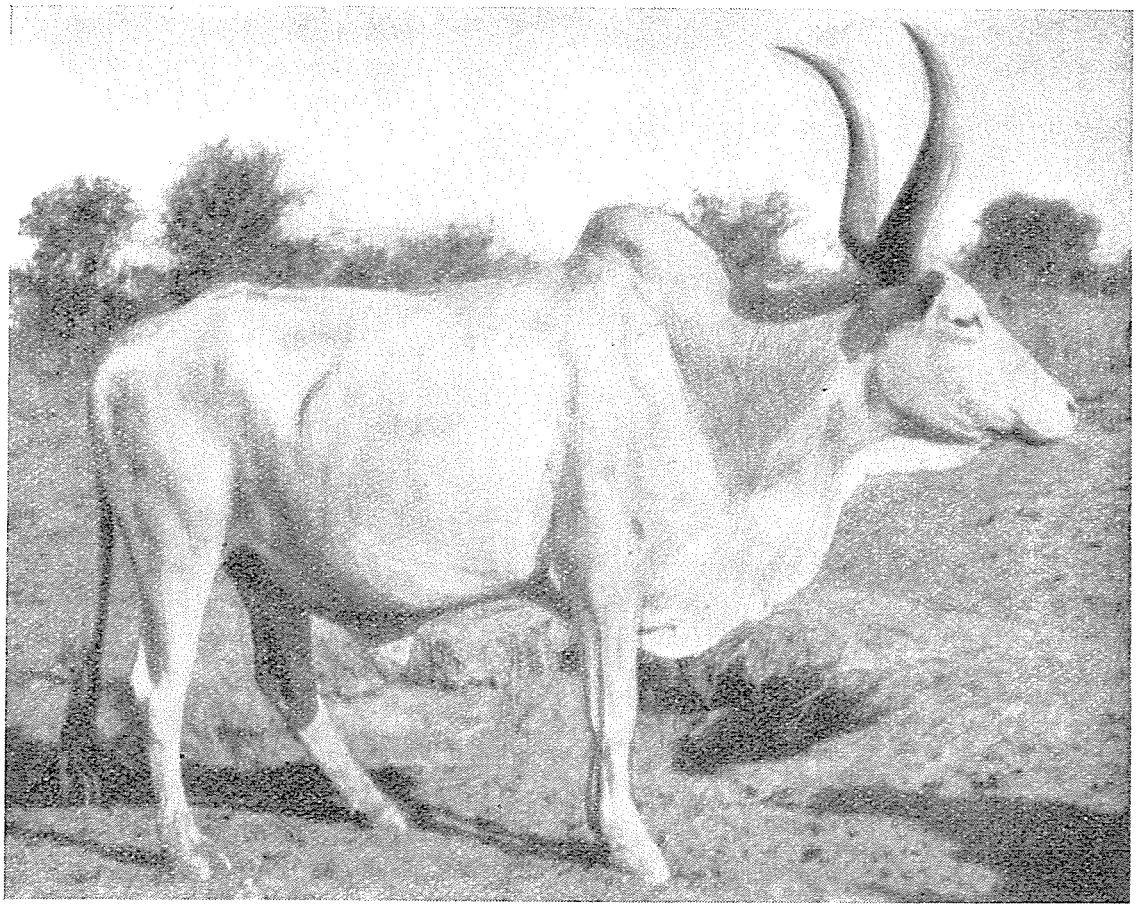


FIGURE 32. [above] *Senegal Fulani steer*; [below] *Sudanese Fulani steer.*

Courtesy of Service intercolonial d'information et de documentation and Service de l'élevage et des industries animales, Paris



horns are long and lyre-shaped. Occasionally loose horns are observed. The hump is large and well developed. It is more prominent in bulls than in cows. The neck is short and the dewlap is large, well developed and loose, with many folds. The chest tends to be narrow and not deep. The paunch is deep and slightly pendulous, giving a sway-backed appearance. The pelvis is wide and the buttocks are well muscled. The rump is sloping. The tail is long and fine and reaches well below the hocks. The udder is small and poorly developed. The sheath in the male is slightly loose. The hairs are short and the skin is thick and loose and of light pigmentation. White coat coloration is preferred by the breeders, although black and red patches and brindle stripes are also seen. The average birthweight of male calves is about 15 kg. and of female calves 14 kg.

Average body measurements of Senegal Fulani cattle in the Senegal area and in Mauritania are given in Tables 32 and 33.

TABLE 32. – AVERAGE BODY MEASUREMENTS OF SENEGAL FULANIS IN THE SENEGAL AREA

	Mature cow	Mature bull	Mature ox
Weight, kg.	322 (34)	415 (8)	348 (56)
Length from shoulder point to pinbone, cm.	142 (34)	140 (8)	135 (56)
Height at withers, cm.	139 (34)	143 (8)	137 (56)
Depth of chest, cm.	72 (34)	78 (8)	74 (56)
Width of hips, cm.	45 (34)	42 (8)	43 (56)
Heart girth, cm.	183 (34)	192 (8)	180 (56)

NOTE: The figures in brackets show the number of animals measured.
SOURCE: Larret, R. *Personal Communication.*

TABLE 33. – AVERAGE BODY MEASUREMENTS OF SENEGAL FULANIS IN MAURITANIA

	Mature cow	Mature bull	Mature ox
Weight, kg.	250–300	300–350	300–350
Length from shoulder point to pinbone, cm.	104	124	126
Height at withers, cm.	124	130	137
Depth of chest, cm.	63	70	71
Width of hips, cm.	41	45	41
Heart girth, cm.	149	160	162

SOURCE: Service de l'élevage de la Mauritanie: *Personal Communication.*

Functional characteristics of the breed

The Senegal Fulani cattle are used by the breeders as milking animals, as meat producers on natural grasslands, and as pack animals for transporting loads. The males are first used for service when they are about 4 years old. Castrated animals are put to work when they are about 5 years of age and weigh around 300 kg. They are fairly docile workers. As breeding bulls, they are quick in service and remain active breeders for 8 to 10 years.

Females calve for the first time when they are about 4 years of age. Although they breed throughout the year, the peak period for breeding is in winter during October and November.

As meat producers, the cattle are fattened easily on natural pastures from September to November. They are ready for slaughter when they are about 5 years old. Although prime animals yield about 48 to 51 percent meat, the poorer quality animals dress out at only 42 to 45 percent. The following figures, representing 70 bullocks, are reported from an investigation carried out at the slaughterhouse in Saint-Louis:

Liveweight	302	kg.
Dressed weight	137	"
Tendons	14	"
Bones	25	"
Fat	15	"
Meat	78	"
Scraps	2	"
Waste	3	"

The average Senegal Fulani cow produces about 450 to 500 liters of milk in a lactation period of 185 days. The average percentage of fat in the milk is 5.5 The average calving interval is estimated to be 18 months.

Sources of breeding stock and information regarding the breed

Breeding stock are mainly available in Linguere, Longa and the lower Senegal areas.

Further information regarding the type can be had from the Director, Service de l'élevage et des industries animales, Saint-Louis, Senegal.

SUDANESE FULANI
(ZÉBU PEUL SOUDANAIS)

Origin

The Sudanese Fulani belong to the group of Fulani cattle having long lyre-shaped horns. Pagot (*Personal Communication*), referring to Delafosse, mentions that they probably originate from the cattle brought in by Semites when they invaded the region now known as French West Africa, in the seventh century. This type of cattle is referred to by French workers as the Zébu Peul soudanais (Doutressoulle, 1947).

Conditions in the native home of the breed

Location, topography and soils

Sudanese Fulani cattle are found in those areas, including the districts of Ségou, Mopti, Niafunké, Goundam, and Timbuktu, lying in and around the flood plain of the Niger system of rivers from Ségou to Timbuktu.

The Niger and its tributary, the Bani, emerge near Ségou into a great plain of deposition and divide into a series of distributaries, which spill over into numerous depressions which are inundated when the rivers are high, as are vast areas of the plain itself. At the height of the rains the inundated area is in some places 150 km. wide. This system is generally referred to as the Central Delta of the Niger. The seasonal rise and fall of the rivers is consequential upon the incidence of rain in their headwater areas and particularly in the Fouta Djallon plateau, and is progressive from Koulikoro above Ségou where the rise is complete in June while the level is low in April and May, to Bamba below Timbuktu where high water occurs in December and January and low in June and July.

The plain of deposition is, for much of its length, more restricted on the right banks of the river system than on the left. The soils are alluvial and vary from sands to clays. Low plateaus of sandstone or lateritic material bound the plain of deposition and emerge from it in places above the level of the seasonal flood waters.

Water from the rivers and flooded depressions is available in the flood plain throughout the dry season but on the plateaus, wells, which may be as much as 80 meters or more in depth, are the only source for man and livestock (Doutressoulle, 1952).

Climate

The climate of the area has been described as *sub-sahélien*. From March to June temperatures are high and the humidity is low but rises as the rains approach. The annual absolute temperature range is in the neighborhood of 12° to 13° C. to 47° to 50° C. Rainfall is restricted to the period of June to October and is, in most of the area, in the range of 300 to 400 mm. a year (Doutressoulle, 1952). The winters are cool and dry.

Climatological data for a station in the southern part of the area are summarized in Table 34.

TABLE 34. – CLIMATOLOGICAL DATA COLLECTED AT SOKOTO

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean maximum temperature, °C.	34	36	40	42	43	42	38	36	36	39	37	35	38.2
Mean minimum temperature, °C.	14	16	18	22	24	23	22	22	22	21	19	16	19.9
Humidity at 07.00 hrs., %	40	30	25	30	40	60	75	85	78	70	45	45	51.9
Rainfall, mm. ...	—	—	—	15	30	90	175	230	125	15	0	0	680

SOURCE: Pagot, *Personal Communication*.

Vegetation

In the areas subject to inundation there is an abundant vegetation in which wild rice (*Oryza brevilingulata*) and bourgou (*Pennisetum burgu*) are among the more important species, in association with a variety of aquatic plants. Various crops such as paddy rice, millets and lentils are cropped on the higher land and the by-products are utilized as cattle feed. The natural vegetation on the plateaus consists of grasses, which form a thick cover during the rains, and thorny trees and bushes which appear in varying degrees of density according to soil and water conditions.

Management practices

Cattle are maintained permanently on pastures and are rarely hand-fed. A very complex system of seasonal migration, co-ordinated with the rise and fall of the flood waters is practiced by the Fulani (Peul) tribes. The herds utilize the lush flood plain pastures, retreating as water from the rising rivers inundates the land. They continue to graze the riverain pastures until the emergence of swarms of biting

flies necessitates the movement of the whole cattle population, with the exception of a small number of milch cows which remain for the supply of the permanent villages, to the higher land on the plateaus. The cows which remain in the flood plain tend to be regarded as expendable by their owners and large numbers are lost during the following winter as a result of malnutrition and a condition which appears to be trypanosomiasis. During the rains they are kept inside buildings for much of the day, as a protection against flies, and only graze at night.

The remaining cattle are divided into, first, bulls, dry cows and young stock, which leave the flood plain early and move considerable distances to dry-season pastures, and, secondly, the milch cows and calves which spend the dry season on the less distant upland pastures. A return is made to the plain when biting flies have ceased to be troublesome and the herds follow the retreating flood waters, grazing the pastures as they are exposed.

There is a considerable internal trade in cattle in this area and there are regular livestock markets, often held at weekly intervals, in a number of the more important population centers.

Physical characteristics of the breed

The Sudanese Fulani (Figures 32 and 33) is a medium-sized animal with a long but slightly shallow body. The back slopes towards the withers and the rump is inclined. The chest is deep but lacks width. The

FIGURE 33. *Fulani cattle grazing in the northern Ivory Coast.*

Courtesy of Service intercolonial d'information et de documentation, Paris

legs are long in proportion to the body. The head is long and fine. The horns vary in size, but are generally rather long. The muzzle is dark-colored and the jaw has many skin folds. The hump is larger in the male than in the female and is well developed and musculo-fatty. The dewlap is thin but well folded and extends from chin to brisket. The umbilical fold and sheath are less conspicuous. The skin is soft with pigmentation varying from light to dark. The hair is short and smooth. The usual color is gray or light gray with dark patches. The udder and teats are not very well developed.

Birthweights of male calves are about 17 kg. and of female calves about 15 kg.

Some typical measurements of 10 Sudanese Fulani cattle are summarized in Table 35.

TABLE 35. – SOME MEASUREMENTS OF SUDANESE FULANI CATTLE

	Mature male	Mature female	Mature ox
Weight, kg.	325	240	330
Length from shoulder point to pinbone, cm.	135	139	147
Height at withers, cm.	119	116	128
Width of chest, cm.	35	29	35
Width of hips, cm.	48	42	48
Heart girth, cm.	163	144	166

SOURCE: Pagot, *Personal Communication*.

Functional characteristics of the breed

The Sudanese Fulani is primarily utilized for the production of meat and to some extent for milk. The animals are rarely used for draft purposes, but are occasionally employed as pack animals. The females calve for the first time when they are about 3 years of age. The animals are usually bred during the winter. The males are ready for service when they are 2 years and 6 months old. They are usually slow in service. The average breeding life of a bull is considered to be 8 to 10 years.

It is estimated that the cows produce about 450 to 500 liters of milk in a lactation, excluding the quantity taken by the calf. Records taken from a herd of 16 cows kept in the Ségou region and fed concentrates, showed an average yield of 1,041 kg. with 4.8 percent fat. The

average peak production is about 5 liters a day, the average daily production being about 3 liters. The average calving interval is about 16 months. The average number of lactations during a lifetime is estimated to be about 6.

The breed shows some aptitude for fattening under favorable feeding conditions. During winter months the condition of the animals is good. They produce a fair quality carcass. The average weight of a good animal for slaughter is about 325 kg. The dressing percentage is about 46 to 47. Well-nourished animals show good fat covering. The fat is frequently yellow in color.

The breed is fairly tolerant to tick-borne diseases. The occurrence of foot-and-mouth disease is very rare.

Sources of breeding stock and information regarding the breed

It is estimated that there are over a million head of Fulani cattle in the French Sudan (1950). Further information regarding the type can be obtained from the Director, Service de l'élevage et des industries animales, Bamako, French Sudan, French West Africa.

WHITE FULANI

Origin

The White Fulani cattle, also known as Bunaji and Yakanaji, appear to be the most widely distributed type throughout Northern Nigeria.

Mason (1951*a*, 1951*b*) classifies White Fulani cattle under the group "Lyre-horned Zebus." It is believed that these cattle are remotely derived from stocks originating in Asia. They are maintained in their pure form by the nomadic Fulani tribe, a pastoral people of Hamitic origin. Some authorities suggest that this type may possibly have resulted from an intermixture of shorthorned zebus with earlier established types of cattle, such as the Hamitic Longhorn.

Conditions in the native home of the breed

Location, topography and soils

The White Fulani is found mainly in the Northern Province of Nigeria. This territory lies roughly between 6° and 13° east longitude and 9° and 13° north latitude. The provinces with the greatest populations are Kano, Katsina and Bauchi, although considerable numbers

are also found in all other provinces. Within this longitudinal and latitudinal boundary are two distinct vegetation zones running east to west and parallel to each other. These are: the Sudan zone (sometimes called the Nigerian Sudan) to the north and the northern Guinea zone to the south.

Topographically, the northern part of the country consists of open elevated plains, developed in part on young sedimentary rocks and covered by sandy drifts. Wherever this drift material is coarse-textured it gives a deep, easily worked sandy soil, while in the areas where it is finer textured the soils, though slightly heavier, are still productive. The average altitude varies between 1,000 and 2,000 feet above sea level. The high plateau of Plateau Province, however, has an altitude of 4,000 to 6,000 feet. Over much of the plateau soils are derived from the underlying basement rocks and are thin and poor, with a tendency for the formation of hardpan concretions.

Climate

The northern half of Nigeria is in the subsaharan region. It is a dry and sunny area. At Kano, for example, the average annual number of sunny hours are estimated to be 3,000 (Kendrew, 1953). There is a clearly marked rainy season. The year may be roughly divided into three climatic periods; a wet period from May to October, a cool, dry period from October to January when the northeasterly winds from the desert affect the area, and a dry hot period from January to May.

TABLE 36. – CLIMATOLOGICAL DATA FOR JOS AND KATSINA AS REPORTED IN THE OFFICIAL HANDBOOK OF NIGERIA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Jos													
Mean temperature, °F.	70	74	77	77	74	72	70	69	71	74	73	71	72.7
Humidity, % ...	36	35	43	66	81	84	89	90	83	71	42	38	63.2
Mean rainfall, in.	0.19	0.04	1.25	3.37	7.73	9.06	12.21	11.71	8.14	1.68	0.02	0.07	55.47
Katsina													
Mean temperature, °F.	71	76	82	87	87	84	80	77	80	83	79	73	79.9
Humidity, %	29	25	24	38	62	70	82	87	84	62	32	30	52.1
Mean rainfall, in.	0.01	—	0.03	0.26	2.44	3.61	6.03	10.92	4.63	0.42	0.01	—	28.36

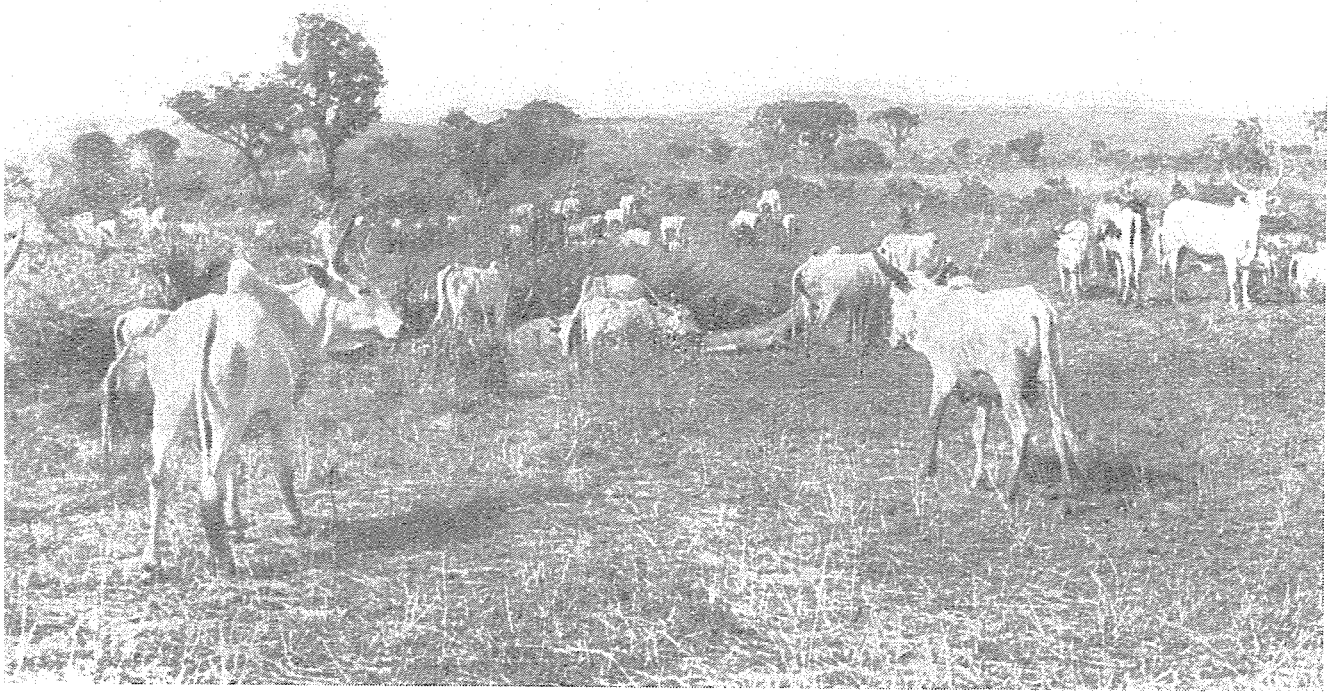


FIGURE 34. *A herd of White Fulani cattle in northern Nigeria.*

Courtesy of G. M. Gates

During the cool period mean temperatures are as high as 70° F. The almost constant wind is known as the harmattan and is very dry and dusty. Clear skies are rare. In this season plants shed their leaves. From March onward, humidity and temperature rise and the heat becomes severe. There is a considerable variation in the diurnal temperature. In June, the direction of the wind changes and southwest winds bring clouds. This is the period in which tornadoes occur. The range between night and day temperatures is very small. The rains begin in late May or early June. The average rainfall is about 40 inches. Climatological data for Jos and Katsina are given in Table 36.

Vegetation

The typical Sudan vegetation is more open than the savannahs in the Guinea zone to the south and consists of fine-leaved thorny trees mixed with broadleaved species (Figure 34). Leaves of some trees such as *Acacia pallida* and *Parkia* are used as cattle feed. There is more or less continuous grass cover. The grasses are short and feathery and usually under 4 feet in height, as contrasted with the grasses of the Guinea savannahs, which are tall, coarse and tussocky. Vegetation in the Sudan zone has been greatly modified by cultivation, grazing and grass fires. Where grazing and trampling are heavy, grass is kept short or actually rooted up, leaving the ground bare. In most of the Sudan zone, wherever irrigation facilities are not available the most common cultivated crops are millet, sorghum, maize, ground-

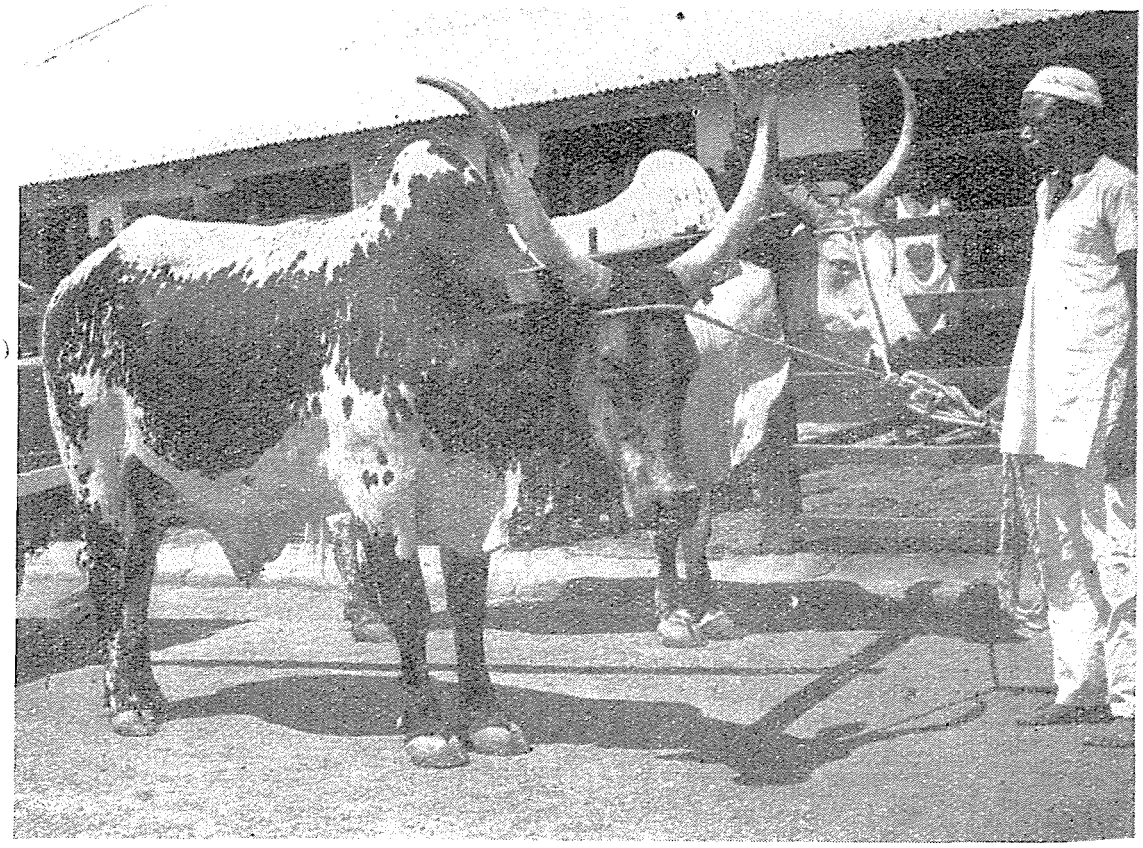
nuts, seseme, and, to a certain extent, cassava and yams. Cotton is grown on the heavier soils of the Guinea zone. *Eleusine coracana* and *Digitaria exilis* are grown on the poorer upland soils. In some parts of the areas, notably in the Kano district, trees such as *Acacia allida* and *Parkia* sp. provide, in their leaves, feed for livestock and, as they remain green in the dry season and shed their leaves in the rains, allow adequate light for crops grown under them.

Management practices

About 95 percent of these cattle are in the hands of the Fulani tribe which is almost entirely nomadic, although more and more individuals are being persuaded by the government to settle down as mixed farmers. Cattle, as well as being a source of individual prestige, are the basic wealth of the nomads and, together with their products, provide the means of exchange for the purchase of, for instance, grain, which is obtained in exchange for milk and butter. Money for the payment of taxes and other purposes is obtained by the sale of male cattle which, after the selection of the best which are retained for breeding purposes, are castrated for sale as young stock or slaughter

FIGURE 35. *A pair of White Fulani work oxen.*

Courtesy of G. M. Gates



animals. Cows are disposed of when they are no longer fertile. The tribesmen are very reluctant to dispose of breeding cattle.

While the ownership of the cattle is usually vested in the men of the tribe, the dairy products are claimed by the women. Milk forms the basis of the diet of the nomads, and is consumed in its liquid form or as a form of clarified butter.

The cows are milked twice daily and the calves are allowed to suckle the dams briefly at the beginning of milking and at its conclusion, a system which normally results in the calves, except for a favored few destined to become stud bulls, being underfed.

The nomads grow no crops themselves but purchase all their grain from the farmers, who permit the herds to graze over their cultivated land after the harvest, allowing the nomad and his animals the gleanings of the crop in exchange for the manure left on the land by the cattle. The farmers buy work oxen (Figure 35) from the nomads as well as beasts for fattening, which they keep tied up and feed on crop residues such as groundnut tops, sorghum straw and bran and cottonseed. The cattle respond well to fattening and many fine beasts for slaughter have been produced around Kano.

The cattle depend almost entirely on grazing and little attempt is made by their owners to provide supplementary feed during scarcity periods. During the dry season (from November until April) the herds are constantly on the move, maintaining a precarious balance between the need for better pasturage and the danger of contracting trypanosomiasis in the wetter southern regions.

Physical characteristics of the breed

The White Fulani cattle (Figures 36 and 37) are large animals measuring about 130 cm. high at the shoulder immediately behind the hump. The usual color is a full white, but sometimes animals with black or blue flecking are seen. Pigmentation of the skin is normally black, although Gates (*Personal Communication*) mentions that, probably through crossing with red types, varieties with red and white coat colors on a white skin have also been observed. Ears, eyes, muzzle, feet, horn tips and switch are usually black. The face is long with a well-developed muzzle. The forehead is wide and flat or slightly concave. Horns are medium to long, curving outwards and upwards soon after leaving the head. Some have an outward turn again at the tip giving a lyre shape. The ears are erect. The neck is short and the shoulders muscular. The chest is wide and deep and the back wide and long. The ribs are round and the middle is deep. The rump is long, wide and sloping. The thighs are muscular.

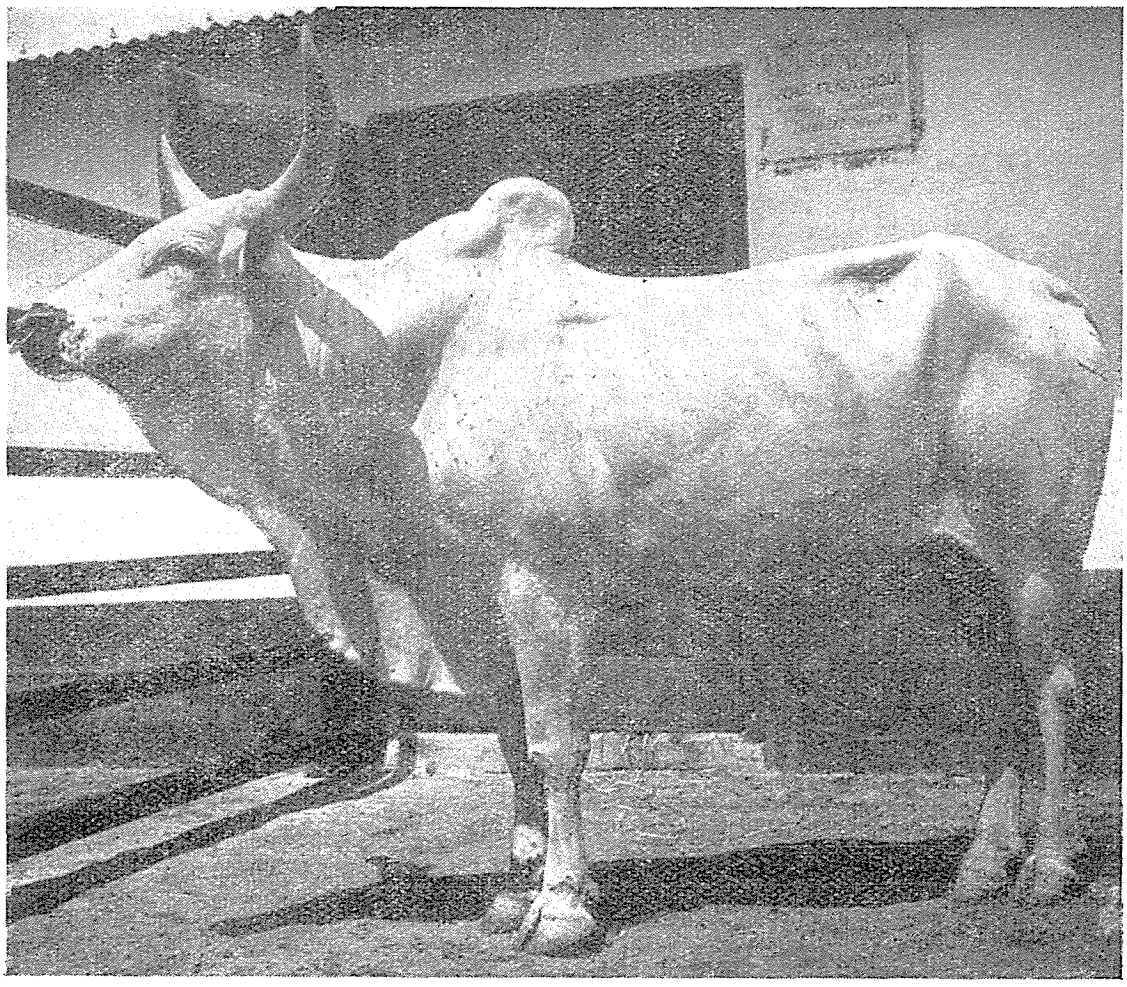
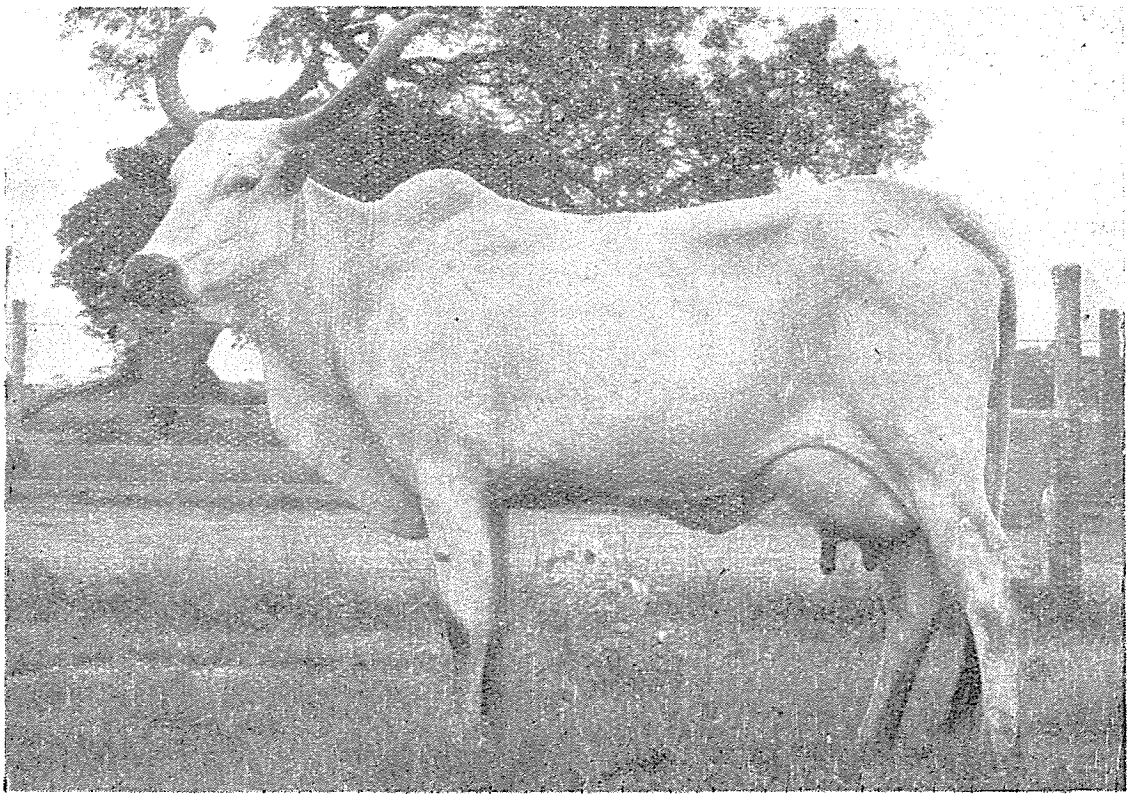


FIGURE 36. *White Fulani bull.*
Courtesy of G. M. Gates

FIGURE 37. *White Fulani cow.*
Courtesy of Public Relations Department, Govt. of Nigeria



The tail is long with a good switch. The hoofs are strong and even. The skin tends to be loose and the hair is soft. The hump is well developed, fatty-muscular and cervico-thoracic in position. The dewlap is fairly large and well developed with many folds. The sheath and navel flap are not marked. The udder is well developed with medium-sized teats. Ryall (*Personal Communication*) gives the birthweights of male and female calves as 54 and 50 lb. respectively. Tasker (1955)

TABLE 37. – TYPICAL MEASUREMENTS OF WHITE FULANI CATTLE MAINTAINED AT SHIKA STOCK FARM, NIGERIA

	Male			Female		
	1 year	2 years	mature	1 year	2 years	mature
Weight, lb.	329.0	602.0	1 176.0	315.0	511.0	749.0
Length from shoulder to pin-bone, in.	41.0	53.0	60.0	41.5	50.0	54.0
Height at withers, in.	41.0	49.0	52.5	40.5	46.5	49.5
Depth of chest, in.	20.0	26.0	29.5	19.0	23.0	26.0
Width of hips, in.	10.5	14.0	18.0	10.5	13.5	16.5
Heart girth, in.	50.0	61.5	76.0	46.5	57.5	63.5

SOURCE: Ryall, T. E., *Personal Communication.*

gives the birthweights of calves from a herd of White Fulanis maintained at Vom in the year 1950 as 45 lb. for males and 44 lb. for females. Some typical measurements of White Fulani cattle maintained at Shika Stock Farm, Nigeria, are given in Table 37.

Functional characteristics of the breed

Although the productive efficiency of the breed in the hands of the nomads is at a low level, these cattle have been used as triple-purpose animals for beef, milk, and work. As beef animals they normally fatten on natural grassland when it is plentiful. As work animals, for tillage purposes, they are fairly good but slow workers. They are appreciated by the native breeders as fair milk producers by comparison with the other indigenous types in the area.

Heifers calve for the first time when they are about 3 years and 4 months of age. Their breeding life is about 10 years. The cows appear to be fairly regular breeders and to produce a calf every year. Richards (1946), from his study of the records of the White Fulani herd at Shika Stock Farm in the Northern Provinces of Nigeria,

reports that the average service period for a total of 233 cows was 83 days. The average service period of a White Fulani herd kept in the Southern Provinces, however, was approximately 161 days.

The average production of all tested White Fulani cows in the herd at Shika was reported (Ryall, T. E., *Personal Communication*) to be 2,250 pounds of milk with 5.75 percent butterfat, the average lactation period being 240 days with a calving interval of 375 days.

The production of a superior cow is reported as 5,075 pounds of milk with 5.5 percent butterfat in 354 days with a calving interval of 457 days.

Records of White Fulani cattle at Shika Stock Farm were subjected to a study by Robertson (1950). Records of over 500 Fulani cows which had been milked in the herd were studied. In this herd, the average age at first calving was about 43 months. It was noted that, in about 2,000 calvings, there were no twin births. The average length of the milking life of cows was about 5 lactations. The average age of bulls in this herd at the birth of their first offspring was 61 months. The average first lactation yield was about 180 gallons with a coefficient of variation of 50 percent. The effect of the age of cows on their yield was investigated by the paired lactation method. The effect of age is shown in Table 38.

TABLE 38. – EFFECT OF AGE ON MILK YIELD OF WHITE FULANI COWS AT SHIKA STOCK FARM

Measure of production	First lactation	Second lactation	Third lactation	Fourth lactation
Yield, in gallons	177	175	194	196

SOURCE: Robertson, 1950.

The correlation of yield in one lactation with that of the next was found to be close to 0.6 and that of lactation length 0.5. The heritability, as obtained from the intra-sire regressions of the daughter's performance on that of the dam, of a single record was found to be 0.32, and of the average of two records 0.47.

Tasker (1955) reported the yield of White Fulani cows maintained at the Livestock Investigation Center, Vom, as 1,407 lb. in 305 days. The average lactation period was, however, only 256 days. These records refer to 63 full lactations. The average percentage of fat in milk of the herd was 6.39, with 6.29 percent fat in the morning and 6.56 percent fat in the evening milk samples. The mean number of cows in milk was 51.

As draft animals, the Fulani cattle are put to work at 3 to 4 years of age when they weigh about 700 to 800 lb. They are slow but even-tempered and willing workers. A pair of bullocks can haul a load of about 1,000 to 1,200 lb. in a cart while walking at about two miles an hour and working six to eight hours a day. On average they work about 250 days a year in various field and transport operations.

Well reared, meat animals are ready for slaughter at about 5 years of age when they weigh 1,100 to 1,200 lb. The estimated dressing percentage is about 50 to 55.

Performance in other areas

A herd of White Fulani cattle was established at University College, Ibaden, Western Nigeria, by the transfer of six cows, a heifer and a bull from Shika Government Stock Farm. These cattle and their progeny have been maintained since 1950 in open buildings about 500 yards from a stream by which tsetse (*Glossina paloalia*) have been caught, while Stomoxys and Tabanids have been a severe seasonal pest near the buildings themselves. The cattle have been allowed to graze permanent pastures between the buildings and the stream.

During the period 1950-55, stained blood smears in which *Trypanosomas vivax* was the most commonly identified species, although *T. congolense* was found in 4 percent of the smears, indicated positive trypanosome infection in 80 percent of the herd, while the remaining animals showed symptoms indicative of trypanosomiasis, although the parasite could not be demonstrated. With the exception of one foundation cow which received treatment, the female stock, after showing symptoms of the disease which varied from the mild to the fairly acute, appeared to recover for reasons which were not wholly understood, although it is known that an adequate plane of nutrition, such as that which prevails in this herd, can encourage the appearance of a state of premunition to trypanosomiasis. It was suggested, too, that recovery was assisted by allowing the animals complete rest, except for milking, during attacks of fever and sickness.

While 92 percent of the untreated female stock survived and remained in apparent good health and production during the five years, it was found that young draft bulls broke down under trypanosomiasis but could stand up to heavy work after prophylactic treatment with antrycide. After two bulls had died of trypanosomiasis, all male animals were given routine treatment with antrycide pro-salt every four months.

Lactation records made by the foundation cows after their arrival at Ibaden in all cases exceeded the previous records made by the same

cows at Shika. The average production of 21 lactations at Ibaden was 3,603 lb. of milk. The two highest recorded yields were 6,506 lb. of milk in 427 days, and 5,642 lb. in 305 days. The average calving interval for the herd was 402 days (I.B.E.D., 1956).

Sources of breeding stock and further information regarding the breed

It is estimated that there are over 3 million head of these cattle. Further information on the White Fulani may be had from:

The Director of Agriculture, Kaduna, Northern Nigeria.
The Director of Veterinary Services, Kaduna, Northern Nigeria.

M'BORORO

Origin

Mason (1951*a*) classifies the M'Bororo as a long Lyre-horned zebu so as to distinguish it from the Lyre-horned Fulani cattle types. Gates (1952) suggests that these cattle may have had their origin in Sanga cattle which migrated westward from Upper Egypt, and it may be considered that the conformation of the cattle, and in particular that of the head, horns and hump, lends some support to this theory.

In French territory these cattle are usually known as Bororo, M'Bororodji or M'Bororo, from the tribe of that name, a subsidiary of the Fulani group, which owns large herds of this type, and which, in its turn, derives its name from the fact that its members live in the *Mbouroura* or bush. Locally the cattle may be called Brahaza (in the Hansa and Beri-Beri areas) or, toward the east, simply Fulani, although the herds in Darfur in the Sudan are usually spoken of as M'Bororo. In Nigeria this cattle type is known generally as Rahaji; Rahaza, Gadahe, Gabassae, Abori and Hanagamba are alternative local names. Descriptive names which have been applied to these cattle, have been Red Fulani (to distinguish them from the White Fulani) and, proposed by Gates (1952), Red Longhorn.

According to Mornet and Koné (1941) the Bororodji tribe originally inhabitated the area which is now the Colonie du Niger in French West Africa and the Sokoto Province of Nigeria. To avoid Islamization in the early part of the nineteenth century, this tribe fled to the east and settled in Bornu (Nigeria), Adamawa (Cameroons), Mayo Kebbi (Ubangi-Shari of the French Cameroons), Baguirmi (Chad Colony) and as far east as Darfur (Republic of the Sudan).

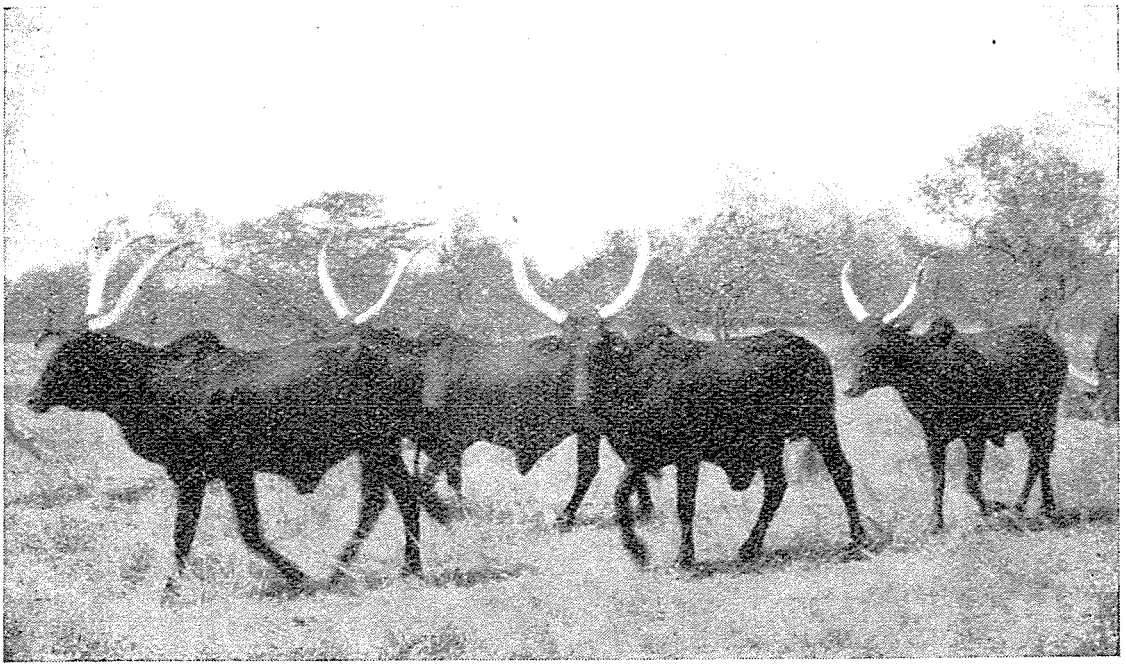


FIGURE 38. *M'Bororo cattle in Darfur Province, Republic of the Sudan.*

Courtesy of J. D. M. Jack

Conditions in the native home of the breed

Location, topography and soils

Herds of M'Bororo cattle are found near the northern boundary of Nigeria, from Sokoto to Lake Chad, in the Bamenda and Mambila areas of the British Cameroons, and in the adjoining French territories of French West Africa and French Equatorial Africa, particularly in the Colonie du Niger and in Ubangi-Shari and Baguirmi. Isolated herds occur as far east as Darfur Province in the Republic of the Sudan (Figure 38) where it has been estimated that there are about 50,000 head of these cattle.

The northern borders of Nigeria and the adjoining Colonie du Niger in French West Africa are undulating plains of 1,200 to 1,500 feet elevation. In the Cameroons to the south of Lake Chad the country is mountainous with elevations of from 2,000 to 4,000 or 5,000 feet in the Bamenda area.

In the northern region the soil is light and sandy, of orange brown to red color. Sedentary dunes occur throughout the area. Around Lake Chad the soils are plastic clays with areas of loose sand, while in the montane regions of the Cameroons strongly leached friable porous and sandy clays of reddish color occur.

Climate

The climatic pattern of the zone occupied by the M'Bororo cattle varies with the situation and relief. Near the northern border of Nigeria and in the eastern part of the Colonie du Niger it is generally hot and dry. During the dry season, which extends over seven to nine months, the dust-laden northeasterly harmattan winds blow and, on account of the quantity of dust in the air, the days are not clear and bright in spite of the hot sun. There is great variation between day and night temperatures. The prevailing winds are southwesterly during the wet season, which begins in May, and the climate is hot and humid with decreased diurnal temperature variation.

In the mountainous regions of the Cameroons the average rainfall is about 100 inches and temperatures are moderate.

Climatological data for three stations in the M'Bororo area are given in Table 39.

Vegetation

A wide variety of vegetation is met with in the area occupied by the M'Bororo, depending upon the climate, rainfall, location and altitude. In areas of 20 inches or less rainfall, where various species of *Acacia* are common, salt bush type vegetation provides rough grazing.

TABLE 39. – CLIMATOLOGICAL DATA FOR THE KATSINA, BAMENDA (BRITISH CAMEROONS) AND BOUAR AREAS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Katsina													
Mean temperature, °F.	71	76	82	87	87	84	80	77	80	83	79	73	79.90
Humidity, % ..	29	25	24	38	62	70	82	87	84	62	32	30	52.10
Rainfall, in. ...	0.01	nil	0.03	0.26	2.44	3.61	6.03	10.92	4.63	0.42	0.01	nil	28.36
Bamenda													
Mean temperature, °F.	70	71	72	71	70	68	65	65	67	69	69	70	68.90
Humidity, % ..	69	69	73	80	83	89	89	91	89	85	81	76	81.20
Rainfall, in. ..	1.14	1.72	6.31	8.86	9.16	13.55	15.17	15.49	17.79	10.63	3.75	1.50	105.37
Bouar													
Mean temperature, °C.	24.4	25.9	25.4	26.3	25.6	25.3	24.2	23.3	23.9	23.9	24.9	25.1	24.8
Humidity, % ..	25	37	59	55	60	67	72	77	71	68	41	18	55.8
Rainfall, mm. .	3.8	21.6	79.9	39.7	149.4	142.6	207.8	459.4	223.9	251.6	5.7	nil	1 585.4

SOURCE: Katsina: Gates, G. M., *Personal Communication.*
Bamenda: McCulloch, J., *Personal Communication.*
Bouar: Desrotour, *Personal Communication.*

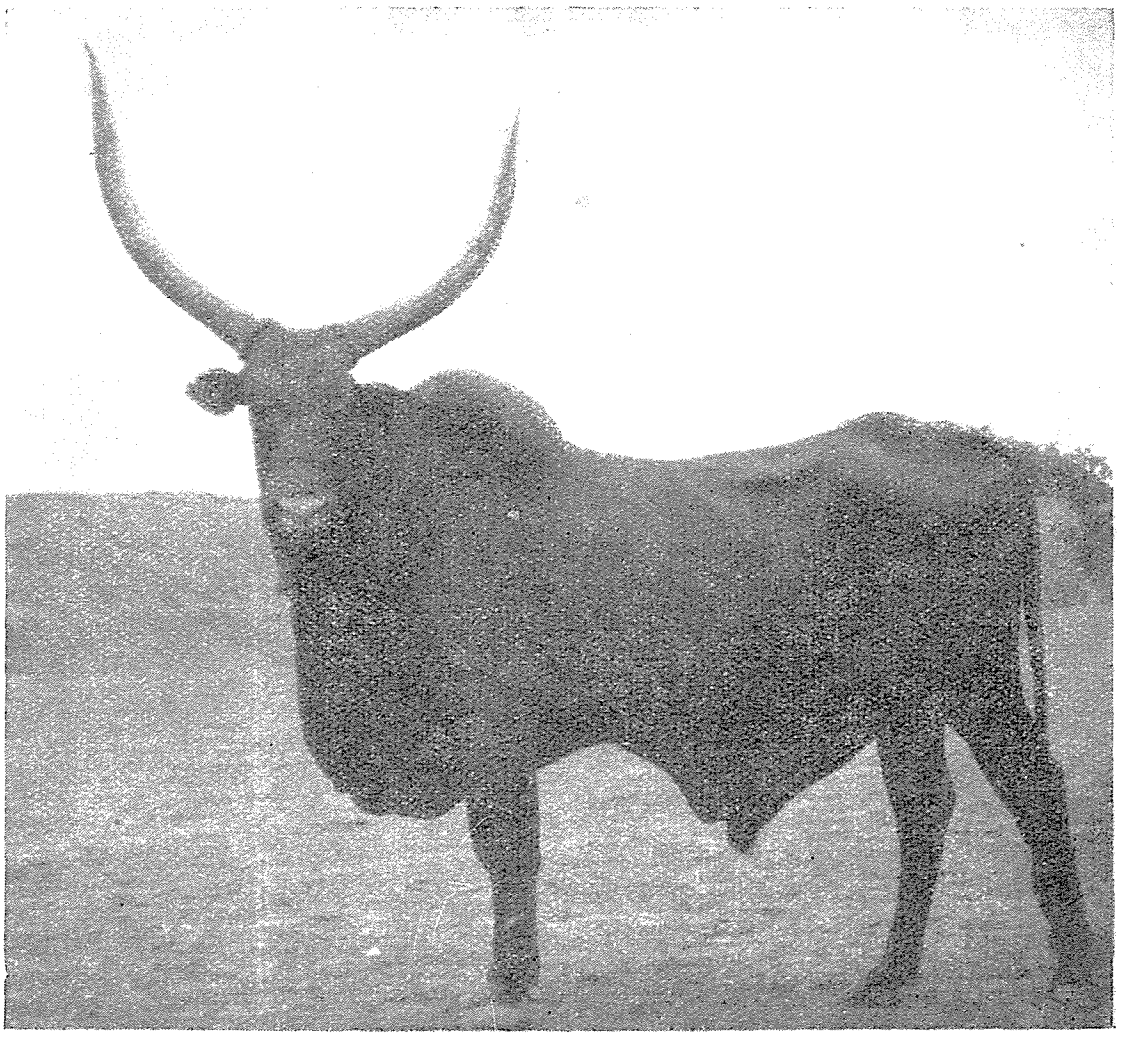


FIGURE 39. *M'Bororo bull.*

Courtesy of G. M. Gates

Where the rainfall is higher, grasses of the genera *Andropogon, Hyparrhenia* and *Pennisetum* occur. Papyrus extends well out into the shallow water bordering Lake Chad. Flat-leaved tussocky grasses (including *Sporobolus* spp.) and clovers in clumps are common in the mountainous regions of the Cameroons. Other grasses occurring in the region include *Eleusine indica, Setaria* spp., *Melinis minutiflora, Paspalum* spp. and *Imperata* spp. On the lower slopes coarser grasses such as *Andropogon* spp., *Cymbopogon* spp., *Imperata* spp. and *Pennisetum purpureum* occur.

Management practices

Hardiness, showiness and size are some of the characteristics looked for by the nomadic herdsmen in selecting M'Bororo cattle for breeding. The herds are reared entirely on grazing throughout the year. In the

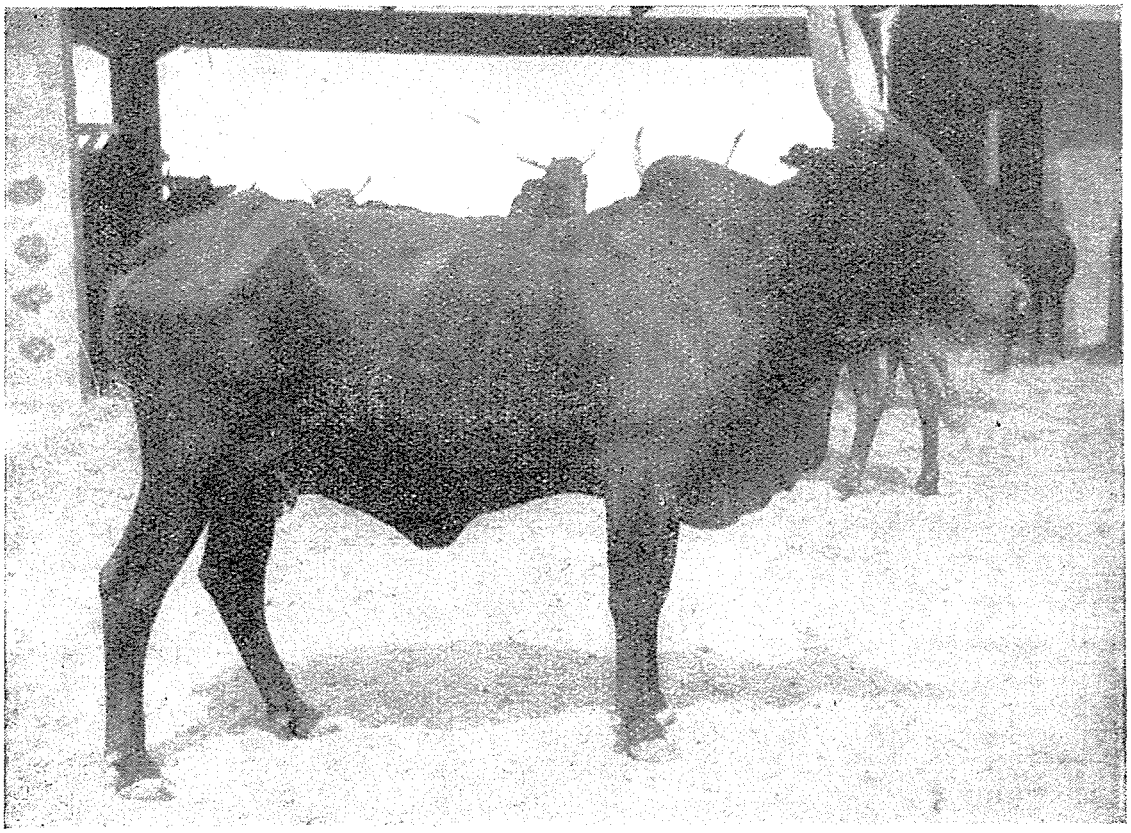
northern areas the cattle migrate toward rivers, valleys and drying swamps during the dry season and return to their native areas at the beginning of the rains. In the mountainous regions of the east the cattle are taken to hilly grazing areas during dry periods. Supplementary feeds are never given.

Physical characteristics of the breed

The M'Bororo cattle (Figures 39 and 40) are large-framed animals, with good height and long legs. The hump is well developed, musculo-fatty in nature and cervico-thoracic in situation (Gates, G. M. *Personal Communication*). It is much larger in the male than in the female and castrated male. The dewlap is also well developed, extending from under the chin to the breastbone. The naval flap and, in the bull, the sheath, is loose and pendulous. The head is fine and long with large, lyre-shaped horns curving outwards and upwards and usually white in color and reported to be 75 to 120 cm. in length. The back is long, but the ribs do not show sufficient spring and look flat, the shoulders being narrow. The hindquarters are sloping. The legs are fine and long, with strong hoofs. The skin is loose and of medium thickness with pigmentation varying from light to dark. The hairs

FIGURE 40. *M'Bororo cow.*

Courtesy of G. M. Gates



are short and coarse. The coat color is reddish brown to dark red with, in some cases, a white switch.

Some body measurements are summarized in Table 40.

TABLE 40. – SOME MEASUREMENTS OF M'BORORO CATTLE

	Male			Female			Ox
	1 year	2 years	mature	1 year	2 years	mature	mature
Weight, kg.	100	200	350–500	80	150	360–450	360
Length from shoulder point to pinbone, cm.			167			150	165
Height at withers, cm.	116	129	130–145	110	120	130–140	130–145
Depth of chest, cm.	53	59	71	62	62	70	70
Width of hips, cm.	28	34	50	28	43	53	60
Heart girth, cm.	145	155	175–191	130	154	174	196

SOURCE: Desroteur, *Personal Communication.*
Troquereau, *Personal Communication.*

Functional characteristics of the breed

The M'Bororo cattle are wild and of an intractable and nervous disposition. As milk animals they are very poor, producing about 2 liters per day during flush periods. The lactation period is of short duration. The meat is reported to be coarse and of poor quality with a high proportion of bone. Mandon (1953) reports dressing percentages of 40 to 42.

Though they are swift in their movement, they do not make good draft animals on account of their nervous disposition. Only a few young males are castrated and trained as pack animals.

The hides from M'Bororo cattle are much valued and make good leather.

Shaw and Colville (1950) report that despite the undesirable features mentioned above and general unthriftiness, the animals are kept in large numbers. Possibly this is due to their picturesque appearance and alleged dog-like ability to obey their masters' orders. This latter quality makes them good " bush " animals. They are said to scatter quickly to avoid danger at the slightest signal from their masters.

The M'Bororo are hardy and adaptable to a wide range of climatic conditions varying from the hot dry regions where the majority are found, to much colder higher rainfall areas 4,000 to 6,000 feet above sea level, to which they have been introduced.

Sources of breeding stock and further information regarding the breed

From the numbers of M'Bororo cattle exported to Southern Nigeria for slaughter purposes, it has been estimated that there are over 200,000 of these cattle in the Colonie du Niger of French West Africa, particularly in its eastern area, and that they may not exceed 400,000 head in the Cameroons.

There is a herd of M'Bororo cattle at the Livestock Investigation Center maintained by the Veterinary Department at Katsina in Northern Nigeria.

Further information regarding the type may be obtained from the following authorities:

Director, Service de l'élevage et des industries animales, Chad, French Equatorial Africa.

Director, Service de l'élevage et des industries animales, Secteurs occidentaux, Bouar, Oubangui Shari, French Equatorial Africa.

The Director of Agriculture, Kaduna, Northern Nigeria.

The Director of Veterinary Services, Kaduna, Northern Nigeria.