



# Types and Breeds of African Cattle

FOOD AND AGRICULTURE ORGANIZATION  
OF THE UNITED NATIONS

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TYPES AND BREEDS OF AFRICAN CATTLE

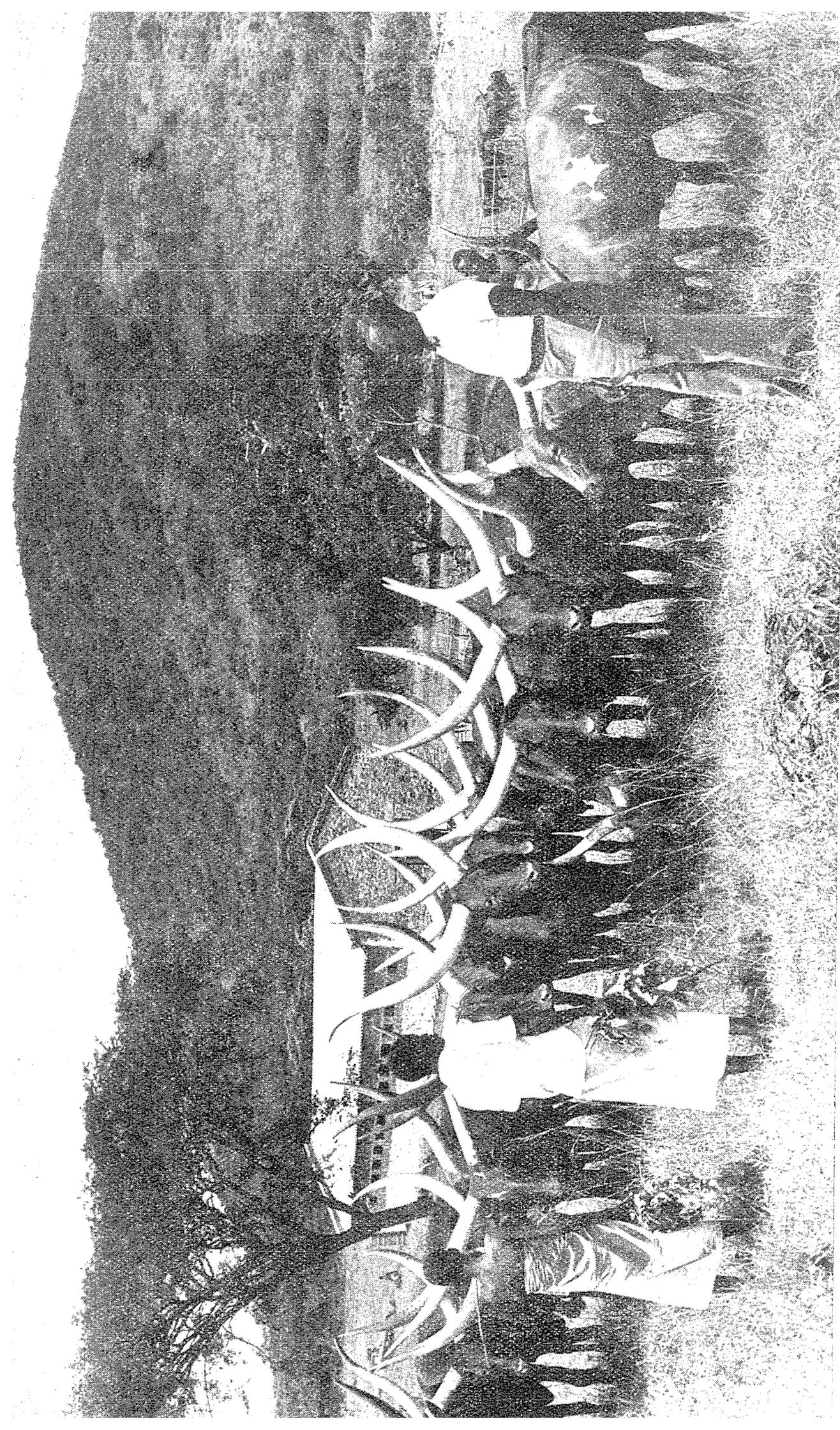


FIGURE 1. *The Mwami of Ruanda, Charles Mutara Rudabigwa, with some of the cattle of Ankole type on his model farm near Nyanza.*

Courtesy of Congress: C. Lamote

# Types and Breeds of African Cattle

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FOOD AND AGRICULTURE ORGANIZATION  
OF THE UNITED NATIONS

ROME, 1957

## Conversion Factors

Length	<p>1 inch = 2.540 cm.            1 foot = 0.3048 m.            1 yard = 0.9144 m.            1 mile = 1.609 km.</p> <p style="text-align: center;">1 mile = 1,760 yards = 5,280 feet</p>
Area	<p>1 sq. in. = 6.452 cm<sup>2</sup>            1 sq. ft. = 0.0929 m<sup>2</sup>            1 sq. mile = 2.59 km<sup>2</sup>            1 sq. mile = 259 ha.            1 acre = 0.4047 ha.</p> <p style="text-align: center;">1 square mile = 640 acres</p>
Volume	<p>1 cu. in. = 16.39 cm<sup>3</sup>            1 cu. ft. = 0.02832 m<sup>3</sup>            1 cu. in. = 0.01639 liter            1 gal. (U.S.) = 3.785 liters            1 gal. (Imp.) = 4.546 liters</p> <p style="text-align: center;">1 gallon = 4 quarts</p>
Mass	<p>1 pound = 0.4536 kilograms            1 short ton = 0.9072 metric ton            1 long ton = 1.016 metric tons</p>
Temperature	$^{\circ}\text{F} = ^{\circ}\text{C} \times \frac{9}{5} + 32$

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## INTRODUCTION

This is the second FAO publication regarding types and breeds of cattle. The first dealt with *Zebu Cattle of India and Pakistan* (Joshi and Phillips, 1953) and, as was pointed out in the introduction to that publication, FAO has been giving attention to the cataloguing of genetic stocks since 1946. Much of the work has had to do with plant breeding material, particularly rice, wheat and barley, and it has been possible to issue only one publication thus far on genetic stocks of cattle. The lack of detailed information on the genetic traits of cattle was recognized when the first publication was issued, and there are obviously many gaps in existing information. Perhaps one of the most useful purposes of such a publication is to point out the gaps in order that research workers may undertake studies aimed at providing the missing information.

In addition to the over-all objective of cataloguing information on important breeds and types of cattle, in order that it may be generally available to breeders in all countries, it must be recognized that many important native types are in danger of being lost or diluted through the mass introduction of other blood. This problem, in Africa as well as in Asia and the Far East, was recognized at the Meeting on Improving Livestock under Tropical and Subtropical Conditions, which was held in Lucknow, India, in 1950 (Phillips, 1950). At that meeting it was recommended that governments should take steps to preserve such native types even though, in some cases, the animals might be uneconomic but might have potential value for use in breeding experiments.

Subsequent to the Lucknow meeting, FAO took steps to establish an intergovernmental committee to assist in the preparation of material on the indigenous types and breeds of cattle in Africa. The countries which participated in the work of that committee and the men designated to serve on it, are listed as follows:

<i>Country</i>	<i>Representatives</i>
BELGIUM	Dr. R. J. Guyaux Conseiller vétérinaire Direction général du Ministère des colonies Brussels  Dr. H. R. F. Colback Veterinary Adviser to the Governor-General Léopoldville, Belgian Congo
EGYPT	Dr. A. R. Sidky Director, Animal Breeding Department (now Minister of Agriculture) Ministry of Agriculture, Cairo
FRANCE	Monsieur Feunteun Vétérinaire-Inspecteur général Ministère de la France d'outre-mer Paris
PORTUGAL	Dr. José de Brito Guterres Direcção Geral de Fomento Colonial Ministerio das Colonias, Lisbon
SUDAN (Republic of the)	Mr. J. D. M. Jack Sudan Veterinary Service Khartoum
UNION OF SOUTH AFRICA	Professor J. H. R. Bisschop P. O. Onderstepoorte, Pretoria  Professor F. N. Bonsma Agricultural Research Institute University of Pretoria, Pretoria
UNITED KINGDOM	Mr. J. P. Maule Director Commonwealth Bureau of Animal Breeding and Genetics King's Buildings, West Mains Road Edinburgh, Scotland  Professor J. E. Nichols Animal Husbandry Division University College of Wales Aberystwyth, Wales  Mr. G. M. Gates Veterinary Department Kaduna, Nigeria  Mr. D. E. Faulkner Department of Veterinary Services Zomba, Nyasaland  Mr. J. C. Raath Department of Research and Specialist Services P. O. Box 25, Causeway (Southern Rhodesia)

Material for the present publication has been assembled from the published literature and from many other sources. Much information has been supplied by correspondents, and the main contributors are listed below, together with the names of the breeds or types upon which they contributed information:

<i>Contributor</i>	<i>Type or Breed</i>
Agricultural Officer Department of Agriculture Bambui, British Cameroons	Adamawa
Agricultural Officer Department of Agriculture Musaia, Sierra Leone	N'Dama
Mr. P. Amegée Chef de la circonscription d'élevage de Sokodé Togo, French West Africa	West African Shorthorn
Prof. J. H. R. Bisschop Division of Veterinary Services Department of Agriculture, P. O. Onderstepoort Pretoria, Union of South Africa	Africander Basuto Nguni
Mr. J. C. Black Department of Veterinary Services Mazabuka, Northern Rhodesia	Barotse
Director of Veterinary Services Kampala, Uganda	Bukedi
Director, Centre fédéral de recherches zootechniques Service de l'élevage et des industries animales Bamako, French Sudan, French West Africa	Maure N'Dama
Dr. Desroteur Chef des secteurs occidentaux Bouar, Oubanguichari, French Equatorial Africa	M'Bororo
Mr. G. M. Gates Veterinary Department, Nigeria	M'Bororo West African Shorthorn
Dr. R. Guyaux Conseiller vétérinaire Ministère des colonies, le 4ème Direction général, 1ère Di- rection, Agriculture, forêts, élevage et colonisation Brussels, Belgium	Lugware Nioka Ankole
Mr. H. G. Hutchison Livestock Research Station Veterinary Research Laboratory Mpwapwa, Tanganyika	Tanganyika Shorthorned Zebu Ankole; Boran; Jiddu
Dr. Herin Songa Farm, Ruanda-Urundi	Ankole
Mr. J. D. M. Jack Sudan Veterinary Service Khartoum, Sudan	Northern Sudan Shorthorned Zebu Nilotic Southern Sudan Hill Zebu Toposa-Murle

<i>Contributor</i>	<i>Type or Breed</i>
Prof. M. P. Jore d'Arces Institut agricole d'Algérie Centre de recherches zootechniques et vétérinaires Maison-Carrée, Algiers	Brown Atlas
Mr. R. Larret Service de l'élevage et des industries animales Saint Louis, Senegal	Senegal Fulani
Mr. A. Lalanne Inspection générale de l'élevage et des industries animales Madagascar	Madagascar Zebu
Mr. J. McCulloch Department of Animal Health Services Vom, Nigeria	Adamawa
Mr. M. J. Pagot Services de l'élevage du Soudan Sotuba, Bamako, French Sudan, French West Africa	Sudanese Fulani
Dr. J. Politzer Service de l'élevage Lomé, Togo	West African Shorthorn
Mr. T. E. Ryall Shika Stock Farm Department of Agriculture, Nigeria	Azaouak White Fulani N'Dama; Sokoto West African Shorthorn
Mr. R. L. Reed Department of Agriculture Maiduguri, Bornu, Nigeria	Kuri Shuwa
Mr. P. J. Sheehy Animal Husbandry Officer Central Research Station, Mazabuka, Northern Rhodesia	Angoni Barotse
Service de l'élevage de la Côte-d'Ivoire Ivory Coast, French West Africa	N'Dama West African Shorthorn
Service de l'élevage de la Mauritanie Mauritania, French West Africa	Maure Senegal Fulani
Service vétérinaire du Congo belge Belgian Congo	Lugware Nioka Ankole
Dr. Troquereau Service de l'élevage du Tchad Fort Lamy, French Equatorial Africa	Kuri M'Bororo Shuwa
Mr. J. M. S. Usher-Wilson Agricultural Department Yola, Adamawa Province, Nigeria	Adamawa
Mr. C. H. Walker Animal Husbandry Officer Department of Veterinary Services Central Research Station Mazabuka, Northern Rhodesia	Tonga Angoni

The contributions made by these workers are gratefully acknowledged by the authors.

The importance of adaptability to the environment in cattle breeding has been stressed in other FAO publications, including the one dealing with zebu cattle (Joshi and Phillips, 1953), and particularly in an earlier Agricultural Study on the "Breeding of Livestock Adapted to Unfavorable Environments" (Phillips, 1949). Therefore, no detailed discussion of this point will be undertaken here, although it will be recognized by the reader that this importance of adaptability is one of the main considerations which justifies giving attention to the cataloging of cattle stocks. Many of the existing types of cattle which have been developed in Africa are able to survive and produce reasonably well under the rigorous environmental conditions in which they are maintained. This adaptability may be of value in some cases in other areas having similar conditions, quite apart from its usefulness under present conditions of livestock production in the native homes of the respective breeds or in the development of new types based on crossbreeding between imported and native types.

## METHOD OF PRESENTATION

Information has been presented on those types and breeds of African cattle which have been considered to be of sufficient numerical importance and which are clearly differentiated from other types; and on which it has been possible to collect adequate material.

For convenience of presentation the cattle types have been arranged as described below. Without entering into detailed historical evidence it should be emphasized that such a grouping can only be tentative. Tribal migrations and nomadic movements are among the factors which have militated against the division of the cattle population of the continent into clearly defined breed groups and the tendency must be recognized for large areas to be occupied by cattle which are intermediate between one type and another, or which are only distinguishable by differences in size and body proportions determined by the level of the nutritional environment and in particular by the incidence and duration of recurring periods of submaintenance existence.

The cattle of Africa have been placed in the following groups:

- I. The humpless or vestigially-humped cattle of the lower Nile valley and Mediterranean Africa (Figure 2):
  - a) The cattle of Egypt, including the Damietta, Baladi, Saidi and Maryuti
  - b) The Libyan cattle
  - c) The Brown Atlas cattle of Morocco and Algeria
  
- II. The zebras of the subsaharan zone (Figure 3). These cattle have many points of similarity with the Indo-Pakistan zebu. This group may be subdivided into:
  1. Medium- and short-horned zebu, of which the following types are described:
    - a) The Adamawa zebu
    - b) The Azaouak zebu
    - c) The Maure zebu
    - d) The Northern Sudan shorthorned zebu
    - e) The Shuwa zebu
    - f) The Sokoto zebu

2. Lyre- and long-horned zebus, including:

[a) The Fulanis, of which four types are described:

- i) The Nigerian Fulani (Zébu Peul nigérien)
- ii) The Senegal Fulani (Zébu Peul sénégalais)
- iii) The Sudanese Fulani (Zébu Peul soudanais)
- iv) The White Fulani

b) The M'Bororo'

III. The humpless, straight-backed cattle of West Africa (Figure 4).

Two types are described under this heading:

- a) The N'Dama
- b) The West African shorthorned cattle'

IV. The Kuri cattle of Lake Chad (Figure 5), humpless and with characteristic bulbous horns, which are considered as a separate group.

V. The cattle of much of central and southern Africa from the flood plain of the Nile in the Sudan, through southwestern Uganda and Ruanda-Urundi, to the Rhodesias, Bechuanaland, Swaziland and Basutoland (Figure 6). These cattle are characterized by large- or medium-sized lyre-shaped horns, small or vestigial humps and moderately sloping hindquarters, and are described under the headings:

- a) The Ankole cattle of Uganda, Ruanda-Urundi, eastern Belgian Congo and Tanganyika
- b) The Barotse cattle of the western part of Northern Rhodesia
- c) The Basuto cattle
- d) The Nguni cattle of Zululand and Swaziland
- e) The Nilotic cattle of the southern Sudan
- f) The Nioka cattle of the Eastern Province of the Belgian Congo
- g) The Nganda cattle of Uganda
- h) The Tonga cattle of the Southern Province of Northern Rhodesia

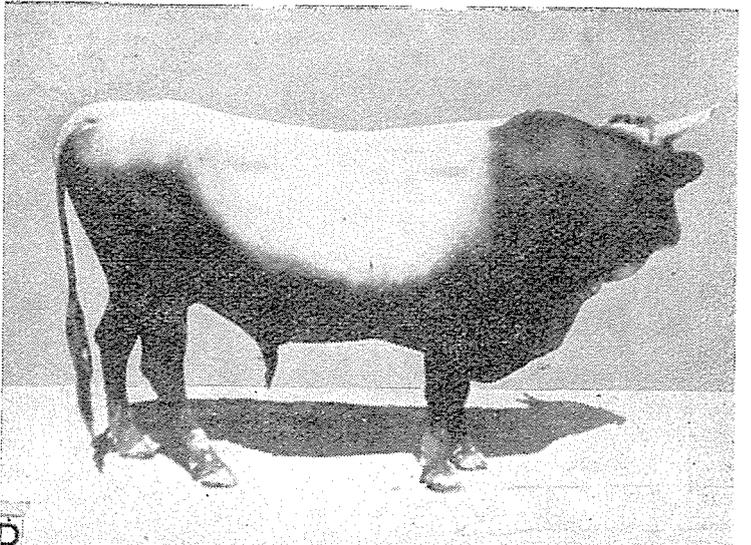
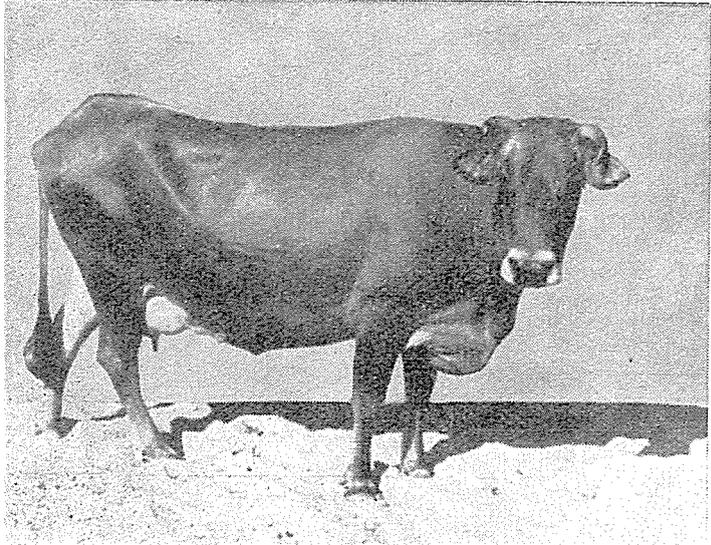
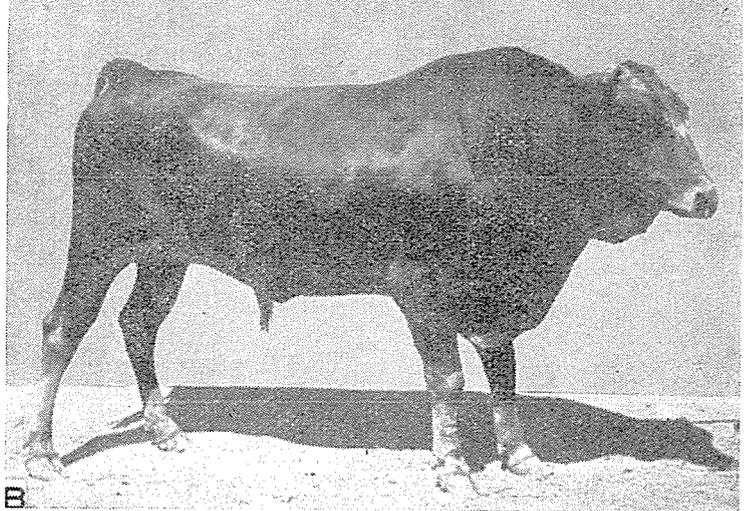
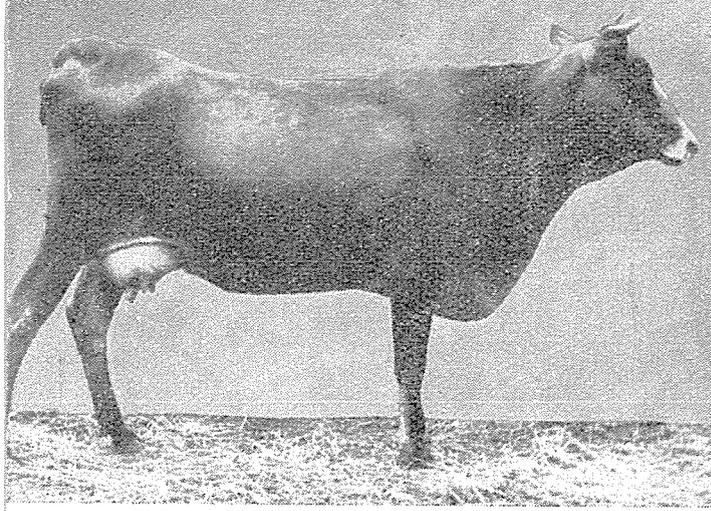


FIGURE 2. *Cattle in Group I.*

- (A) *Egyptian "Maryuti" cow;*
- (B) *Egyptian bull;*

- (C) *Libyan cow;*
- (D) *Brown Atlas bull.*

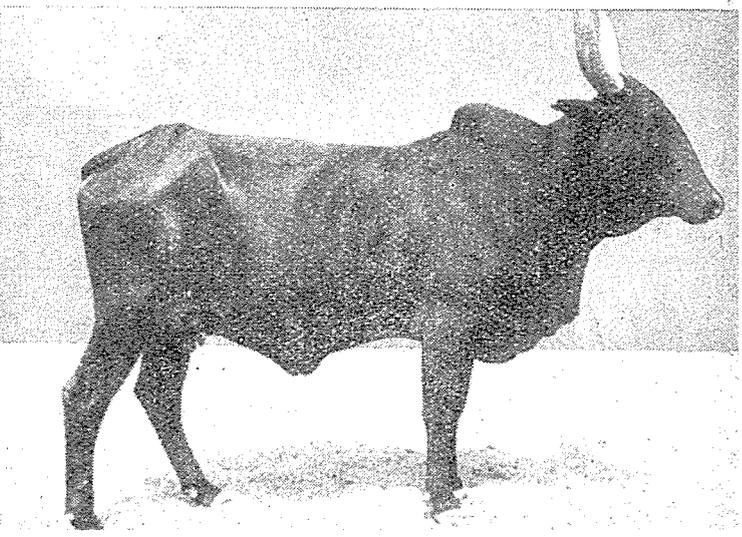
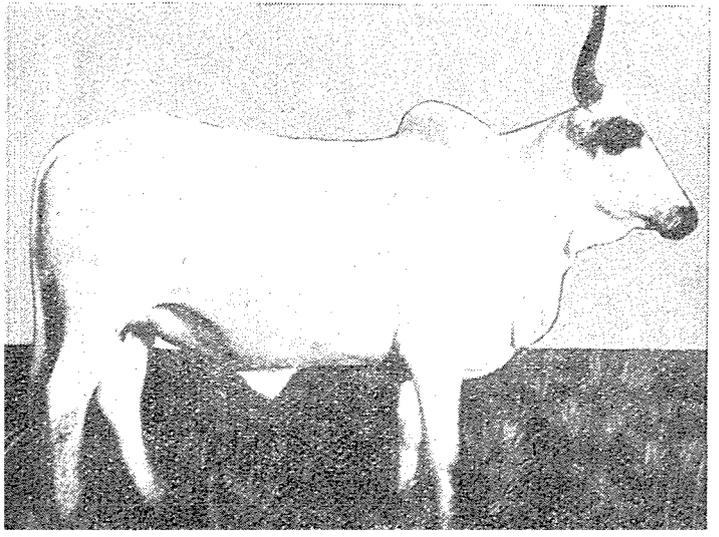
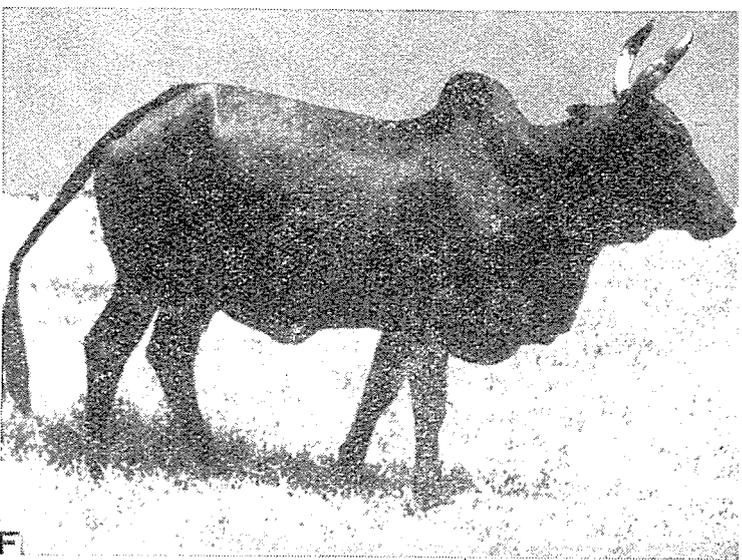
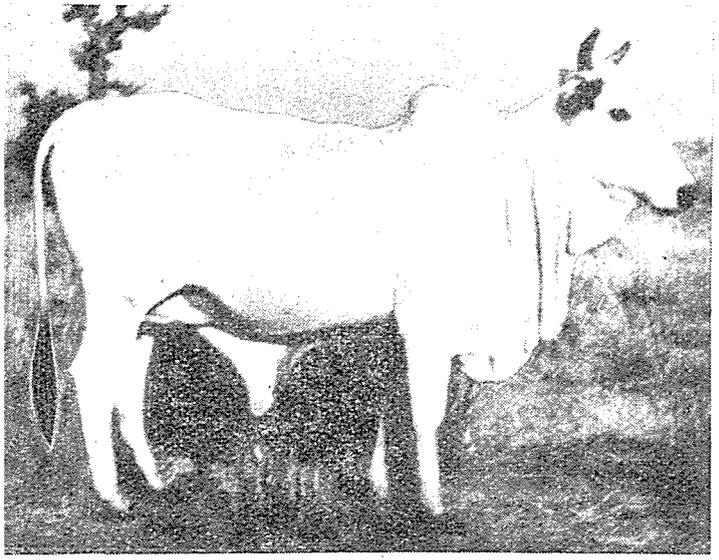
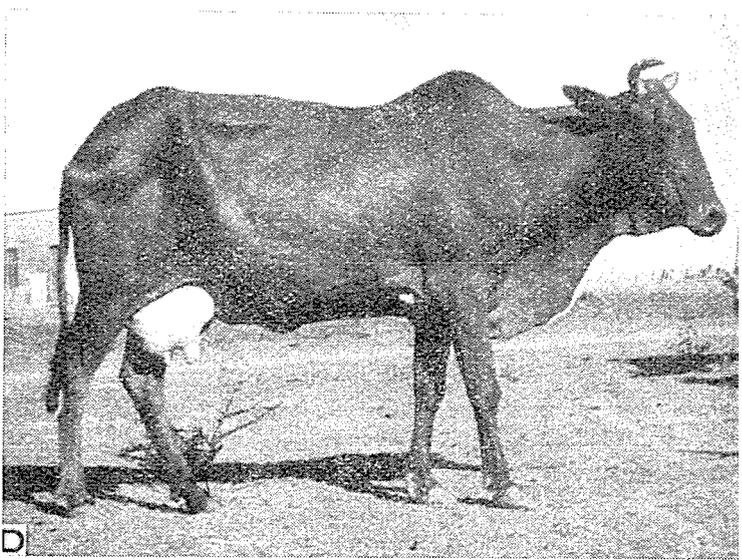
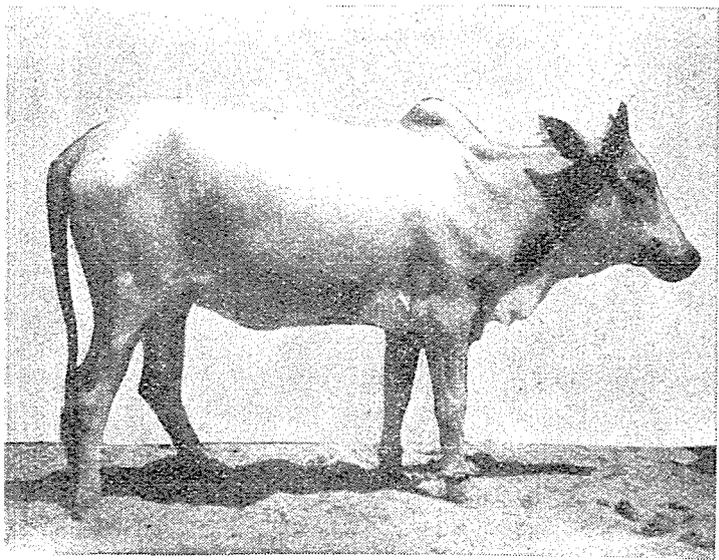
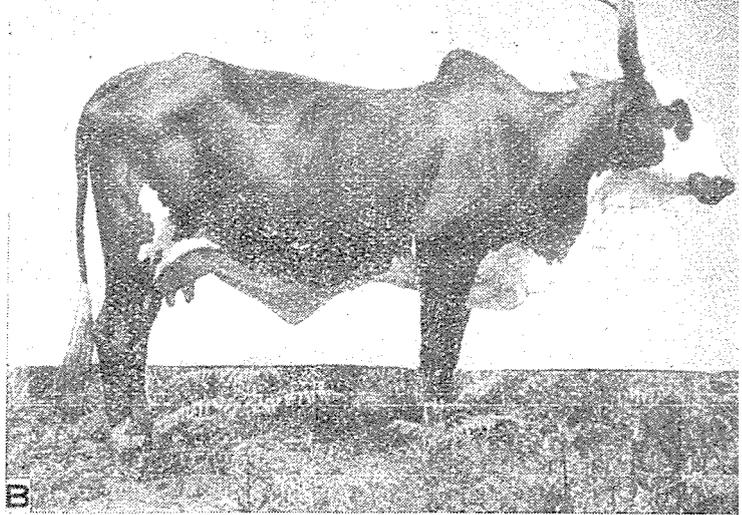
Courtesy of Y. Sabet, S. Farouki, D. E. Faulkner and Jore d'Arcees

FIGURE 3. *Cattle in Group II. [right]*

- (A) *Adamawara "Ngaundere" cow;*
- (B) *Adamawara "Banyo" cow;*
- (C) *Azaouak cow;*
- (D) *Northern Sudan shorthorned zebu cow;*

- (E) *Sokoto cow;*
- (F) *Shuwa cow;*
- (G) *White Fulani cow;*
- (H) *M'Bororo cow.*

Courtesy of G. M. Gates and E. A. McLaughlin



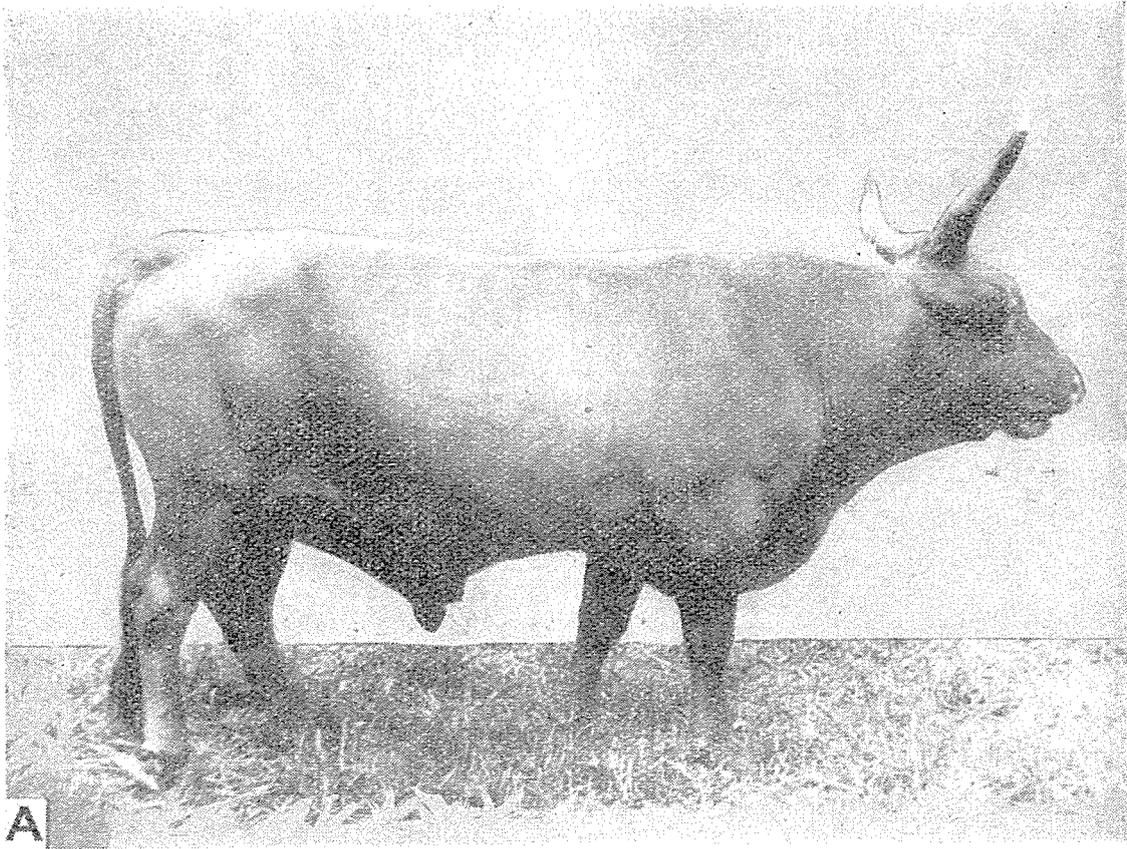
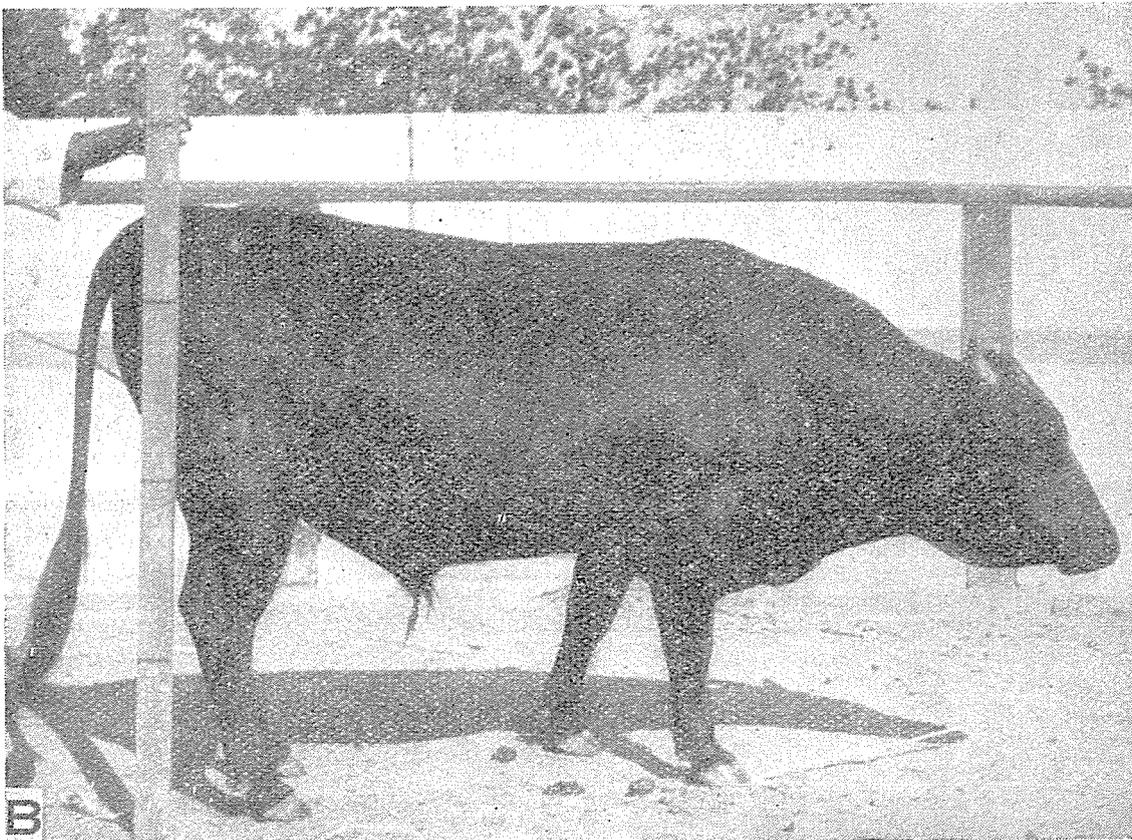


FIGURE 4. *Cattle in Group III. (A) N'Dama bull; (B) West African Short-horn bull.*

Courtesy of G. M. Gates



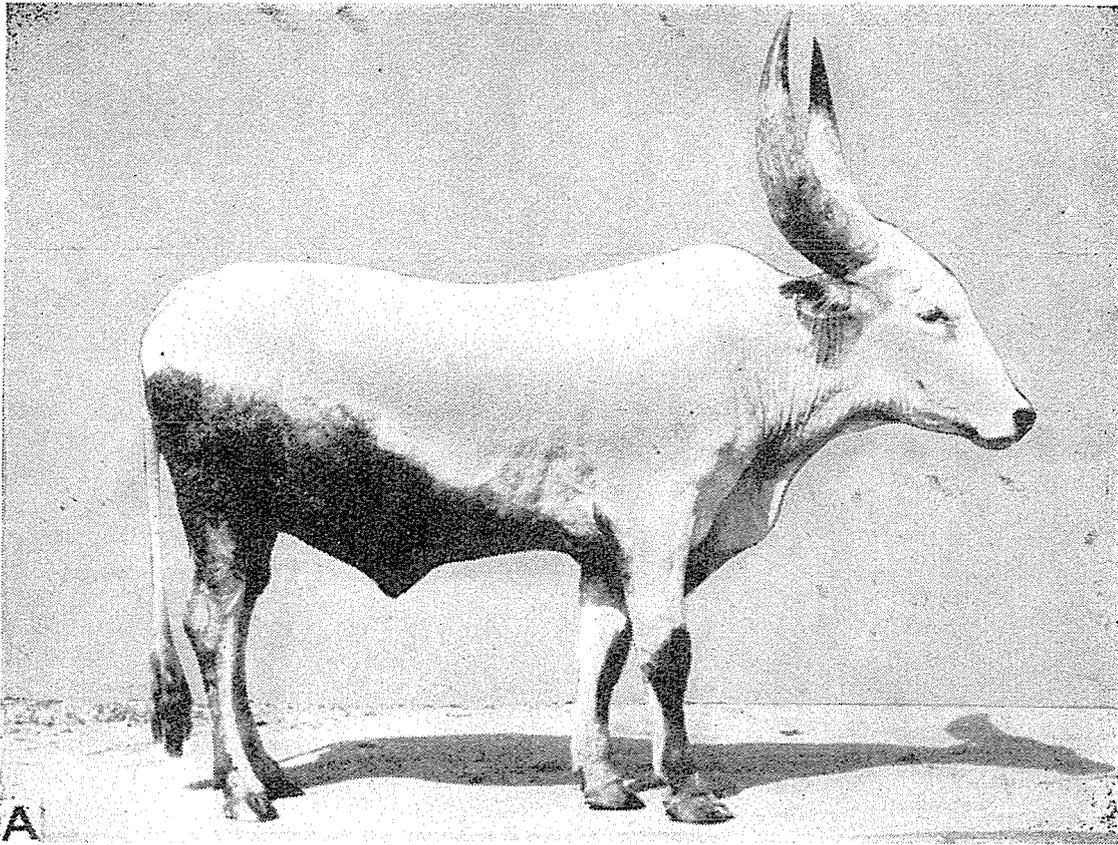
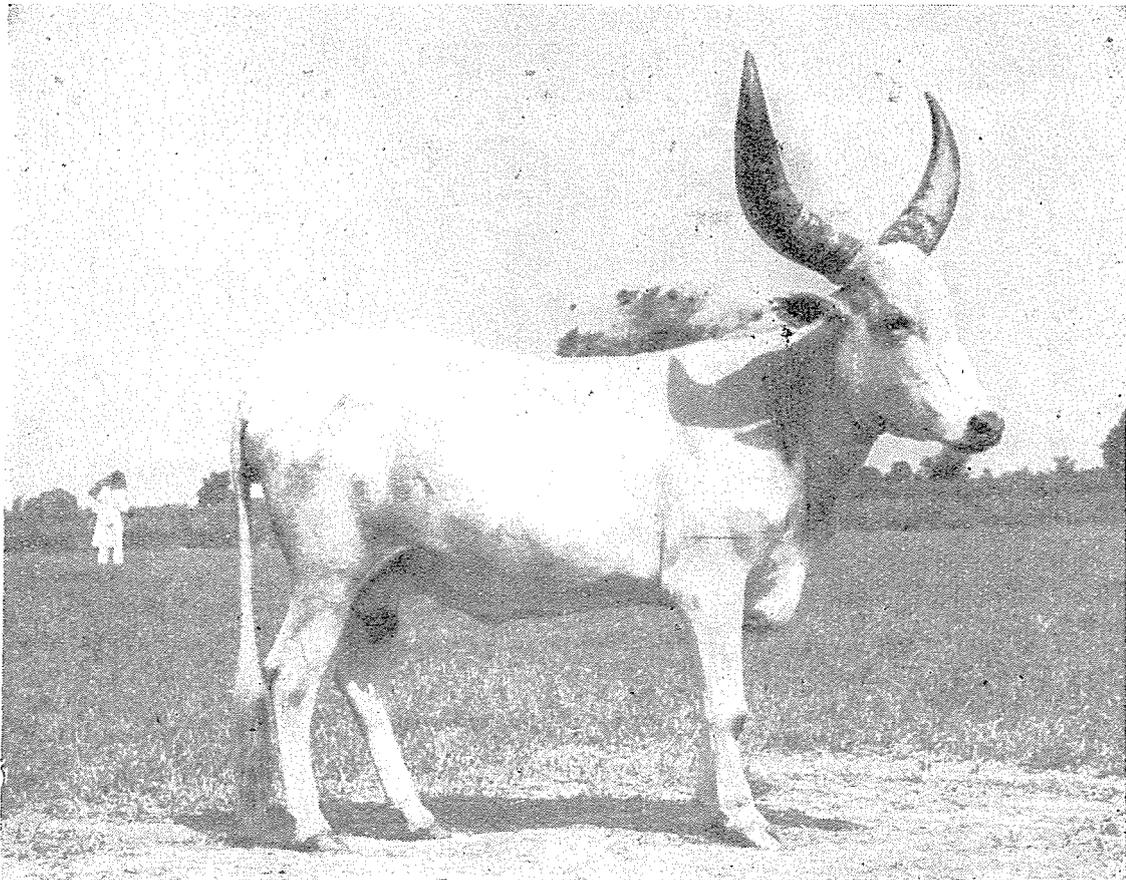
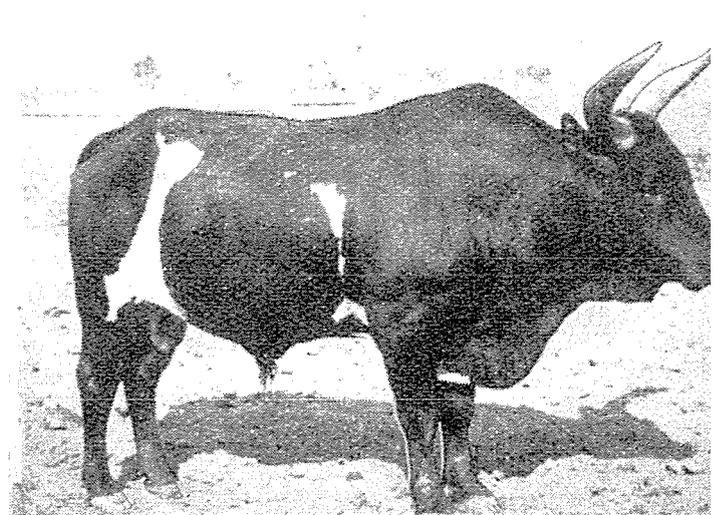
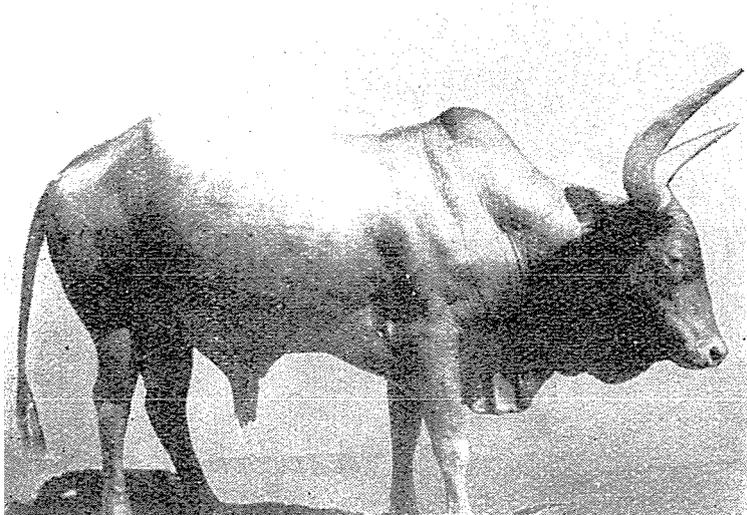
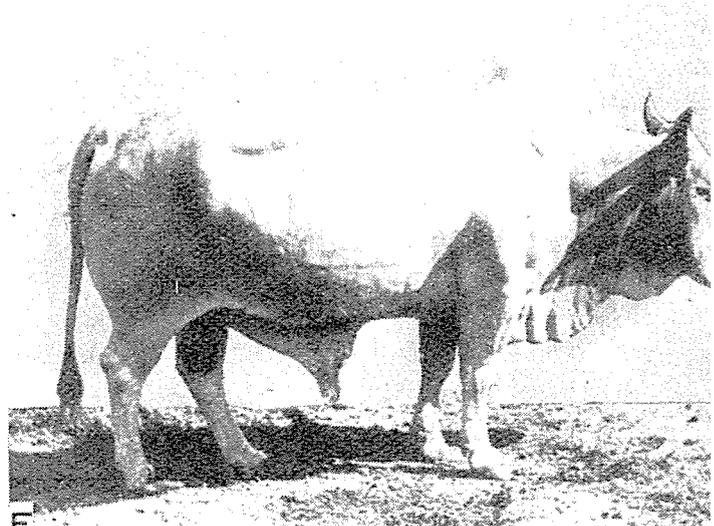
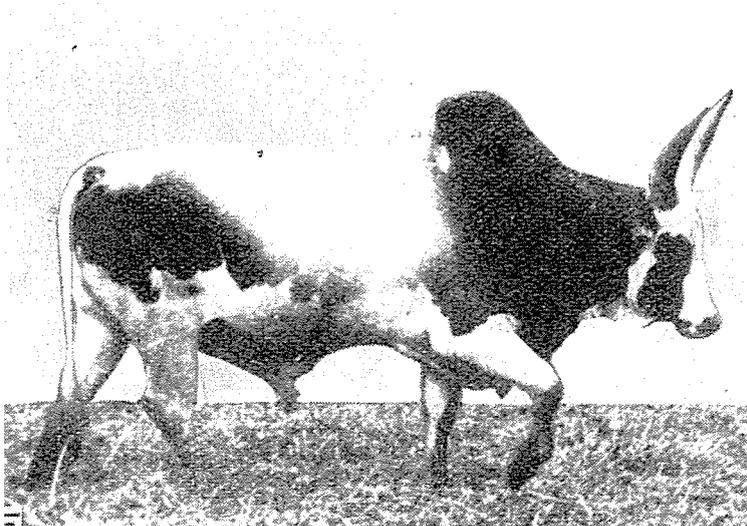
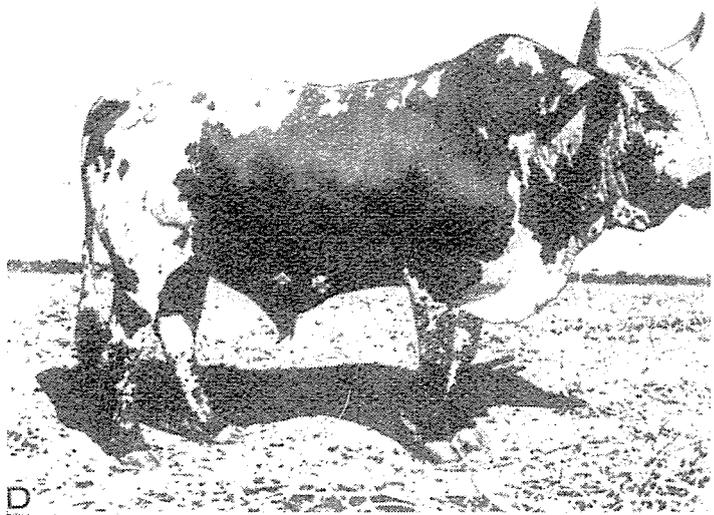
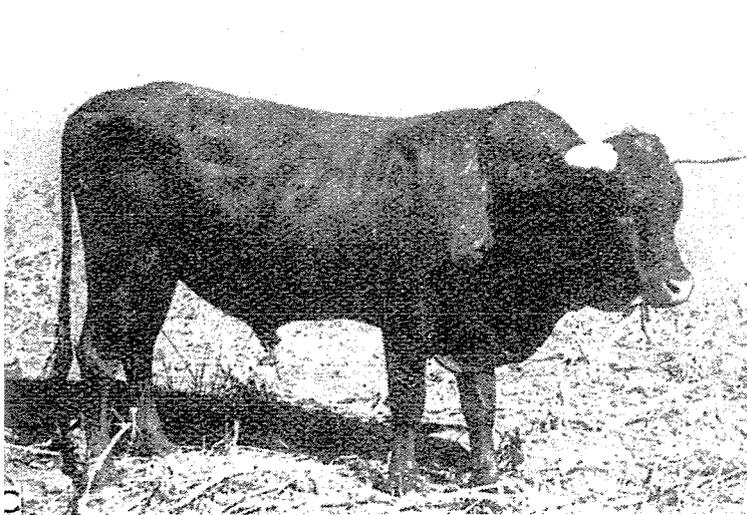
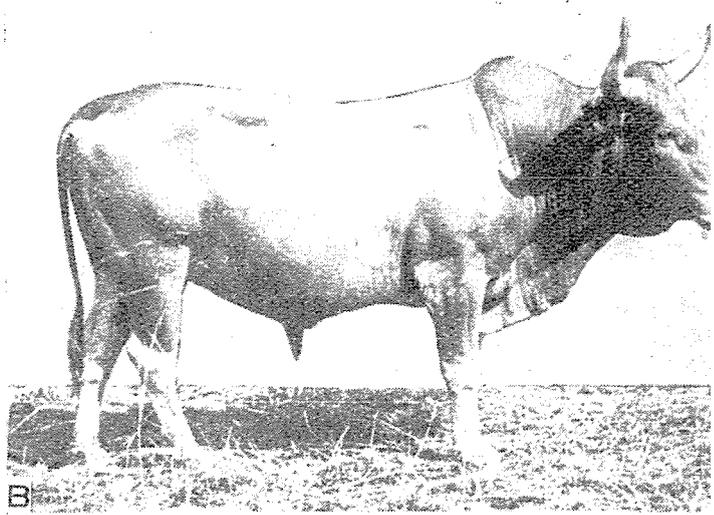
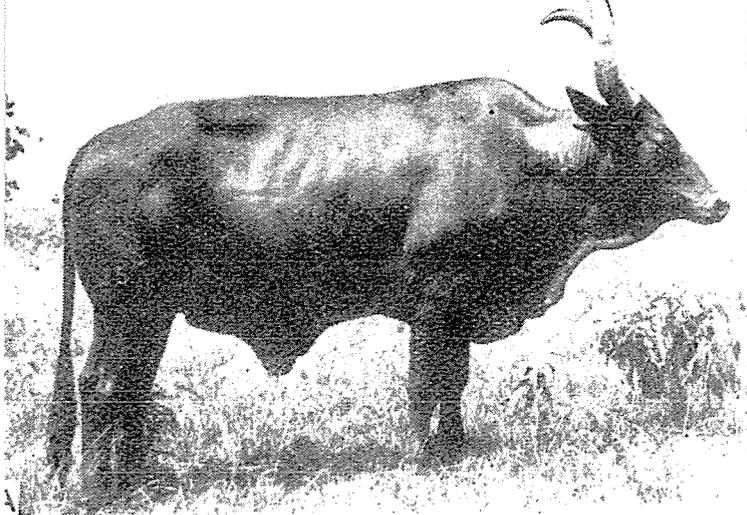


FIGURE 5. *Cattle in Group IV. (A) Kuri bull; (B) Kuri cow.*

Courtesy of G. M. Gates





VI. The cattle types of East Africa (Figure 7). The cattle of this area would appear to form a large heterogeneous population composed of often ill-defined groups merging into one another and, in some cases, into types which have been listed in group V, but which all appear to be predominantly derived from zebu stocks similar to those of the Indo-Pakistan peninsula. The following types are described in this group:

- a) The Angoni cattle of the Eastern Province of Northern Rhodesia
- b) The Boran cattle of southern Ethiopia, Somalia and northern Kenya
- c) The Bukedi zebu of Uganda
- d) The Galla, Jiddu and Tuni cattle of Somalia
- e) The Lugware cattle of the Belgian Congo and Uganda
- f) The Nandi cattle of western Kenya
- g) The Southern Sudan Hill zebu
- h) The Tanganyika shorthorned zebu
- i) The Toposa-Murle cattle of southeastern Sudan

VII. The Africander cattle of southern Africa (Figure 8) have been considered as a distinct group.

VIII. The Madagascar zebu (Figure 9), on account of the geographical isolation of its habitat, has been treated as a separate group.

Photographs of the cattle types, arranged in this order, are reproduced in Figures 2 to 9 to illustrate the broad similarities in conformation between the types within each group.

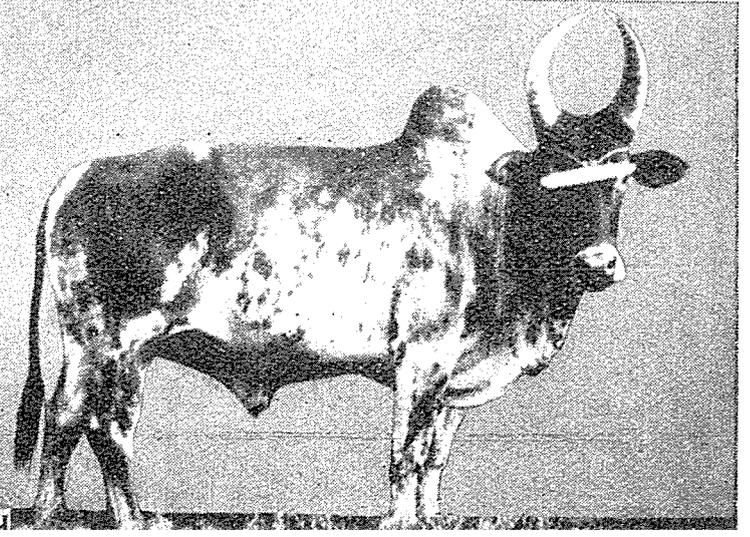
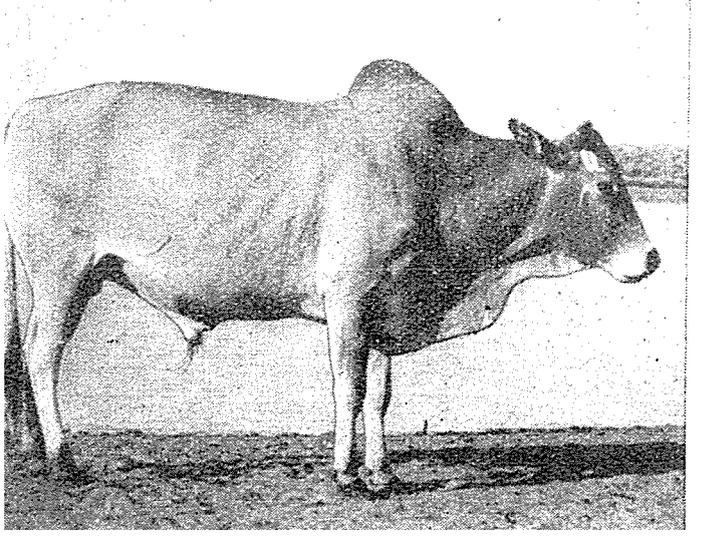
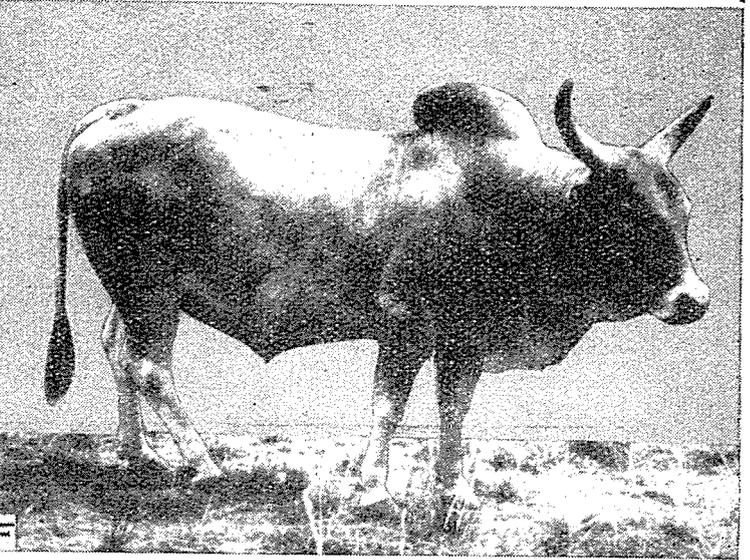
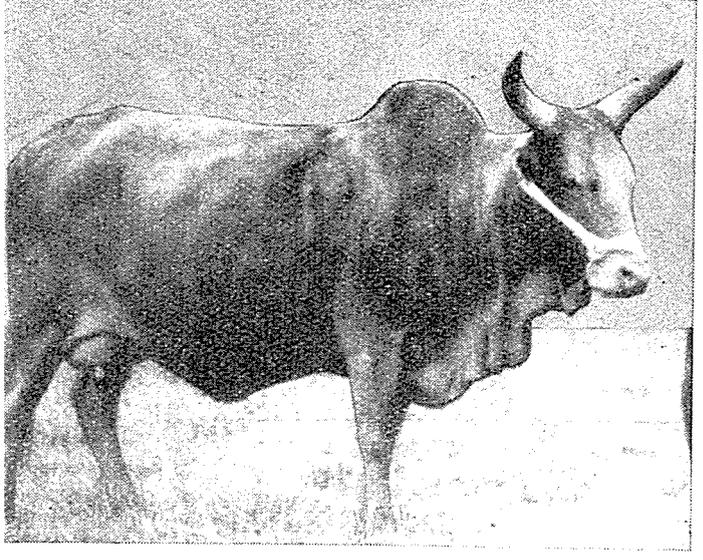
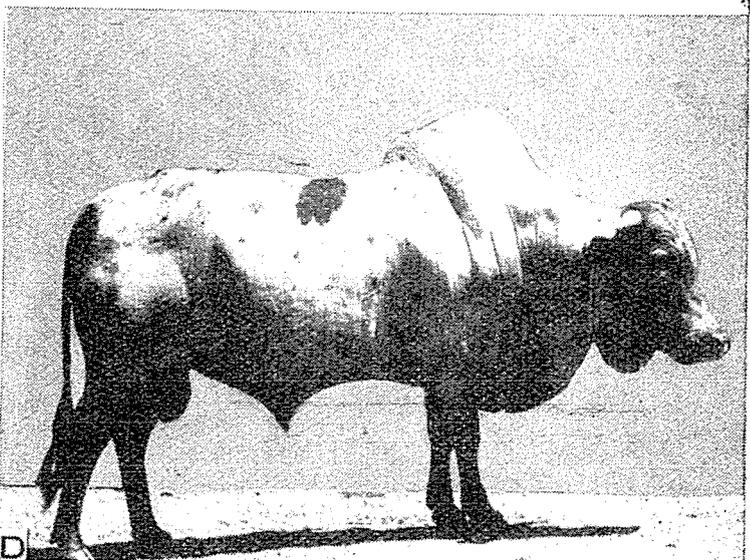
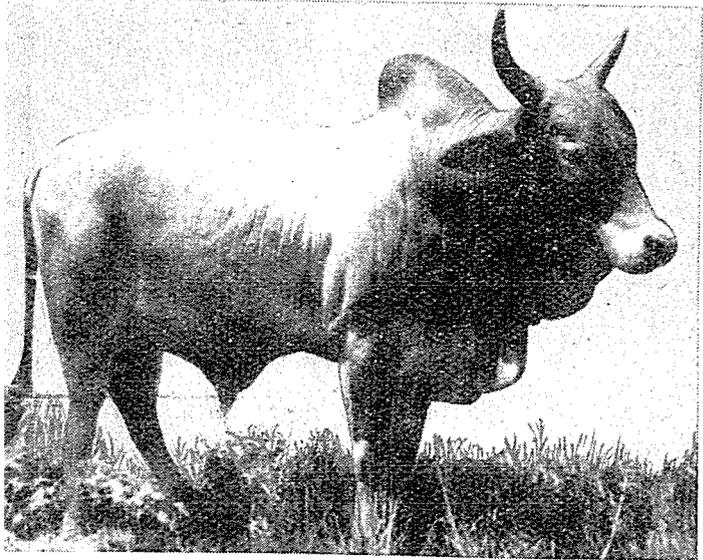
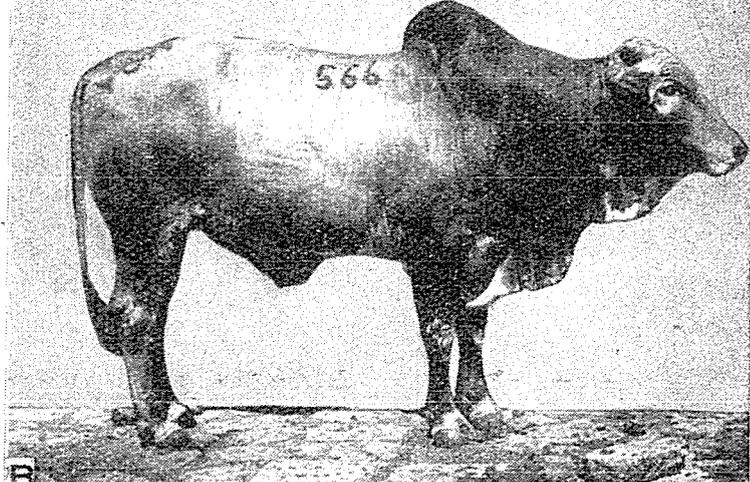
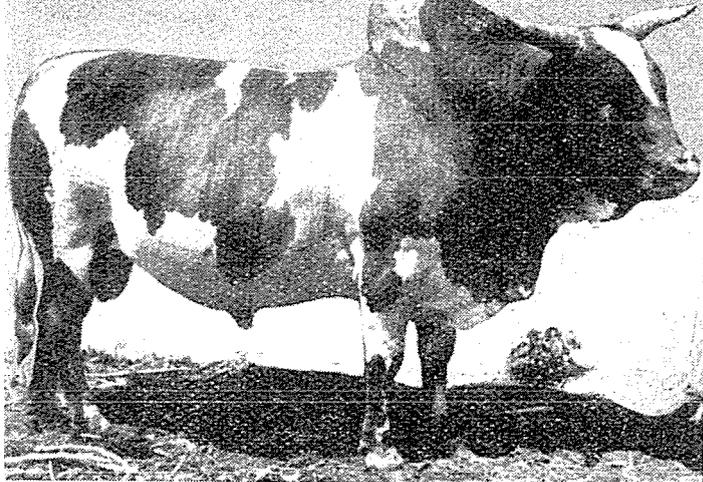
The information on each cattle type or breed has been arranged under the following main headings and subheadings:

Origin; Conditions in the native home of the breed; location, topography and soils; climate; vegetation; management practices; Physical characteristics of the breed; Functional characteristics of the breed; Performance in other areas; Crosses with other breeds of cattle; Sources of breeding stock and information regarding the breed.

Literature referred to in the discussion of each cattle breed or type is listed at the end of the publication.

FIGURE 6. [left] *Cattle in Group V.* (A) *Ankole steer*; (B) *Barotse bull*; (C) *Basuto bull*; (D) *Nguni bull*; (E) *Nilotic bull*; (F) *Nioka bull*; (G) *Nganda bull*; (H) *Tonga bull*.

Courtesy of Congopress: J. G. Black, J. H. R. Bisschop, E. A. McLaughlin and R. Druet



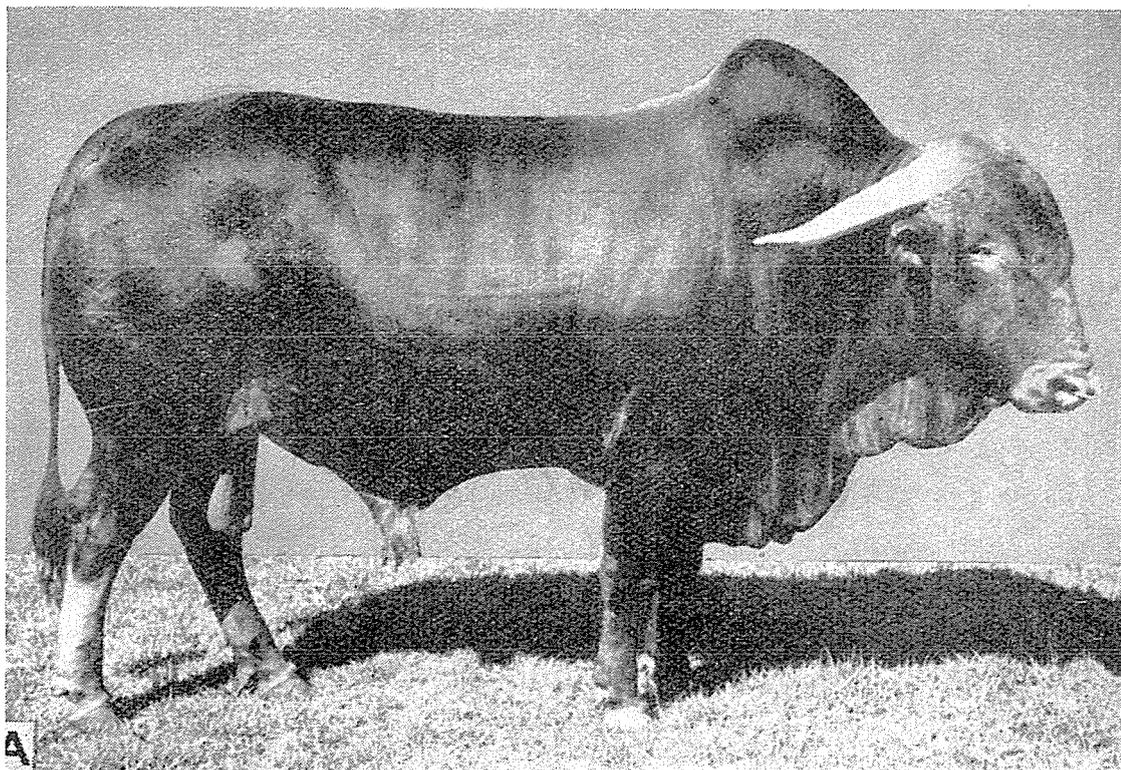


FIGURE 8. *Cattle in Group VII.* (A) *Africander bull*; (B) *Africander cow*.

Courtesy of *Farmer's Weekly*

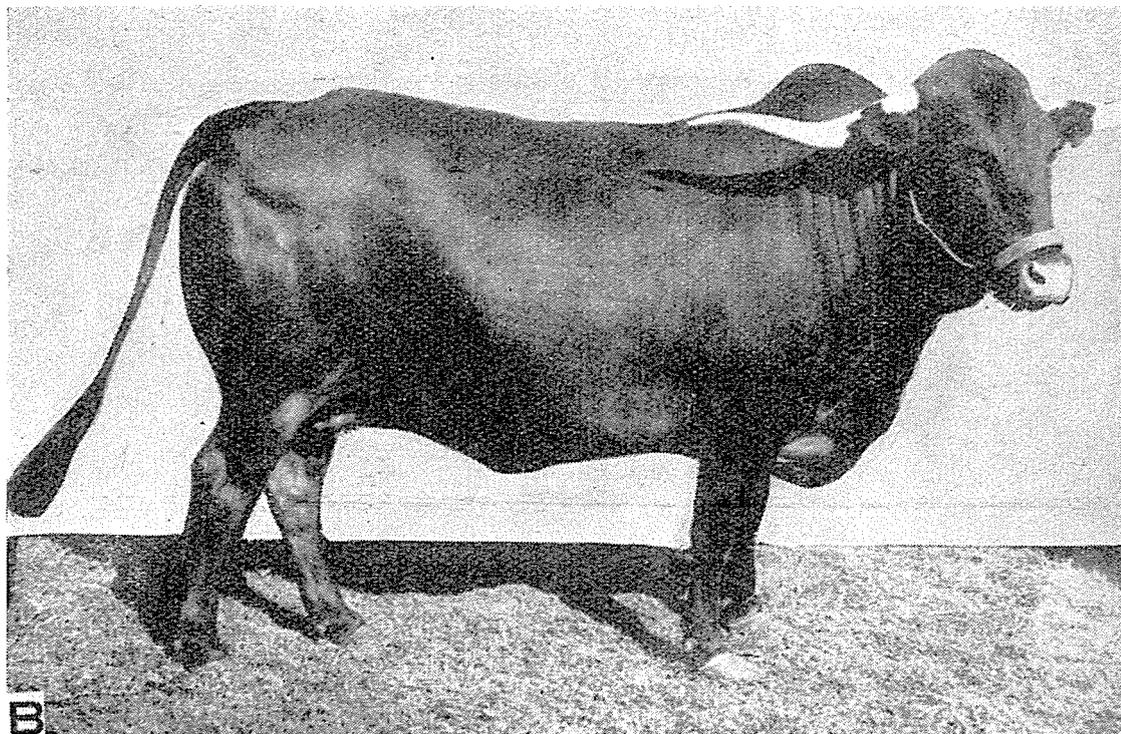


FIGURE 7. [left] *Cattle in Group VI.* (A) *Angoni bull*; (B) *Boran bull*; (C) *Bukedi bull*; (D) *Lugware bull*; (E) *Nandi cow*; (F) *Southern Sudan Hill zebu bull*; (G) *Tanganyika shorthorned zebu steer*; (H) *Toposa-Murle bull*.

Courtesy of J. G. Black, H. G. Hutchison. Director of Veterinary Services, Uganda. Ministère des colonies, Brussels. Ralph W. Phillips and J. D. M. Jack

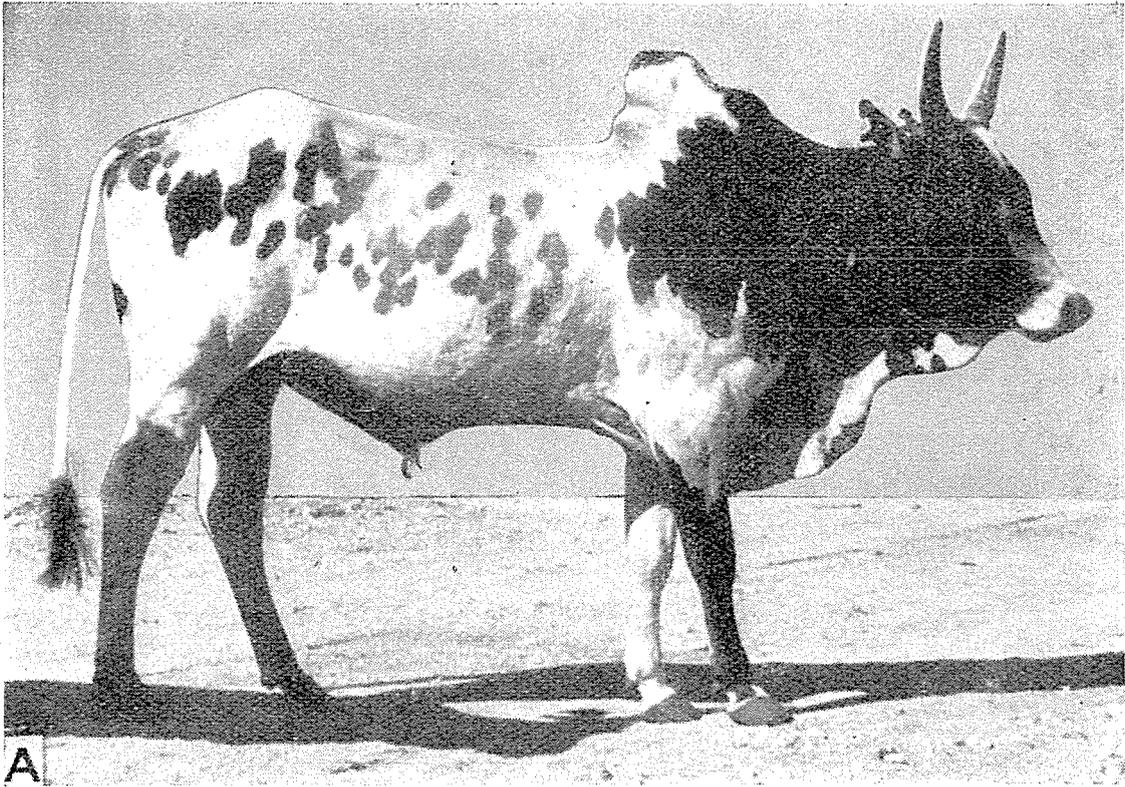
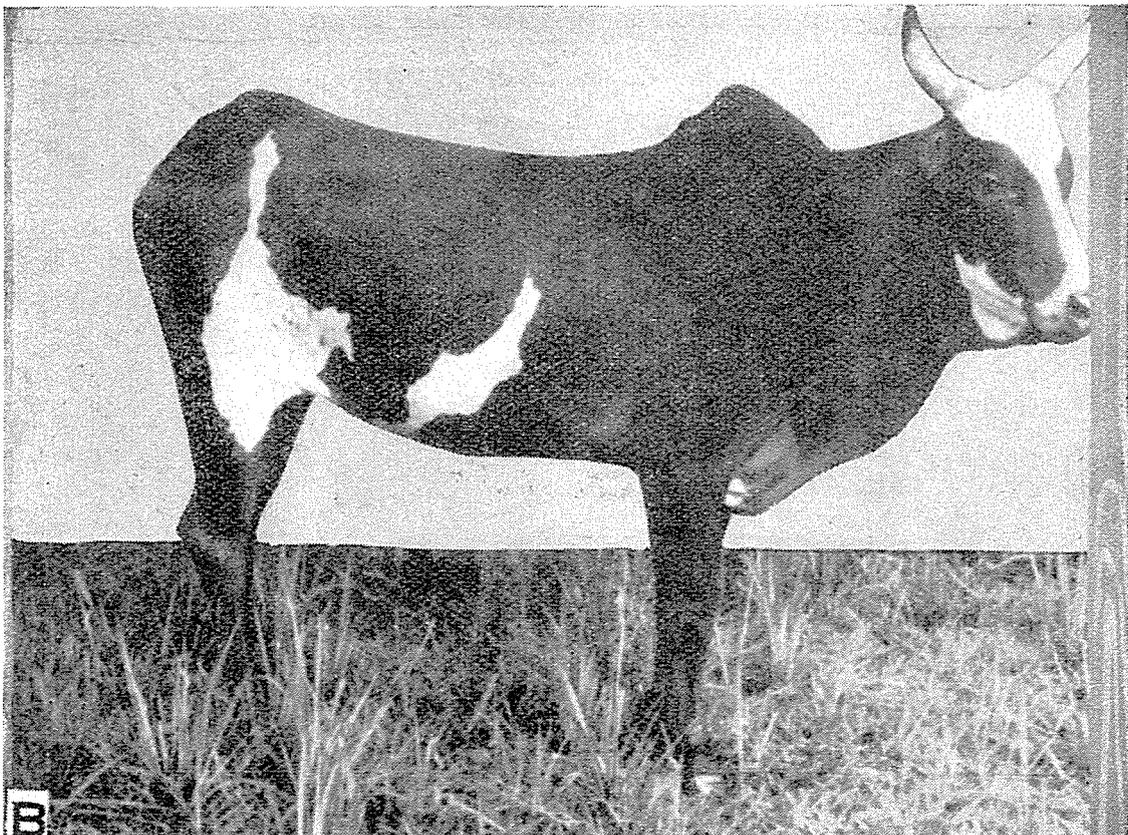


FIGURE 9. *Cattle in Group VIII.* (A) *Madagascar zebu bull*; (B) *Madagascar zebu cow*.

Courtesy of A. Lalanne



## *Group I*

### **EGYPTIAN CATTLE**

#### **Origin**

Various authors (Epstein, 1933; Curson and Epstein, 1934; Curson and Thornton, 1936) who have speculated on the origin of the native Egyptian cattle assume that they are derived from an intermixture of Hamitic cattle, humped cattle from Asia, and shorthorned humpless cattle which have been introduced from Asia and Europe. There appears to be a very close similarity between the cattle populations in different parts of Egypt and for the purposes of this description they have been considered as a single type.

#### **Conditions in the native home of the breed**

##### *Location, topography and soils*

Egypt occupies about 383,000 square miles, of which some 98,000 are desert and 261,000 semi-desert. With the exception of a small number of oases, the only productive land is that which is irrigable from the Nile. The Nile valley south of Cairo is considerably lower than the desert and is bounded by barren cliffs and hills separated from one another by the flat, silt-covered flood plain which is never much more than 12 miles in width and sometimes extends very little beyond the banks of the river.

The eastern desert, which is mountainous and dissected by deep valleys, approaches the river closely down most of the length of the valley, and it is only between Assiut and Luxor that there is any large area of cultivation on the east bank. The western desert is lower, undulating and falls more gently to the valley so that the chief cultivation areas, the larger towns, and the main communications are on the west bank of the river. Water can be found in wells and holes in the valleys of the eastern desert but the western desert is nearly

waterless away from the line of oases which occupy depressions about 100 miles west of the Nile.

At Cairo, the Nile forms two branches which, when they reach the sea 150 miles further north, are 70 miles apart. The alluvial soil of the delta of the Nile between and around these branches provides Egypt with its most fertile land.

The settled and cultivable area covers about 12,000 square miles, or 3 percent of the whole area of the country (Gemmil, 1928; Shantz, 1941; Hurst, 1952).

While the conformation of the indigenous cattle of Egypt appears to be very similar in all parts of the country, those of particular areas are referred to by differing local names. In Lower Egypt there are two local types, the Damietta by the coast, and the Baladi or Baheri inland in the delta; in Upper Egypt in the Nile valley the cattle are of the Saidi type; and the Maryuti or Arabian cattle are in the hands of the nomadic or semi-nomadic tribes outside the irrigated areas (Figure 10) (Curson and Thornton, 1936).

### *Climate*

A narrow strip of the north coast of Egypt has a very arid Mediterranean climate. The winters are mild with a little cloud and rain (mean annual precipitation at Alexandria has been 8 inches, and at Port Said, 3 inches) and the summers are hot and dry.

South of the coastal strip rainfall becomes negligible and, even in the Nile delta, is insufficient for the growth of crops without irrigation. At Cairo the mean annual precipitation is only 1 inch, all of which occurs in winter. This small amount of rain, however, may fall in violent storms, during which hailstones exceeding a pound in weight have fallen.

While winter temperatures at Cairo are lower than on the coast (the January mean has been 54° F.) the summer is considerably hotter. Humidity is low. At Halwan the mean relative humidity, which is 41 percent in May, rises to its maximum of 58 percent in September. When the valley is flooded by the high Nile, however, the weather may be sultry and oppressive.

During the spring, Lower Egypt is subject to an intermittent hot, dry, dust-laden southerly wind, known locally as the *khamisin*, which may continue for two or three days at a time, during which temperatures may rise to 118° F. and the air may be filled with fine dust particles.

Cold northerly winds which occur during the winter lower temperatures until the maximum daily temperature may be little

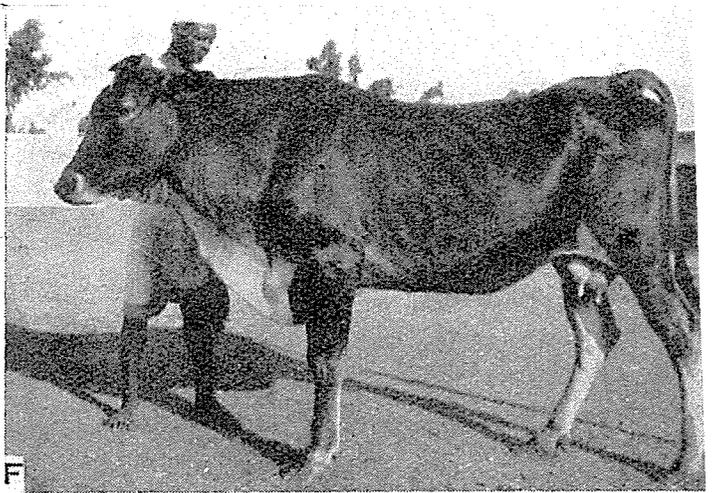
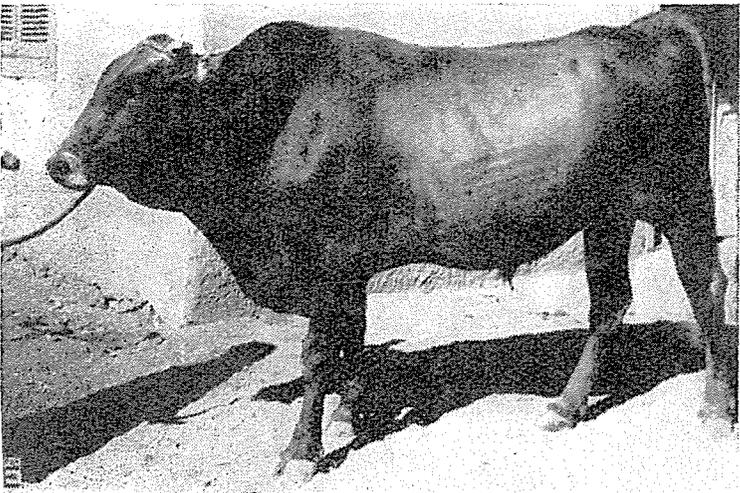
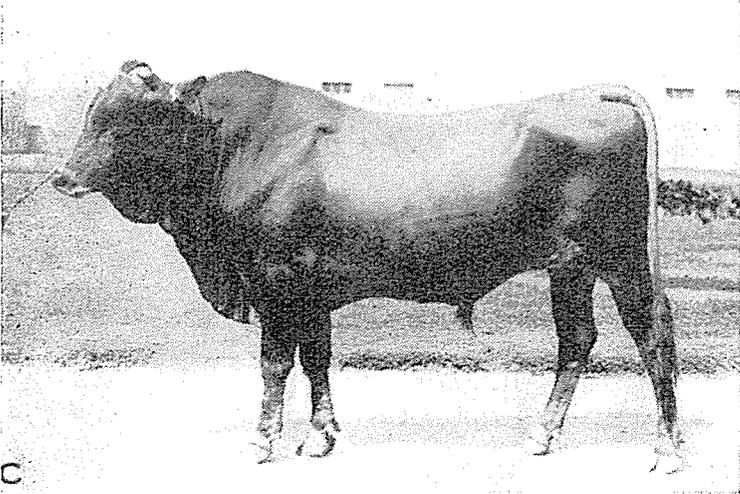
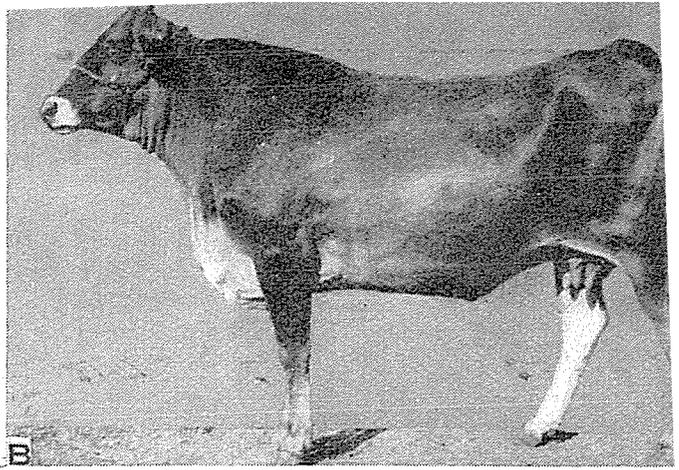
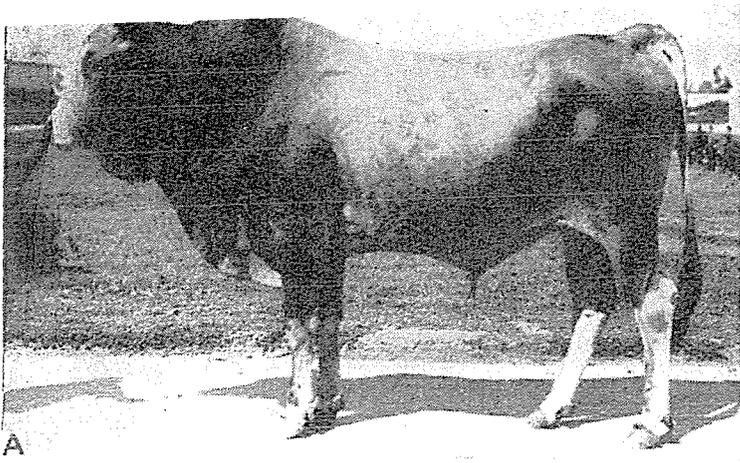


FIGURE 10. *Egyptian cattle.* (A) *Baladi bull*; (B) *Baladi cow*; (C) *Damietta bull*; (D) *Damietta cow*; (E) *Saidi bull*; (F) *Saidi cow*.

Courtesy of Y. Sabet

more than 60° F. The nights are cold and water at ground level may freeze.

Upper Egypt (south of Cairo) has a desert climate. The sky is clear throughout the year. Rain only occurs at very irregular intervals; a violent storm during which 1 or 2 inches of rain may fall in 24 hours following a drought period which may have lasted for as much as 10 or 20 years. Daily and seasonal temperature range is high. Summer maxima in excess of 120° F. have been experienced while, in winter, night frost may occur in the whole area.

Climatological data for three stations in Egypt are presented in Table 1.

TABLE 1. — CLIMATOLOGICAL DATA FOR THREE STATIONS IN EGYPT

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<i>Alexandria</i>													
Mean temperature, °F. ....	56	57	60	64	69	74	77	79	77	73	67	60	68
Mean rainfall, in.	2.0	0.9	0.4	0.1	—	—	—	—	—	0.2	1.3	2.3	7.4
<i>Cairo</i>													
Mean temperature, °F. ....	54	56	61	68	75	80	81	81	77	72	65	57	69
Mean rainfall, in.	0.2	0.2	0.1	0.1	—	—	—	—	—	0.1	0.1	0.2	1.1
<i>Assiut</i>													
Mean temperature, °F. ....	53	56	63	72	80	84	85	84	80	74	65	56	71
Mean rainfall, in.	—	—	—	—	—	—	—	—	—	—	0.1	—	0.2

SOURCE: Kendrew, 1953.

### Vegetation

Away from the oases and the Nile there is insufficient soil water for any but ephemeral or xerophytic vegetation. Much of the area is barren desert only producing short-lived plants after the occasional fall of rain. About 261,000 square miles carry desert shrubs which, in some areas, are close enough together to provide browsing for livestock. In the southeast there is an area of *Acacia*-desert grass which occupies about 14,000 square miles and provides the best grazing land in Egypt.

The irrigated land is intensively farmed and over much of the area two and sometimes three crops a year are taken from the land. During the warmer part of the year the principal crops are cotton

(the most important cash crop), maize, sorghum, sugar cane and rice, while in the winter, wheat, barley, beans and Egyptian clover (*Trifolium alexandrinum*) and other coolweather annual crops are grown. Dates, citrus, vines and a variety of subtropical fruits and vegetables are grown extensively (Shantz, 1941).

### *Management practices*

Although larger estates exist, more than half the agricultural holdings in Egypt are of less than half an acre and the average area is about  $2 \frac{1}{3}$  acres. While the land is carefully and intensively cultivated, methods and implements are primitive, the fass, or hoe, being used for almost all agricultural operations, from digging to ridging up and weeding. A simple wooden plow shod with iron is drawn by oxen or buffaloes. Threshing is carried out by dragging a sled armed with cutting discs, similar to those of a disc-harrow, over the cut wheat or barley and winnowing the broken heads and straw. The straw and chaff is carefully collected for livestock feed.

Cattle are maintained almost exclusively as draft animals, being employed on tillage operations, threshing, and lifting water by means of the *saqiya* or Persian water wheel.

The buffalo is the milch animal of Egypt, except in the vicinity of some of the larger towns of Lower Egypt where herds of imported European cattle are maintained and the Egyptian cow is not usually regarded as a source of milk.

Beef is supplemented by camel meat and some 25,000 camels, many of which are imported from Libya, the Sudan and Arabia, are slaughtered each year.

The few cattle that are kept by the nomadic tribes away from the Nile valley subsist entirely on natural grazing. In the irrigated areas, however, all the land is cultivated and, in the absence of pasture, livestock are maintained on crop residues and Egyptian clover. The clover grows luxuriantly and, during the few months that it occupies the land, is cut four or five times for feeding green to the animals, or for hay. Alternatively, it may be grazed, each animal being tethered to a peg by a rope long enough to permit it to graze an area of clover sufficient for its daily requirements (Hurst, 1952).

### **Physical characteristics of the breed**

Egyptian cattle are medium-sized, long-bodied animals, lean of musculature and lightly boned. The head is of medium length, the face is lean and the profile is straight or very slightly convex. The

orbital arches are slightly accentuated, giving a small degree of concavity to the forehead. The poll is flat and the horns are short and grow from the poll laterally, curving forward so that their inclination is approximately at right angles to the line of the profile. The ears are of moderate size and are carried more or less horizontally.

The neck is of medium length and tends, in the female, to be lean. The dewlap and umbilical fold are small. The crest is accentuated in the bull but it is only in the Saidi subtype that a small cervico-thoracic hump is apparent in the female. The body is long with only moderate depth and the ribs tend to be flat. The topline dips in its central part between the withers and the prominent hook bones and the bottom line rises from front to rear. The rump is of very moderate slope and the accentuated tail setting is often higher than the withers. The tail is of moderate length. The thighs are flat and the limbs are long, lean and lightly boned. The usual coat coloration varies from fawn to red.

The average birthweight of 140 male calves in the herd of the Faculty of Agriculture, University of Cairo, was 27.77 kg. and that of 130 females was 23.93 kg. (Asker and Ragab, 1952).

#### **Functional characteristics of the breed**

Various estimates of the average age of Egyptian heifers at the first calving have been: 33.38 months (Asker and Ragab, 1951), 2.86 years (Asker *et al.*, 1954), and 34.3 months (Ragab *et al.*, 1954).

Bulls in the same herd were very little used for service before they were 3 years of age (Asker and Ragab, 1951). The average calving interval in the herd was 1.15 years and the average productive life of cows covered 3.5 lactations. The average age of cows calving in the herd was 5.73 years (Asker *et al.*, 1954). The average gestation periods in the same herd were 289.8 days (458 calvings) for male calves and 289.2 days (397 calvings) for female calves (Ragab and Asker, 1951).

Asker and Ragab (1951), in an investigation on the generation interval in the University of Cairo herd of Egyptian cattle which embraced the records of 223 male and 238 female cattle, found that the average generation interval was 6.10 years. The intervals between sire-son, sire-daughter, dam-son, and dam-daughter were 6.23, 6.39, 5.74 and 5.85 years respectively.

Asker *et al.* (1955), in a study of the effect of culling in the University of Cairo herd found that the average yield of first lactations was 2,253 lb. (102 records), second lactations, 2,855 lb. (90 records), third lactations 3,150 lb. (71 records), and fourth lactations 3,267 lb. of

milk (49 records). Ragab *et al.* (1953) estimated that the heritability of total milk yield for the first lactations was 0.40.

Asker *et al.* (1952), in an investigation of the effects of exposing Egyptian cattle to sun, found that when tested on three days during which the average air temperature and relative humidity were 99.8° F. and 46 percent respectively, the average heat tolerance coefficient of 9 cattle according to Rhoad's (1944) method was 91.5 percent, the normal body temperature of the animals being 100.53° F. and the average body temperature after being exposed to the sun for two hours, 101.48° F. The average body temperature of the cattle during March when the average air temperature and relative humidity were 61.7° F. and 62 percent, was taken as the normal body temperature for the purpose of the experiment.

### **Sources of breeding stock and information regarding the breed**

A herd of Egyptian cattle is maintained by the Faculty of Agriculture, University of Cairo.

Further information regarding the native Egyptian cattle can be obtained from:

The Director, Animal Breeding Department, Ministry of Agriculture, Cairo, Egypt.

The Dean, Faculty of Agriculture, University of Cairo, Egypt.

## **LIBYAN CATTLE**

### **Origin**

The following account of the cattle type has been compiled from material presented by Faulkner (1956), who refers to the cattle as the Indigenous Libyan Shorthorn.

The Libyan cattle are considered to be derived from shorthorned humpless cattle which are thought to have reached North Africa from Egypt in early historical times.

### **Conditions in the native home of the breed**

#### *Location, topography and soils*

With the exception of a few animals at oases in the Fezzan, cattle are only kept in the more settled areas of the coastal zone, the jebel or low mountain area, and in parts of the semi-arid Jefara plain between the coastal belt and the jebel area.

The coastal zone borders the Libyan coast along its full length and varies in width from the negligible to 18 miles. The coastline is low and is characterized by broken lines of sand dunes, salt water lagoons and salt marshes. The soils are, except in northern Cyrenaica where clays predominate, sandy and of low fertility. The rainfall, augmented by irrigation from shallow wells, is sufficient to support a considerable degree of crop and fruit production.

In Tripolitania, the coastal zone merges into the semi-arid Jefara plain, 14,000 square miles in area, which separates it from the jebel area further inland. Although part of the plain is cultivated by means of irrigation from wells, much of its area can only be used as extensive grazing. The plain lying inland of the coastal strip in Cyrenaica is composed of "white-earth" soils which, with a higher humus content than many of the coastal soils, form the major barley-producing area of the country.

Roughly parallel to the coast, but with a break in its central part so that it forms two blocks extending into Libya from the eastern and western frontiers, is an area of low mountains (jebels) which, however, even in its Cyrenaican section which is higher than that in Tripolitania, does not exceed 762 meters in elevation. The topography is typically that of gently rolling hills and isolated grass-covered plateaus. In Cyrenaica the hills have red and black sedentary soils derived from the underlying limestone.

South of the jebel areas the country is true desert and the rainfall is insufficient to provide grazing for cattle.

### *Climate*

In the northern part of Libya the greater part of the annual rainfall occurs in winter with the heaviest falls in the three coldest months of December, January and February. The dry season extends from May to October and in June, July and August precipitation is negligible. The seasonal and annual variation in rainfall, particularly in Tripolitania, is very considerable and periodic droughts occur which cause severe losses both in crops and livestock. At Sidi Mesri, for instance, there were 736.4 mm. of rain in 1938, while in the preceding year there had only been 167.2 mm. Rainfall in Cyrenaica tends to be both higher and less variable than in Tripolitania. In both provinces the coastal faces of the jebel areas receive the highest rainfall in the territory.

While humidity is generally low throughout Libya, the proximity of the Mediterranean results in higher values being obtained in the coastal zone, particularly near Tripoli and in the northern part of Cyrenaica.

Mean temperatures during much of the year, although modified in the coastal zone by the effect of the Mediterranean and in the jebels by altitude, are generally high throughout Libya. There is, however, a considerable seasonal variation between the hot dry season when air temperatures exceeding 43° C. have been recorded, and the winter when frost may occur for a few days each year. Mean monthly temperatures are in excess of 18° C. in most places for six to eight months each year and, during four to six months, are higher than 21° C.

Very dry, dust-laden southerly winds (*ghibli*) from the Sahara may have a severely desiccating effect on growing plants with a consequent reduction of crop and pasture yields. These winds, which blow intermittently throughout the year, are most frequent in spring.

Climatological data for representative stations in both Tripolitania and Cyrenaica in the coastal, semi-arid and low mountain zones are presented in Table 2.

### *Vegetation*

The coastal zone in Tripolitania and the adjacent parts of the Jefara plain into which it merges are covered with herbaceous vegetation and annual grasses during years of good rainfall. On the plain itself the vegetation includes stunted asphodel and jujube (*Ziziphus lotus*) trees or shrubs. The rainfall is sufficient for the cultivation of olives, almonds and barley; where irrigation water is available, dates, citrus, vegetables, barley and groundnuts are grown.

Between the coastal areas and the jebels, in the semi-arid plain, the perennial vegetation consists of scattered herbs and shrubs including *Caroxylon articulatum*, *Daphne gnidium*, *Chenopodium* spp., *Artemisia herba alba*, *A. campestris*, and asphodel. In years of good rains there is an ephemeral grass cover including *Bromus* spp., *Poa* spp., *Lolium* spp., as well as some legumes such as lotus, *Astragalus* spp. and *Medicago* spp.

The natural vegetation of the northern part of the Cyrenaican plateau is low but relatively dense forest (*macchia*) dominated by the juniper (*Juniperus phoenicia*) and the lentisk (*Pistacia lentiscus*). During the rains annual grasses, including *Bromus* spp., *Phalaris* spp., *Poa* spp. and *Lolium* spp. appear in open spaces. The carob tree grows naturally in northern Cyrenaica. Barley, wheat, olives, almonds and grapes are among the crops grown in this area.

In the jebel areas of Tripolitania the vegetation, as a result of the smaller rainfall, is sparser and of a more reduced habit than in Cyrenaica. The plateaus are generally covered with grassland of similar species to those which are represented in Cyrenaica and hilltops tend to be bare of plant cover. Olives are grown extensively, as well as cereals and figs.

TABLE 2. - CLIMATOLOGICAL DATA FOR SIX STATIONS IN LIBYA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
TRIPOLITANIA													
COAST													
<i>(Misurata)</i>													
Mean maximum temperature, °C.	17.4	18.7	21.6	24.0	26.2	29.6	31.9	33.0	31.1	28.8	24.0	19.2	25.4
Mean minimum temperature, °C.	6.9	7.3	9.9	12.7	15.3	18.5	20.7	21.8	20.8	17.6	13.8	9.0	14.5
Mean temperature, °C. ....	12.1	13.0	15.7	18.3	20.7	24.0	26.3	27.4	25.4	20.7	18.9	14.2	19.7
Mean relative humidity, % .....	67	62	60	56	58	60	59	62	63	61	64	65	61.4
Mean rainfall, mm.	52.6	31.5	13.0	6.6	4.3	1.3	0.0	0.6	11.8	34.0	41.9	49.8	247.4
LOW MOUNTAIN													
<i>(Garian)</i>													
Mean maximum temperature, °C.	12.0	14.1	17.9	22.5	26.9	30.9	32.5	32.8	29.8	25.5	19.4	13.5	23.22
Mean minimum temperature, °C.	4.8	6.2	7.8	11.2	14.7	18.2	20.3	20.8	18.2	15.4	11.4	6.3	12.9
Mean temperature, °C. ....	8.4	10.1	14.8	16.8	20.8	24.5	26.4	26.8	24.0	20.0	15.4	9.9	18.2
Mean relative humidity, % .....	57	54	48	40	36	28	30	31	39	43	53	58	43.1
Mean rainfall, mm.	76.4	52.7	45.4	17.0	9.4	2.2	0.7	0.8	12.6	20.4	41.4	54.1	333.1
SEMI-DESERT													
<i>(Mizda)</i>													
Mean maximum temperature, °C.	16.2	18.9	21.9	28.7	31.3	36.5	38.3	37.4	34.0	28.5	23.5	17.9	27.8
Mean minimum temperature, °C.	4.0	5.2	8.0	12.7	15.6	19.9	21.1	20.7	18.3	14.3	10.4	5.0	12.9
Mean temperature, °C. ....	10.1	12.0	14.9	20.7	23.4	28.1	29.7	29.0	26.1	21.4	16.9	11.9	20.4
Mean relative humidity, % .....	57	52	45	38	34	32	32	34	41	48	54	57	43.7
Mean rainfall, mm	6.9	4.6	9.6	4.0	3.8	1.9	0.0	1.3	6.3	2.7	11.8	9.7	62.6

TABLE 2. - CLIMATOLOGICAL DATA FOR SIX STATION IN LIBYA (continued)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
CYRENAICA COAST													
<i>(Derna)</i>													
Mean maximum temperature, °C.	17.5	18.1	19.7	22.4	23.8	26.5	27.9	28.7	27.9	27.9	23.3	19.5	23.6
Mean minimum temperature, °C	7.7	8.2	9.7	12.3	14.5	18.4	21.4	21.5	20.0	17.1	13.5	8.7	14.4
Mean temperature, °C. ....	12.6	13.1	14.2	17.3	19.1	22.4	24.6	25.1	23.9	22.5	18.4	14.2	19.0
Mean relative humidity, %	74	70	60	52	45	44	50	53	51	55	63	71	57.3
Mean rainfall, mm.	65.3	43.3	28.0	10.4	6.3	0.8	0.1	0.1	2.5	20.8	43.2	62.4	285.2
LOW MOUNTAIN													
<i>(Barce)</i>													
Mean maximum temperature, °C.	15.8	16.6	19.9	24.3	28.3	31.5	31.5	29.9	31.1	28.2	23.4	17.9	24.9
Mean minimum temperature, °C.	5.1	5.5	5.8	7.6	11.7	14.0	15.8	16.0	14.5	12.2	9.8	6.6	10.4
Mean temperature, °C. ....	10.4	11.0	14.8	15.9	20.0	22.7	23.6	22.4	22.8	20.2	16.1	12.2	17.7
Mean relative humidity, % .....	74	70	60	52	45	44	50	53	51	55	63	71	57.3
Mean rainfall, mm.	117.3	86.9	42.2	17.0	6.1	1.2	0.3	0.5	1.9	36.2	56.7	118.5	484.8
SEMI-DESERT													
<i>(Soluch)</i>													
Mean maximum temperature, °C.	17.6	18.1	21.9	26.4	31.0	33.8	34.1	34.0	32.4	29.7	24.3	19.7	26.0
Mean minimum temperature, °C.	5.9	6.8	8.3	11.1	14.7	17.3	18.3	18.4	17.0	14.6	11.3	7.8	12.6
Mean temperature, °C. ....	11.7	12.9	15.1	18.7	22.8	25.5	26.2	26.2	24.7	22.1	17.8	13.7	19.8
Mean relative humidity, % .....	72	69	58	45	43	40	41	45	50	54	59	72	54.0
Mean rainfall, mm.	46.0	36.2	13.4	4.0	2.8	0.4	0.1	0.0	0.6	11.4	23.8	46.8	185.5

SOURCE: Faulkner, 1956.



FIGURE 11. *Libyan heifer about 4 years old (height at withers, 105 cm.) used for plowing on an Arab holding in the irrigated areas of the coastal zone in Tripolitania.*

Courtesy of D. E. Faulkner

### *Management practices*

In the coastal strip and the adjacent parts of the plain the holdings are small, seldom exceeding 7 acres in area. Crops are grown under irrigation, the water for which is drawn from shallow wells, usually from 5.5 to 7.5 meters deep, by animal power partly, and in Tripolitania almost entirely, provided by cattle which are also utilized as draft animals for plowing the land (Figure 11).

While sedentary agriculture is well developed in the coastal areas of Tripolitania, a large proportion of the population in the corresponding parts of Cyrenaica remain nomadic or semi-nomadic, possibly owning a few date palms near the coast, growing their barley on the plains and jebels during the rains, and seasonally moving their livestock in search of grazing and water.

Cattle are not kept in large numbers. A cultivator seldom maintains more than one or two head of cattle and the semi-nomad, except in parts of Cyrenaica, has only comparatively small herds, the greater part of his wealth being in his very considerable flocks of sheep.

While cattle are given precedence over the other classes of livestock for the limited supplies of water, the practice of hobbling the animals to prevent their straying and of leaving them in the charge of small girls near the homestead or tent, tends to result in the intake of grazing being restricted to below that required for the proper development and maintenance of the animals. Faulkner (1956) observes that

phosphate/calcium imbalance, phosphate deficiency and vitamin A deficiency are undoubtedly present as a result both of the soil status and the very low plane of nutrition during most of the year (Figure 12).

Where the cultivated holdings are scattered the cattle are maintained on natural grazing in their vicinity, but where little land remains uncultivated it becomes necessary to devote a proportion of the irrigation water to the production of stock feed.

Although their milk and meat is utilized, draft is the prime purpose for which cattle are kept in the cultivated areas. On the *jebel* areas in Cyrenaica are found the only large herds of cattle, which are the foundation of an export trade to Malta and elsewhere.

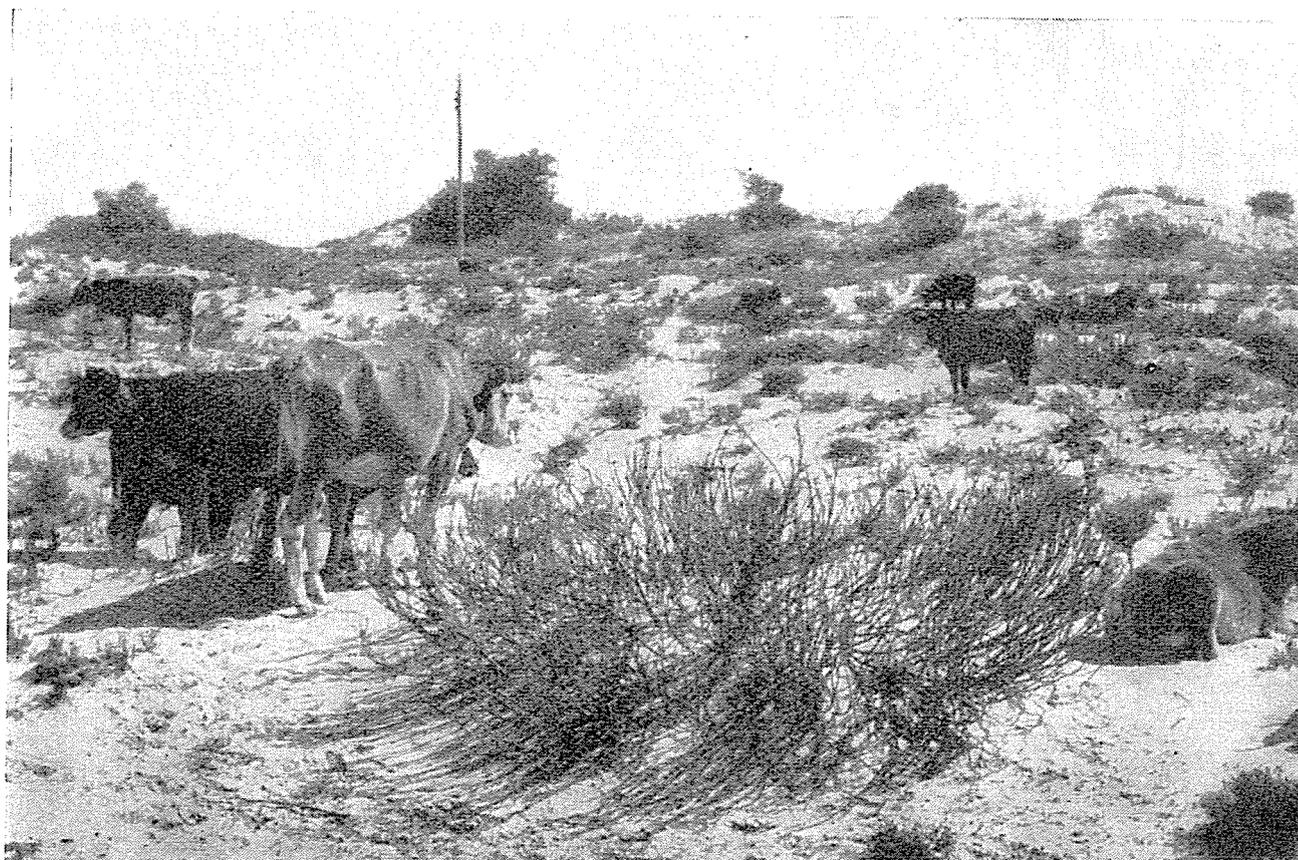
In 1954 a total of 3,022 head of cattle were exported from Libya, 2,877 of which were received by Malta, the remainder going to Egypt (120) and Italy (25). In the period 1950-51, 11,404 head of cattle (including calves) were slaughtered at the main population centers in Libya.

#### **Physical characteristics of the breed**

The Libyan shorthorned cattle are small, humpless, lightly built animals (Figures 13 and 14). The head is of moderate length with its greatest width at the level of the eyes, a wide muzzle and a straight to slightly concave profile. The forehead is flat or slightly concave.

FIGURE 12. *Libyan cattle grazing in desert scrub.*

Courtesy of D. E. Faulkner



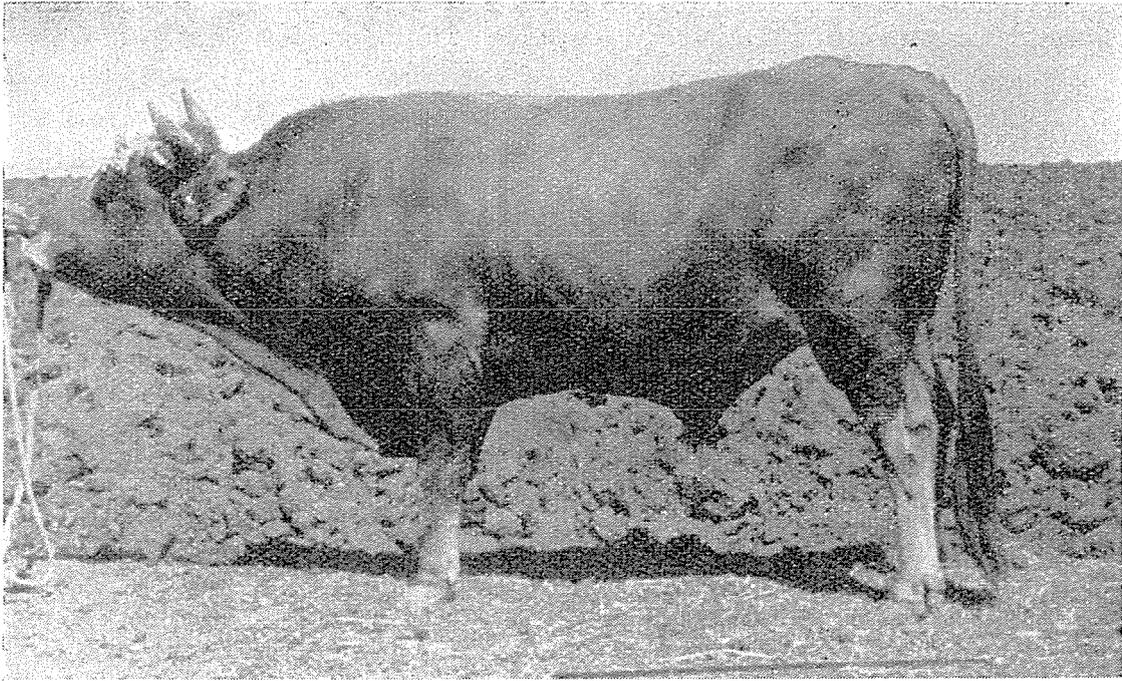
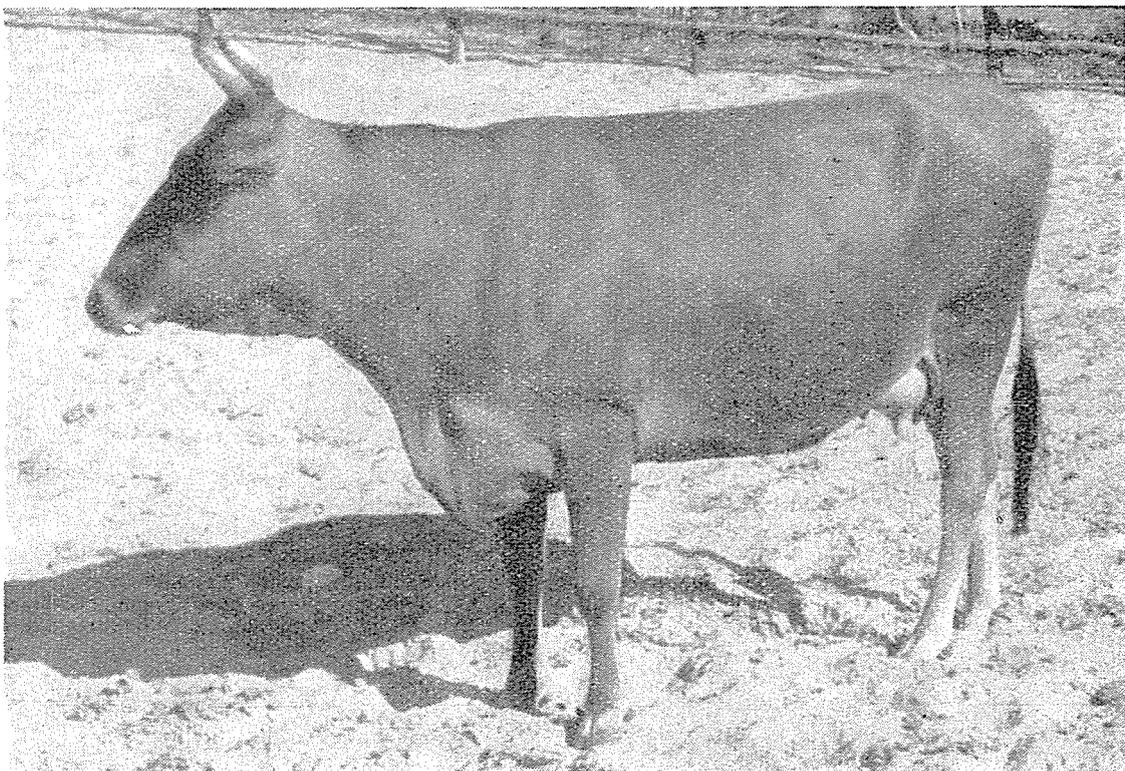


FIGURE 13. *A Libyan bull at the Mazzotti Experimental Station near Barche in Cyrenaica.*

FIGURE 14. *Libyan cow (height at withers, 118 cm.) under good nutritional conditions at the Sidi Mesri Experimental Station.*

Courtesy of D. E. Faulkner



The ears are short and rounded and are carried horizontally. The horns are thin and about 10 to 26 cm. in length, circular in cross section and ending in blunt tips. The usual horn color is cream but the tip is invariably black. The poll is usually covered by a quantity of fairly long hair.

The neck is short and well attached to the shoulders and brisket. The shoulders are compact but the withers tend to be high. Although the ribs tend to be flat the abdomen is usually of good capacity. The body is long and somewhat lacking in depth. The topline often shows a slight depression over the middle. The rump is long and lean, somewhat narrow, and tends to slope downwards from the prominent hook bones to the narrow pinbones. The tail setting is prominent and is often higher than the withers. The tail is slender with a well-marked colored switch which reaches well below the hocks.

The dewlap, for a non-zebu, is well developed in a considerable proportion of these cattle. It is thin and sometimes ends in two separate folds between and behind the front limbs. The umbilical fold and sheath are also well developed for non-zebus.

The thighs are narrow and poorly fleshed. The limbs are fairly well placed, of moderate length, and are very fine and light of bone. Many animals show a tendency to sickle hocks. The hoofs are relatively large and, though well formed, are often overgrown.

The udder is small but well shaped with small well-placed teats, and is strongly attached.

The skin is thin and pliable and is of black, light brown or red pigmentation. The muzzle is usually black. The hair is fine but there is a seasonal variation between the rough, harsh winter coat and the normal coat which is seen in summer. The most common coat colors are whole fawn, red or black. Red or fawn animals, especially bulls, often have some degree of black on the head, hindquarters and legs. Black is particularly common around the eyes, on the head and ears, and on the lower parts of the legs. A pale hair ring around the muzzle and a pale stripe down the back of a dark-colored animal are frequently seen; white patches sometimes occur on the abdomen and udder.

The average birthweights of male and female calves at the Sidi Mesri Experimental Station were 18 and 15 kg. respectively. The average liveweight of mature males at the same station was 400 kg. and that of mature females, 325 kg. The average liveweight of mature cattle brought to the Tripoli abattoir for slaughter was 280 kg. while the largest animals weighed about 300 kg. Other estimates of average liveweights also given by Faulkner (1956) are: cows, 270 kg., 290 kg.; bulls, 380 kg., up to 450 kg.

The average height at withers of 14 mature cows at Tripoli market was 111.0 cm. with a range of 103.0 to 117.0 cm. At Soko Juma market near Tripoli a further 14 mature cows had an average height at withers of 110.9 cm. with a range of 105.5 to 117.0 cm.

A mature bull which was measured at Sidi Mesri Experimental Station measured 127.0 cm. height at withers, 152 cm. length from shoulder point to pinbone, and 193.0 cm. heart girth. Five mature cows were measured at the same station. Their average measurements were: height at withers 114.0 cm., length from shoulder point to pinbone 134.5 cm., and heart girth 165.4 cm.

### **Functional characteristics of the breed**

No information has been received as to the age at which cows calve for the first time. It has been reported that, although no general life statistics are available, there is local agreement that even under poor conditions they calve regularly at yearly intervals.

The mean lactation yield and duration, derived from 31 records made by cows in the herd of the Sidi Mesri Experimental Station, was 2,829 lb. of milk in 305.0 days. The maximum daily yield was 24.2 lb. In Cyrenaica it was reported that it was common for cows to give about 9 lb. of milk daily for approximately four months. Analyses of 147 milk samples at Sidi Mesri gave an average butterfat content of 3.2 percent.

Faulkner (1956) observes that, given reasonable feeding conditions, the Libyan cattle appear to fatten easily, killing out at 45 to 55 percent and yielding meat of reasonably good quality. The fat is, however, poorly distributed, being put on subcutaneously and around the kidneys.

The cattle are docile and easily trained for draft work.

None of the severe epizootic diseases appear to occur in Libya and ticks are rare under the prevailing environmental conditions. Faulkner (1956), however, mentions that cases of piroplasmiasis and trypanosomiasis are occasionally reported. Tuberculosis, which is common among imported breeds, is of rare occurrence in the indigenous cattle. Anthrax and rabies occur throughout the country, while quarter-evils appear to be confined to Cyrenaica. The incidence of cysticercosis, strongylosis and echinococcus is high. Ringworm and paratyphoid are commonly diagnosed in calves.

## Sources of breeding stock and information regarding the breed

Faulkner (1956) reports that the total number of cattle in Libya is 63,000. The indigenous Libyan cattle could be expected to form the largest group contributing to this total.

Further information on the Libyan cattle can be obtained from the Director-General of the Ministry of National Economy, Tripoli.

## BROWN ATLAS

### Origin

For the purpose of this descriptive account the term "Brown Atlas" has been understood to embrace the indigenous cattle types of Tunisia, Algeria and Morocco.

It appears probable that the Brown Atlas cattle are derived from types which have been established in the area from very ancient times. *Bos primogenius mauritanicus*, which was discovered by Thomas in North African quaternary deposits, is thought to be the main ancestral stock (Dechambre, 1922).

Bas-reliefs, dating from the Roman occupation of the area, show heads of cattle which appear to be essentially similar to the Brown Atlas of the present day and it would seem reasonable to assume that there has been little modification in the conformation of the indigenous cattle during historic times.

More recently, however, French settlers, in an attempt to increase the productive ability of their herds, have introduced exotic stocks, including most of the French breeds, which have been so freely crossed with the indigenous cattle that Brown Atlas cattle which show no signs of any such admixture have now become rare, at least in Algeria.

An attempt was made toward the close of the nineteenth century to form an organization for the preservation and improvement of the local cattle in Algeria. Little interest was, however, aroused and the movement did not receive sufficient support to permit its continuance. No further steps were taken in Algeria until 1942 when an experimental breeding station was initiated at Kroubs near Constantine which included prominently in its program the preservation of the Brown Atlas and an investigation into its productive potentialities. The herd at this station, which included in 1951, 3 bulls, 20 cows, and young stock, is one of the few surviving groups of purebred Brown Atlas cattle in Algeria (Jore d'Arces, M. P., *Personal Communication*).

## Conditions in the native home of the breed

### *Location, topography and soils*

Brown Atlas cattle are distributed along the Atlas complex of mountain ranges in Tunisia, Algeria and Morocco. The elevation of the mountains and plateaus varies from 900 meters to 4,000 meters.

### *Climate*

The climate of those parts of Morocco and Algeria in which cattle can be maintained is of the Mediterranean type with a winter rainfall and a hot dry summer. The summer climate on the Atlantic coast of Morocco is, however, modified by the cool Canaries current, so that July temperatures are commonly below 70° F. and the high humidity and fairly frequent fog and low clouds relieve the drought which affects the remainder of the area. In winter the westerlies bring rain. In January mean temperature on the coast is about 18° F. lower, and inland 30° F. lower than in July. Snow and frost occasionally occur in the north, the seaward slopes of the Atlas mountains being snow-covered for most of the year.

East of the Straits of Gibraltar higher temperatures are experienced in summer, the mean temperature on the Algerian coast in the hottest month, August, being about 75° F. About 80 percent of the annual rainfall occurs in the winter-half of the year. In January the mean temperature is between 50° and 55° F. and frost is rare. While the whole of the area receives more than 20 inches of rainfall, there is considerable variation from year to year, the recorded extremes at Algiers having been 16 and 51 inches in a year.

The plateau of the Shotts has, both as a result of altitude and continentality, and the effect of the Atlas ranges between it and the sea, a steppe climate. Dry north winds bring severe cold in the winter with temperatures considerably below freezing point and violent snow-storms occur. Géryville has an average of 84 days with frost in the year. Day temperatures are as high as, or higher than, those occurring at sea level, but the nights are cool, the diurnal range reaching 30° F. Géryville, with a recorded winter minimum temperature of 9° F. has, in summer, reached 108° F. Rainfall is from 10 to 20 inches a year with the maximum in spring. Heavy thunderstorms occur in spring and autumn.

Rainfall is heavier in the Saharan Atlas than on the plateau. The range forms a sharp climatic divide between the land to the north with

a rainfall sufficient for plant growth and the barren Sahara to the south (Kendrew, 1953).

Climatological data for four stations in the area are presented in Table 3.

TABLE 3. — CLIMATOLOGICAL DATA FOR FOUR STATIONS IN THE BROWN ATLAS AREA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<i>Casablanca</i>													
Mean temperature, °F. ....	53	54	57	59	62	68	71	73	71	67	60	56	63
Mean rainfall, in.	1.5	1.8	2.3	1.5	0.7	0.4	0.1	0.1	0.1	1.1	4.0	2.9	16.3
<i>Marrakech</i>													
Mean temperature, °F. ....	53	55	60	65	69	75	83	85	77	71	59	55	67
Mean rainfall, in.	0.8	1.0	1.7	0.9	0.6	0.3	0.1	0.1	0.4	0.7	1.7	0.7	8.9
<i>Algiers</i>													
Mean temperature, °F. ....	53	54	57	60	65	71	75	77	74	68	60	55	64
Mean rainfall, in.	4.6	3.6	2.9	1.6	1.6	0.6	0.1	0.2	1.7	2.8	5.0	5.1	29.8
<i>Géryville</i>													
Mean temperature, °F. ....	39	42	46	52	60	70	78	77	68	56	46	40	56
Mean rainfall, in.	0.9	1.2	2.4	1.7	2.2	0.7	0.2	0.5	1.2	1.5	1.3	1.5	15.3

SOURCE: Kendrew, 1953.

### Vegetation

The vegetation of the Brown Atlas area includes both temperate and tropical species. Different species of palm (including the date palm) occur with the jujube, juniper, tamerisk, oleander, poplar, willow, alder, *Euphorbia* spp., and, on the Moroccan Atlas, cork oak covering very extensive areas.

Among the grasses represented in the area are *Dactylis glomerata* L., *Bromus* spp., *Agrostis* spp., *Agropyrum repens* Beauv., *Cynodon* spp., *Holcus lanatus* L., *Anthoxanthum odoratum* L., *Poa palustris* L., *P. sinaica* Steud. and *Festuca altissima* All. in association with *Carex* spp.

Legumes are numerous and include species of *Trifolium* and *Medicago*, as well as *Lotus* spp., *Vicia* spp., *Lathyrus* spp. and *Melilotus* spp.

Napier grass, Kikuyu grass and *Chloris gayana* have been introduced into Algeria and Morocco from further south in Africa and have been found to be successful in this environment (Duraud, 1942).

### *Management practices*

The management of cattle in Algeria and Morocco is very largely determined by, first, the natural environment, and in particular the summer dry season, and secondly, the social organization and system of land tenure.

Land is held in Morocco under three different types of tenure: *biens Maghzen* lands, the administration of which is guaranteed by the state; *biens habous*, inalienable lands owned by religious foundations; and collective tribal land, inalienable and untaxed, over 3 millions of hectares of which, or a third of the agricultural land of Morocco, have been registered.

Individual holdings are very often reserved for cultivation, while the farmers' cattle are placed in the charge of a herdsman who is responsible for finding adequate pasture for the herd and who may, in Morocco, receive as payment for his services either a proportion of the value of the increase in the liveweight of the cattle in his charge, which may be fixed at a half, third, quarter or fifth, or a proportion of the calf crop, with which he may start a slaughter or breeding herd of his own.

Breeding is arranged so that the calves are dropped between early September and late January when the cows, on green rains grazing, are able to provide an abundance of milk.

Forage is not generally preserved and there may be heavy losses if the supply of natural pasture is interrupted. In 1928, for instance, when the Gharb area in Morocco was flooded, it was estimated that 30 percent of the cattle died, and in 1930 there was severe mortality when the pastures were heavily damaged by locusts.

Improved management practices, including grazing control, forage preservation as hay or silage and the use of crop residues for cattle feed, are practiced on the holdings of European colonists and by the more advanced indigenous stock owners (Duraud, 1942).

The Kabyle tribesmen in Algeria pay some attention to the protection of their cattle during the winter, although the shelter may be only a stone wall, a jujube hedge or a roofed but wall-less building within which the animals are confined during the night on the bare earth without litter. Some straw and carob nuts are fed to the cattle in addition to grazing.

The calf is separated from the dam during the first month and is only allowed to suckle twice daily, before milking, to stimulate milk

ejection and, at its conclusion, to withdraw the strippings. Weaning at 6 months causes the calves to lose condition but, if the pasture is good, they quickly recover. Working oxen are castrated at 2 years of age.

The cattle are used for draft purposes, sometimes, for heavy work, being harnessed in mixed teams with mules.

### **Physical characteristics of the breed**

The Brown Atlas (Figures 15 and 16) is a sturdy, fairly compact animal reaching a greater development in Morocco than in the territories to the east. The head is short and broad with a straight to slightly concave profile and, as a result of the faint prominence of the orbital arches, a rather concave forehead. The horns are short, growing laterally from the poll, then turning forwards and upwards. The inclination of the horns is approximately at right angles to the line of the profile.

The neck is short and there is little development of the dewlap. The ribs are well rounded and the chest is deep. The topline is straight or has a slight dip in the center part. The rump is of medium length, tends to be light and slopes only slightly from front to rear. The sacrum is, in some individuals, slightly accentuated, giving the appearance of a downward break or step in the topline in front of the low tail setting. The tail is thick at the base and tapers to a full switch, falling well below the hocks. The limbs are fine and the hoofs are hard and close textured.

The hairy coat is short and close. The coat coloration of the cattle in the eastern part of Algeria from Tunis to Djurdjura is a light gray which, especially in bulls, shades into darker areas covering, to a greater or lesser extent, the head, shoulders, limbs, hindquarters and underline. In the remainder of the area, while the dark shading remains, the gray is replaced by fawn. There is often an area of light-colored hair surrounding the muzzle, which varies from slate-gray to black in color. The horns are white or grayish at the base with black tips, and the hoofs are slate-gray or black. The switch is black. The skin is thick, and of dark pigmentation.

In Morocco there are two varieties, distinguishable only by their coloration. One, found in the Atlas and continuous with the cattle of western Algeria, has a dark fawn hairy coat, light along the topline and with a white ring around the muzzle, but shading toward black on the head, limbs and switch, and with a black muzzle, tongue, mucous membranes and hoofs. The other, the *Race blonde des Zaers*, occurs in western Morocco, between the Atlas and the sea, and has an over-all

light coat coloration with pale muzzle, mucous membranes and hoofs. A pied type, intermediate between the preceding two, is found in the Fez-Meknès area (Duraud, 1942).

The height at withers varies from 1.15 to 1.25 meters with a depth of chest of 75-85 cm. in Algeria, to 1.18 to 1.30 meters in Morocco. The average birthweight of calves at the Station expérimentale d'élevage at Kroubs has been 20 kg. with a range of 14 to 27 kg. The liveweights of males and females at one year of age were about 60 kg. and 50 kg. respectively. At maturity, which is reached at about 7 years of age, males weigh between 250 and 420 kg. and females about 200 kg. (Jore d'Arces, M. P., *Personal Communication*).

### **Functional characteristics of the breed**

Heifers calve for the first time at between 22 and 24 months. Young bulls are allowed to serve the cows and heifers as soon as they reach sexual maturity at about 10 or 12 months. The bulls are generally quick to service.

At the time of writing no detailed records of milk and butterfat yields were available. Jore d'Arces (*Personal Communication*) suggests that the better cows in Algeria give about 8 liters of milk a day during the two months following calving, after which the yield falls rapidly

FIGURE 15. *Brown Atlas bull, Algeria.*

Courtesy of M. P. Jore d'Arces



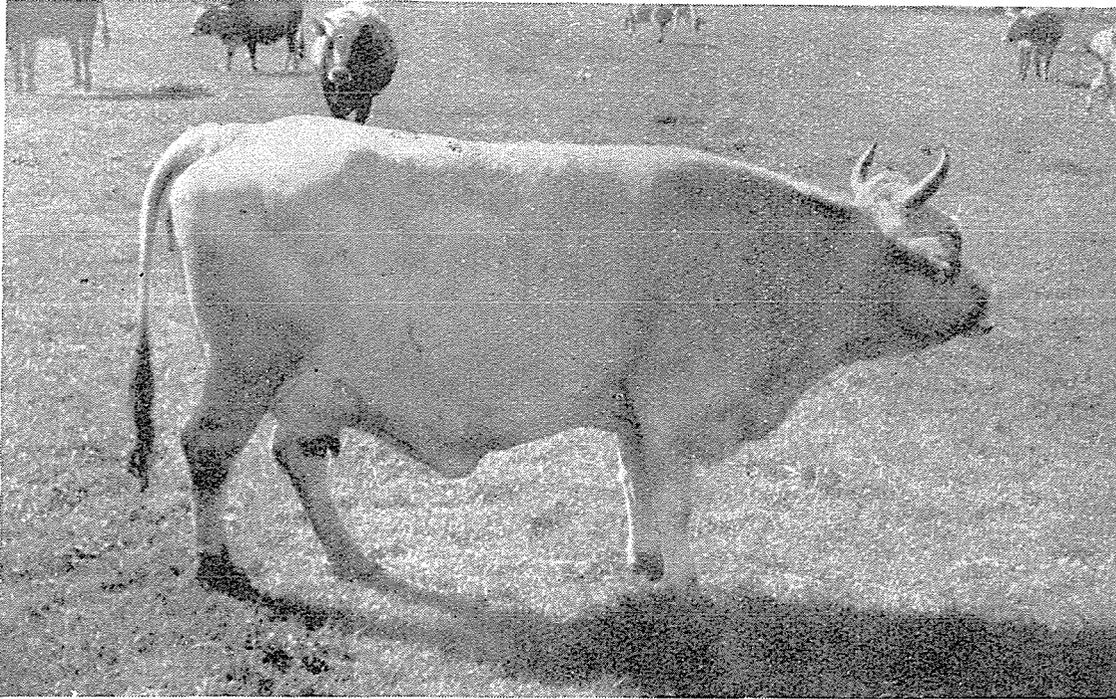


FIGURE 16. *Brown Atlas cow, Algeria.*

Courtesy of M. P. Jore d'Arces

until the lactation is terminated after 5 or 6 months, while Duraud (1942) is of the opinion that Moroccan cows give 8 to 12 liters a day when the pastures are at their best. The butterfat content of the milk (over 40 grams to the liter) is high. Records which are being kept at the Station d'élevage at Kroubs suggest that it is unlikely that Brown Atlas cows will equal the yields of Tarantais females at the station which have given 5,000 kg. of milk in 300 days.

Brown Atlas steers fatten well on grazing. Normally, on natural pastures, the cattle are fat from March to August, after which they deteriorate in condition until, in January and February, they have lost about 20 percent of their former liveweight. If the cattle are killed when in peak condition they yield between 45 and 49 percent of useful meat. The liveweight of steers between 2 and 5 years of age which are fat off grass is between 200 and 300 kg., while that of mature animals retired from the herds at 12 or 14 years of age is between 200 and 400 kg. (Jore d'Arces, M.P., *Personal Communication*). Diffloth (1922) refers to steers weighing 500 to 600 kg. and killing out at 50 to 55 percent. Duraud (1942) gives 50 to 55 as the killing out percentage of Brown Atlas cattle in Morocco.

The cattle make docile, active and steady draft animals, with a walking pace covering between 2.4 and 2.8 km. an hour.

While the Brown Atlas is resistant to many of the diseases and parasites to which imported European cattle are susceptible, it is subject to a number of epizootic and enzootic diseases occurring in Mediterranean countries, notably piroplasmiasis and anthrax.

#### **Sources of breeding stock and information regarding the breed**

The only source of breeding stock and information on the Brown Atlas in Algeria is the Station expérimentale d'élevage at Kroubs (Constantine).

Information on the cattle of Morocco can be obtained from the Direction de la production agricole, Sous-Direction du Service vétérinaire, Ministère de l'agriculture, Rabat.

## *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	283.7	261.8	233.1	153.7	17.7	4.3	16.32
BAMENDA													
Mean temperature, °F. ....	70	71	72	71	70	68	65	65	57	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*.

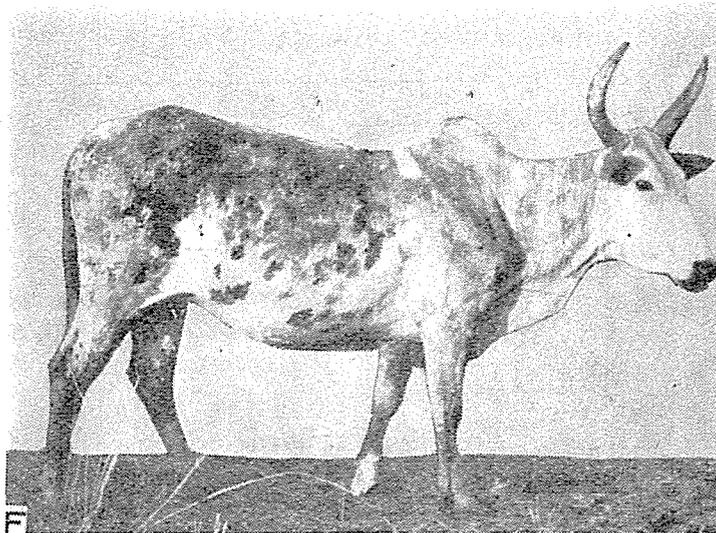
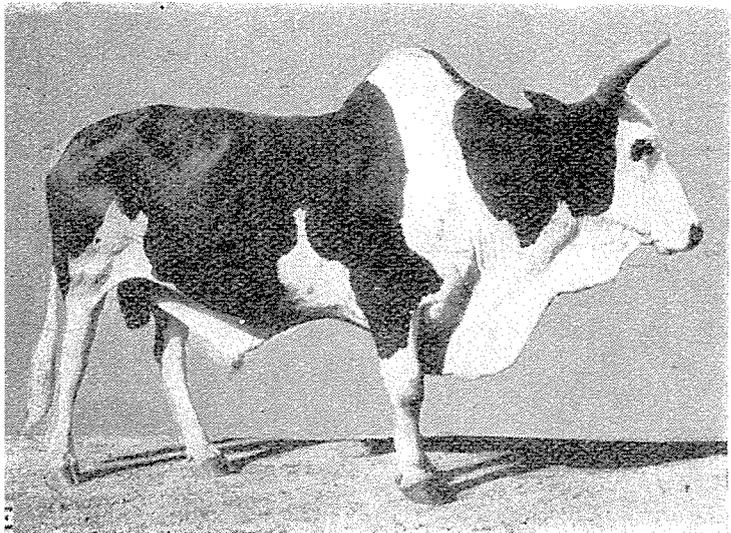
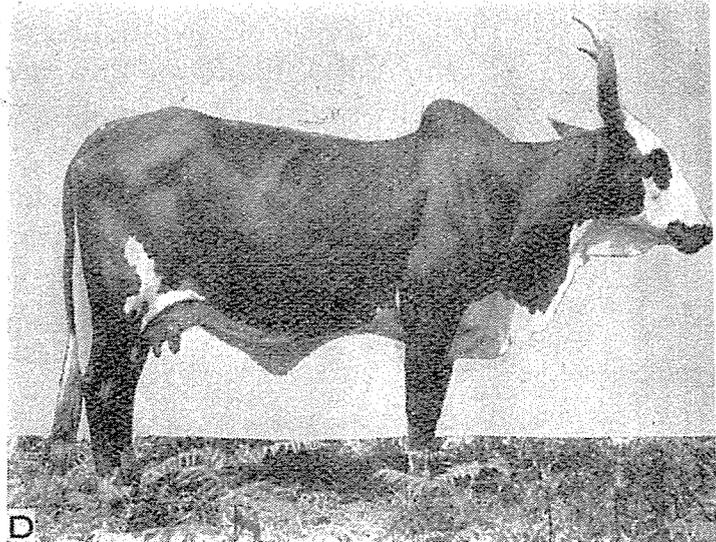
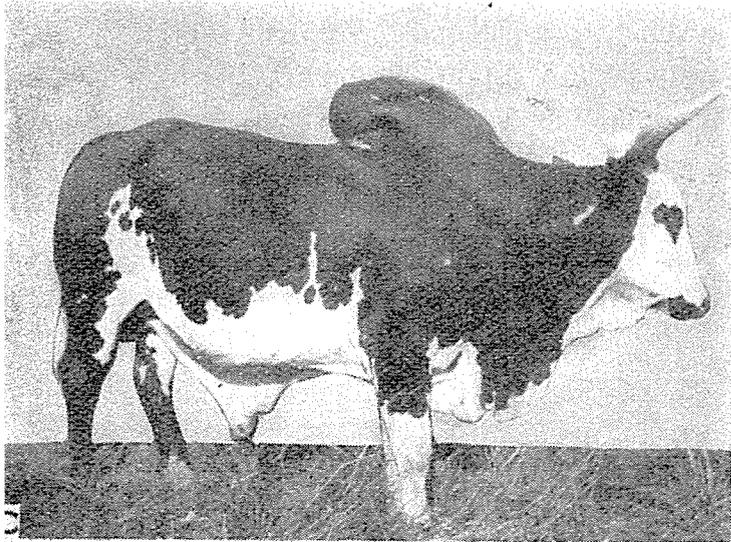
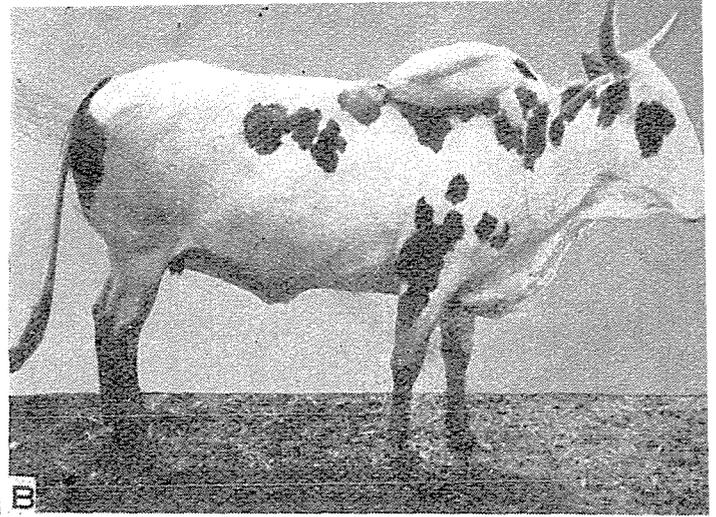
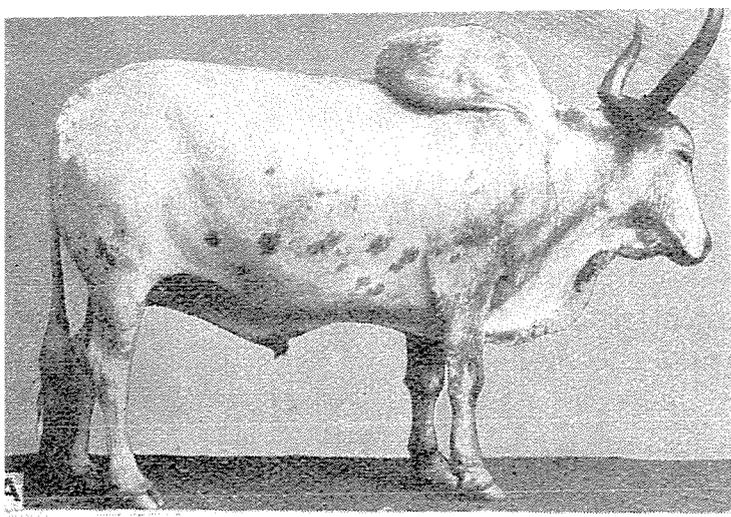


FIGURE 17. *Adamawa cattle*. (A) *Ngaundere steer*; (B) *Ngaundere cow*; (C) *Banyo bull*; (D) *Banyo cow*; (E) *Yola bull*; (F) *Yola cow*.

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 *Tattabareji*.

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
<i>Sokoto</i>													
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
<i>Katsina</i>													
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
<i>Gao</i>													
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 prieri*, *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.

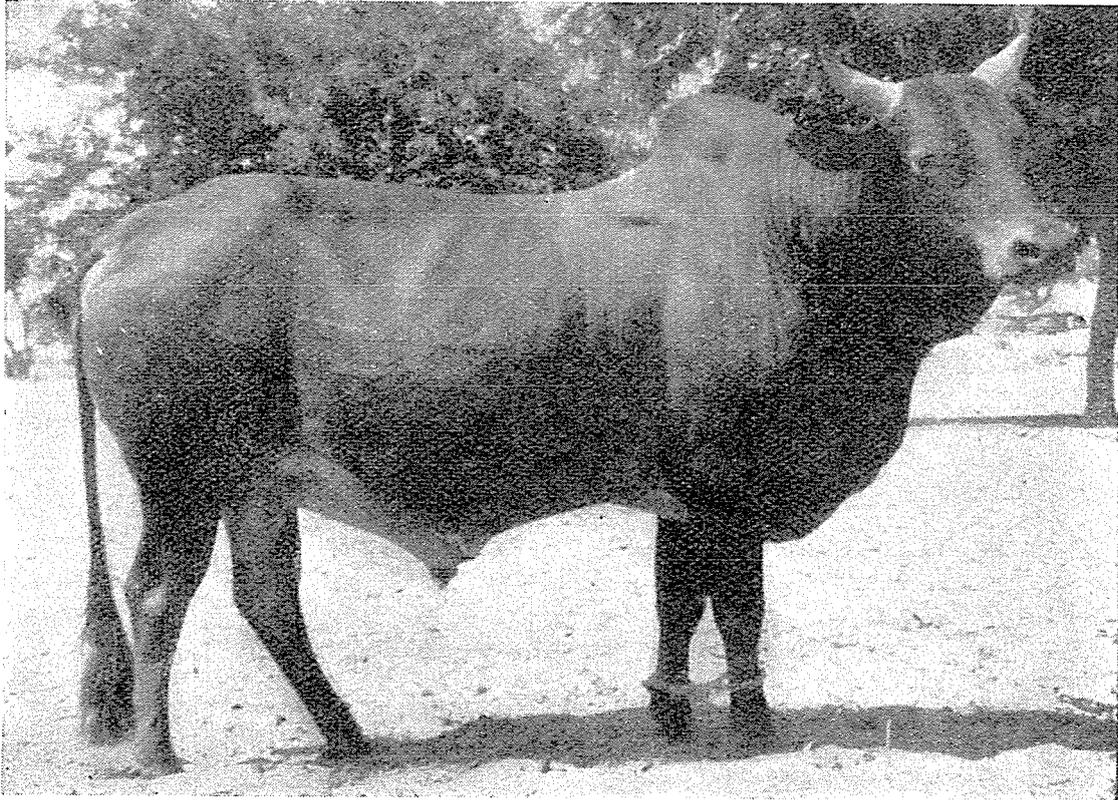
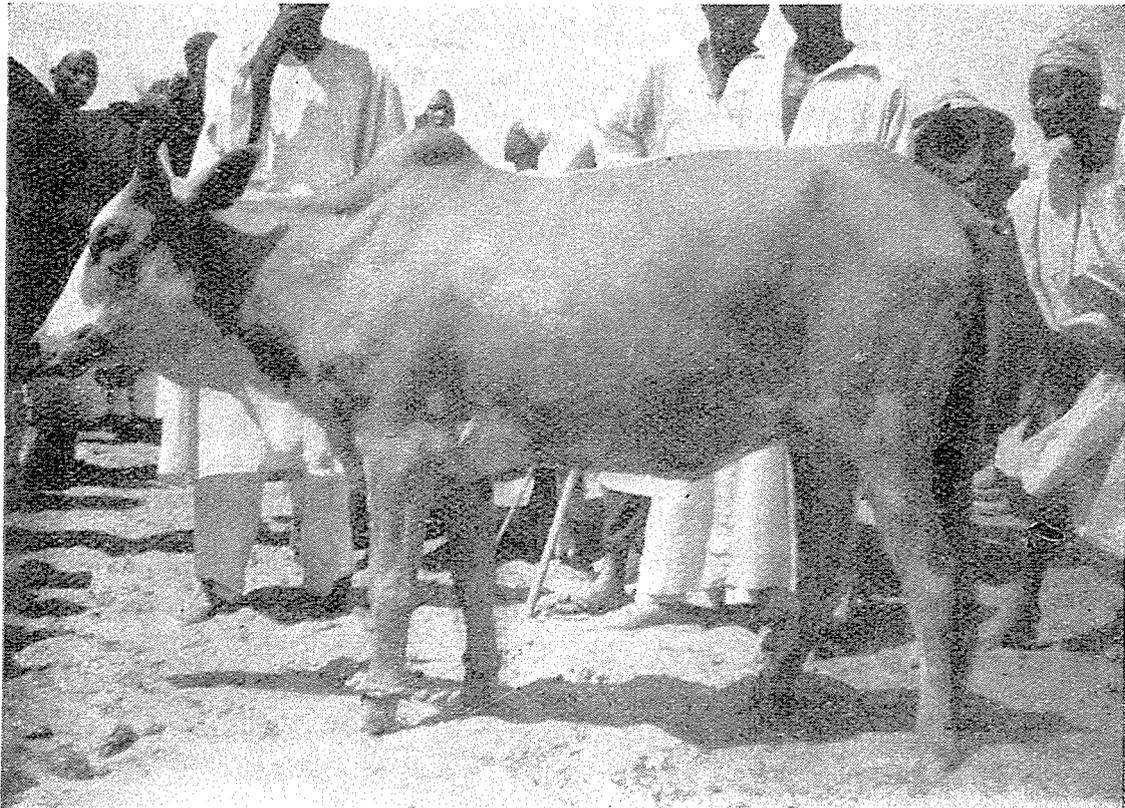


FIGURE 19. *Azaouak bull.*

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 ± 20.39	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 (1951a) 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 Niore, 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 forwards 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,

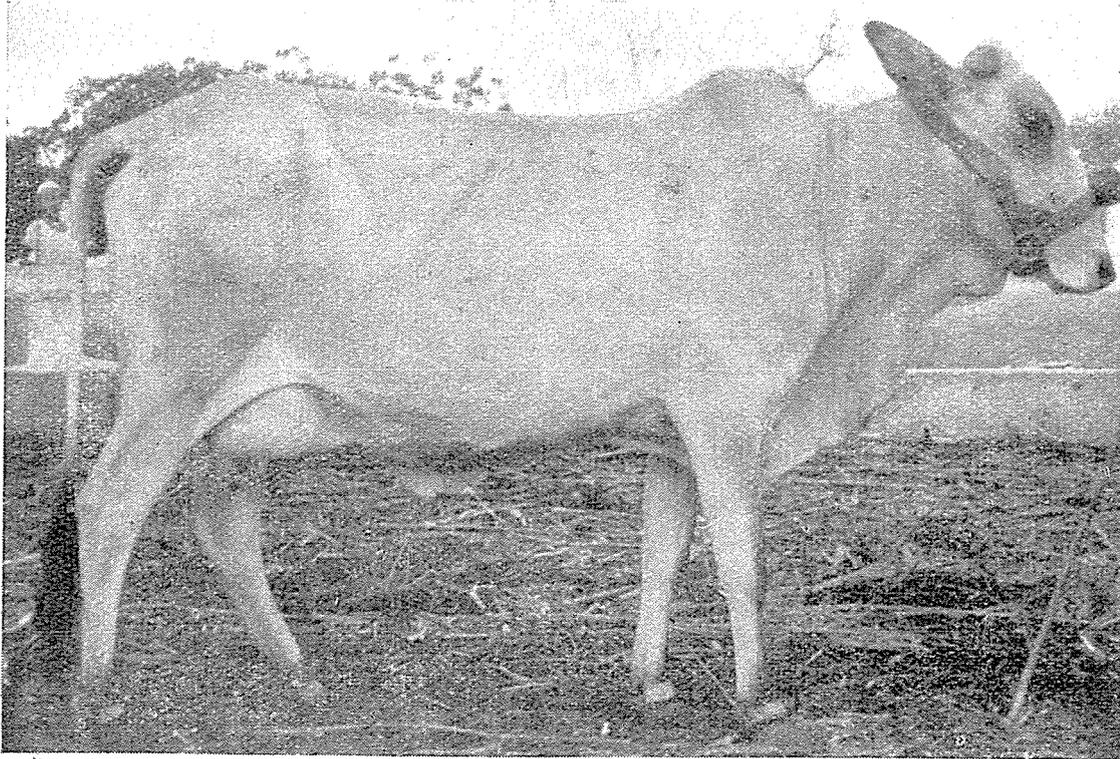
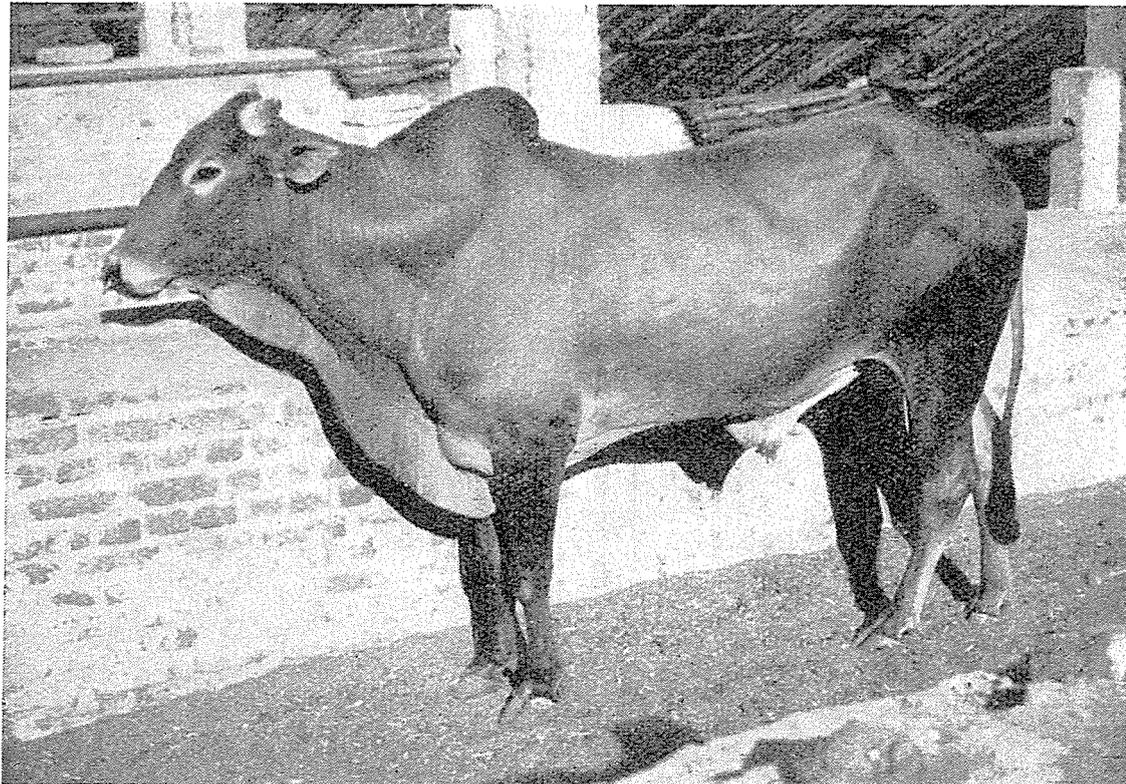


FIGURE 22. *Northern Sudan shorthorned zebu « Kenana » cow.*

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
<b>DARFUR</b>													
<i>(El Fasher)</i>													
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
<b>KORDOFAN</b>													
<i>(El Obeid)</i>													
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 14.00 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
<b>BLUE NILE PROVINCE</b>													
<i>(Singa)</i>													
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
<b>NORTHERN PROVINCE</b>													
<i>(Kareima)</i>													
Altitude: 250 m.													
Mean maximum temperature, °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

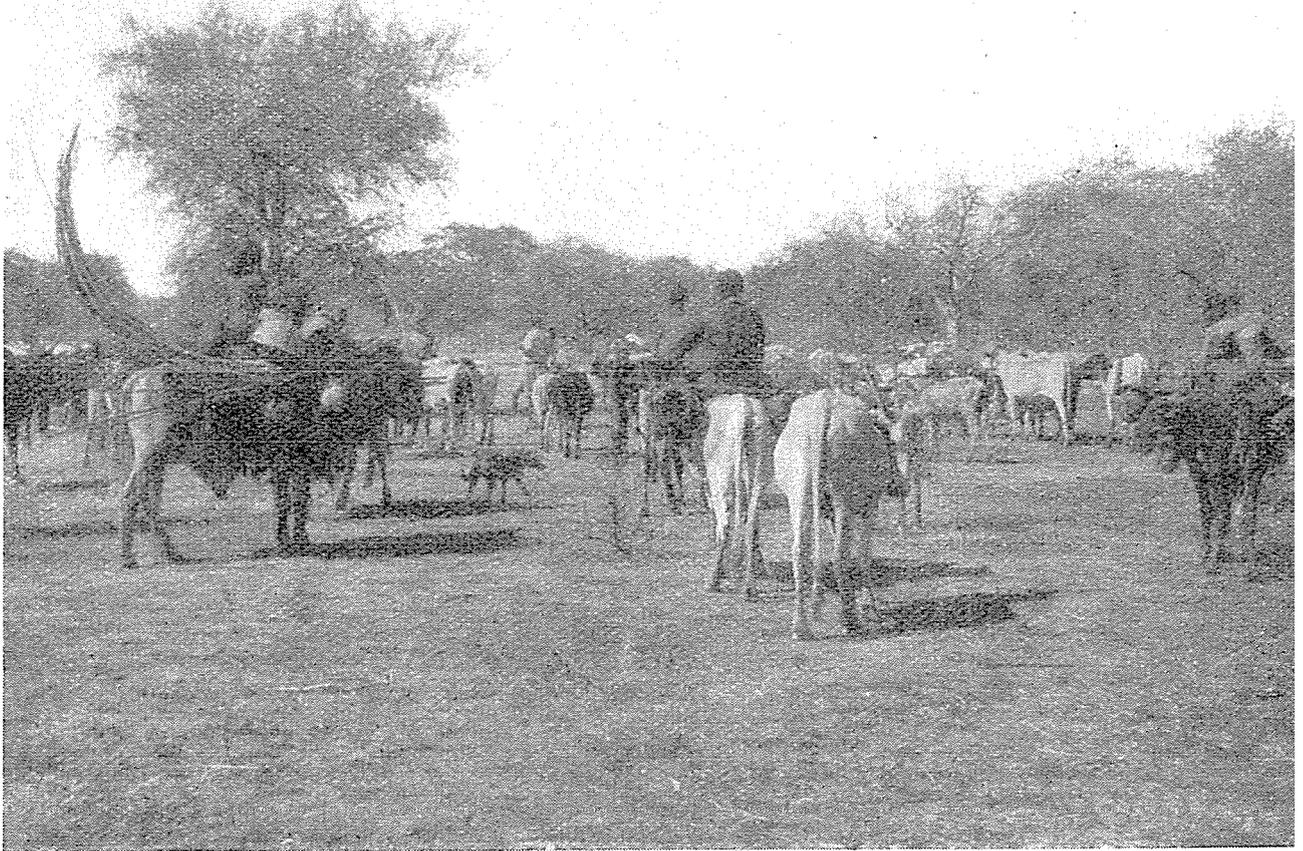


FIGURE 24. *Northern Sudan shorthorned zebu. Baggara cattle camp or feriq on the move in Darfur Province, Sudan.*

Courtesy of J. D. M. Jack

fold, the average depth of which in the cow is  $3 \frac{1}{2}$  inches (19 samples) while the sheath and umbilical fold in the male is of an average depth of  $5 \frac{1}{2}$  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)
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)
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  $40.6 \pm 0.8$  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  $408 \pm 9$  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  $286.6 \pm 0.6$  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 $\pm$ SE.	range	mean $\pm$ SE.	range
1948	14	3 318 $\pm$ 278	1 606-4 840	224 $\pm$ 9	154-278
1949	21	3 632 $\pm$ 269	522-6 603	251 $\pm$ 16	58-424
1950	22	3 875 $\pm$ 296	672-6 514	232 $\pm$ 15	62-367
1951	23	3 677 $\pm$ 318	324-6 676	229 $\pm$ 14	68-342
1952	26	2 856 $\pm$ 276	262-6 165	223 $\pm$ 13	58-348
1953	15	3 965 $\pm$ 212	2 196-5 143	275 $\pm$ 16	152-358
1954	28	4 045 $\pm$ 251	902-6 108	260 $\pm$ 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  $3,795 \pm 111$  lb. in  $242 \pm 5$  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 $\pm$ SE.	range	mean $\pm$ SE.	range
1	24	3 707 $\pm$ 267	1 462—6 240	256 $\pm$ 15	131—367
2	24	4 150 $\pm$ 217	2 174—6 426	266 $\pm$ 11	152—358
3	17	4 330 $\pm$ 260	2 746—6 744	250 $\pm$ 8	190—342
4	12	4 073 $\pm$ 270	2 676—6 096	232 $\pm$ 10	167—280
5	8	3 951 $\pm$ 148	3 512—4 601	258 $\pm$ 13	213—327
6 or over	17	4 142 $\pm$ 200	2 370—5 822	264 $\pm$ 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  $4.73 \pm 0.09$  percent (234 tests) and solids-not-fat content was  $9.25 \pm 0.05$  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 zebu 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 zebu, 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
<i>Maiduguri</i>													
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
<i>Abéché</i>													
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.

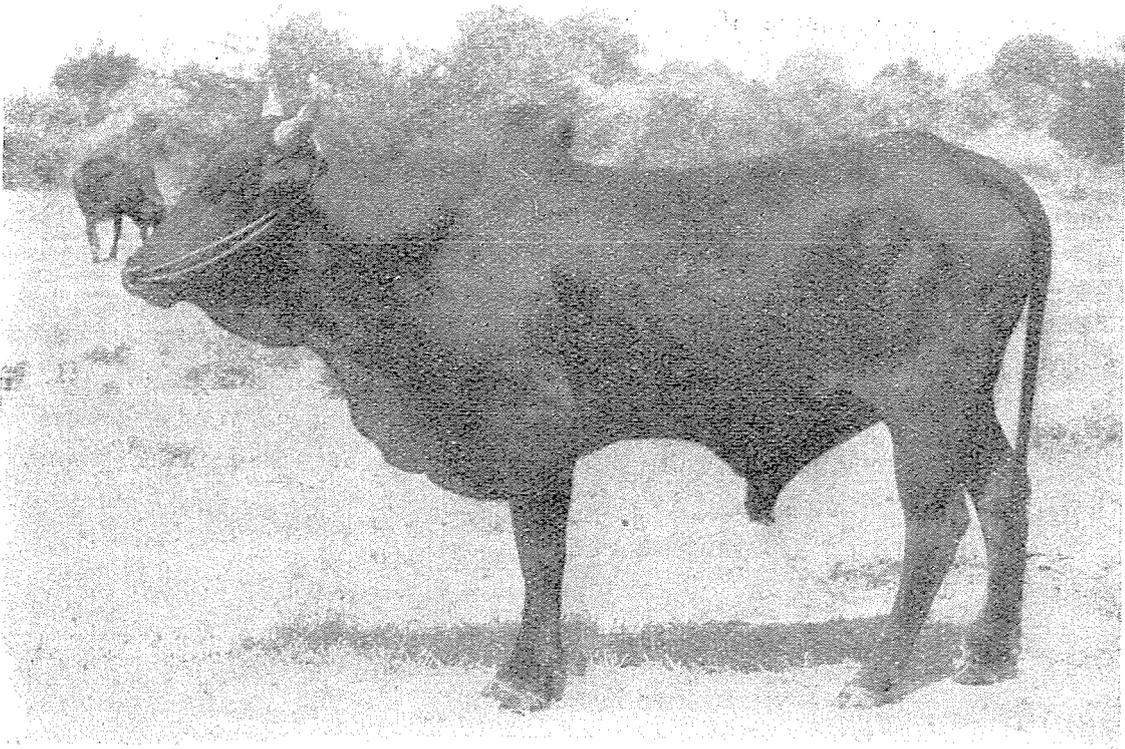
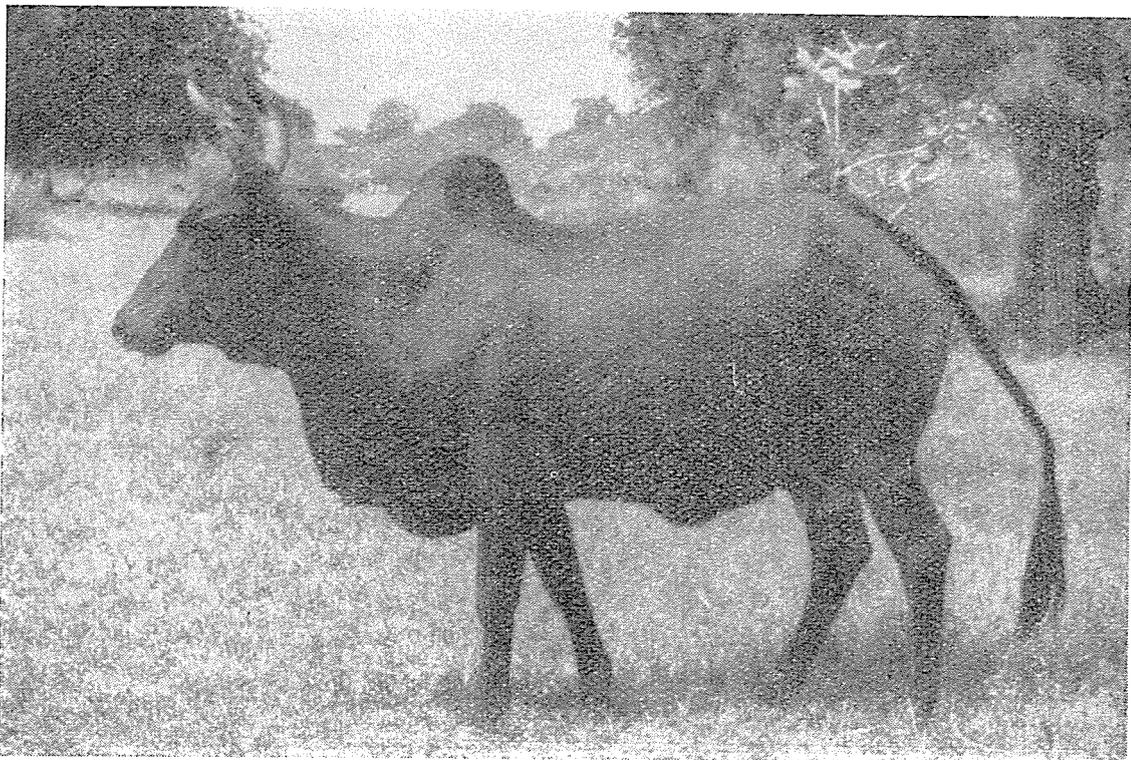


FIGURE 28. *Shuwa bull.*

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	Number 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 sedimentary 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

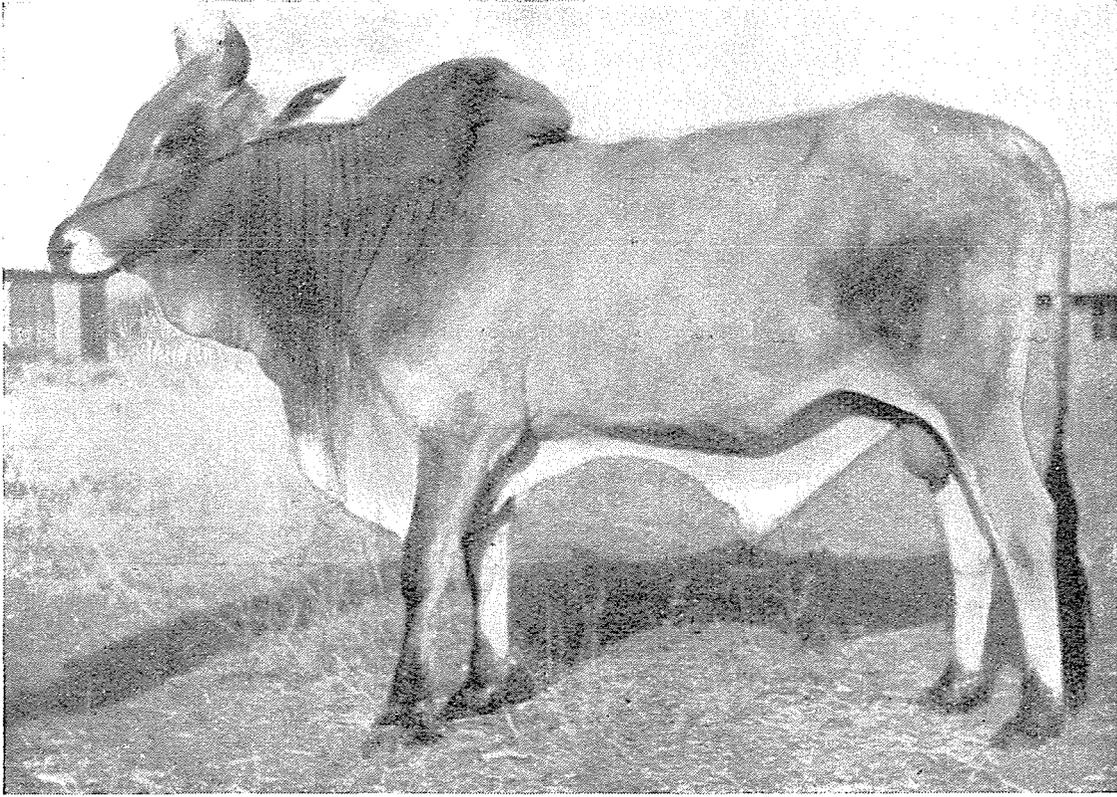
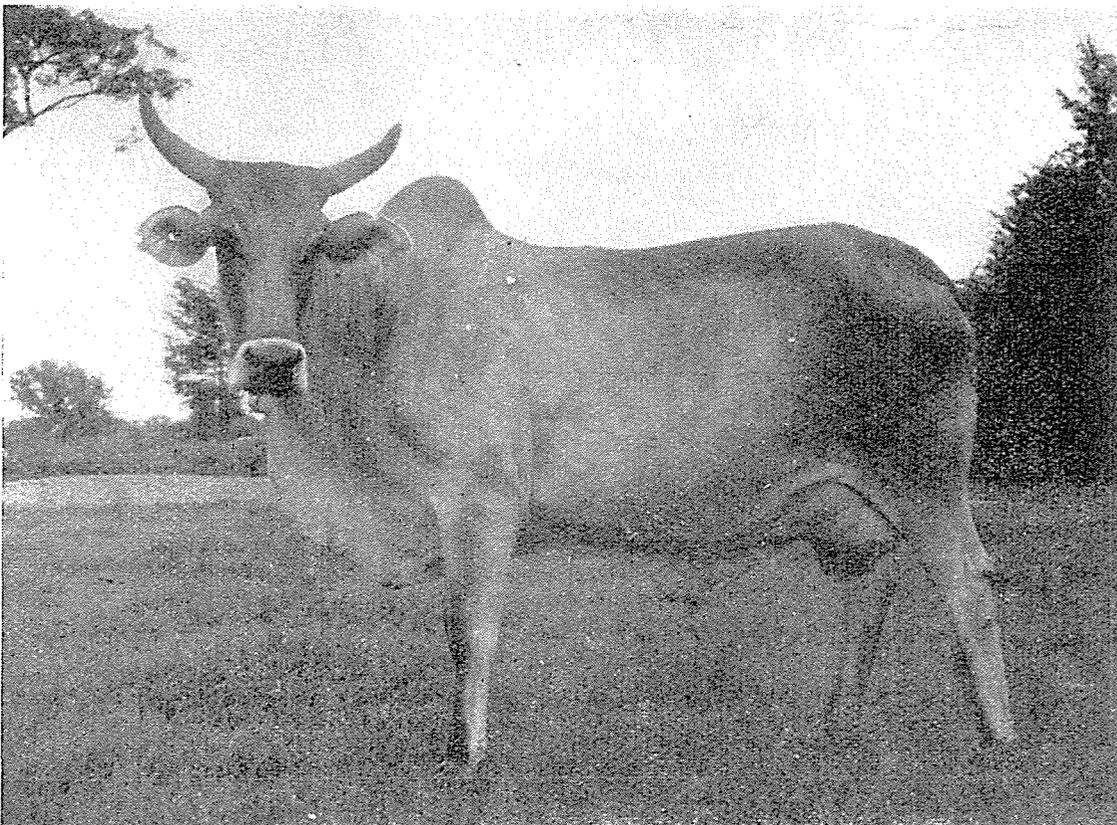


FIGURE 30. *Sokoto bull.*

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	235	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 Komadougou, 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 inter-territorial boundary the *Prosopis-Terminalia* association is dominated by *Prosopis africana*. Further to the west, in the Madaua-Zinder-Maradi area the *Combretum-Sclerocarya* 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 savannah woodland 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 steno-carpa*, 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.	Dce.	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
<i>Plateau of Ferlo</i>													
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
<i>Sine</i>													
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
<i>Senegal river region</i>													
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
<i>Gorgol</i>													
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 priouri*, *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 priouri*, *Digitaria debilis*, *Tragus racemosus*, *Brachiaria distyphophylla*, *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

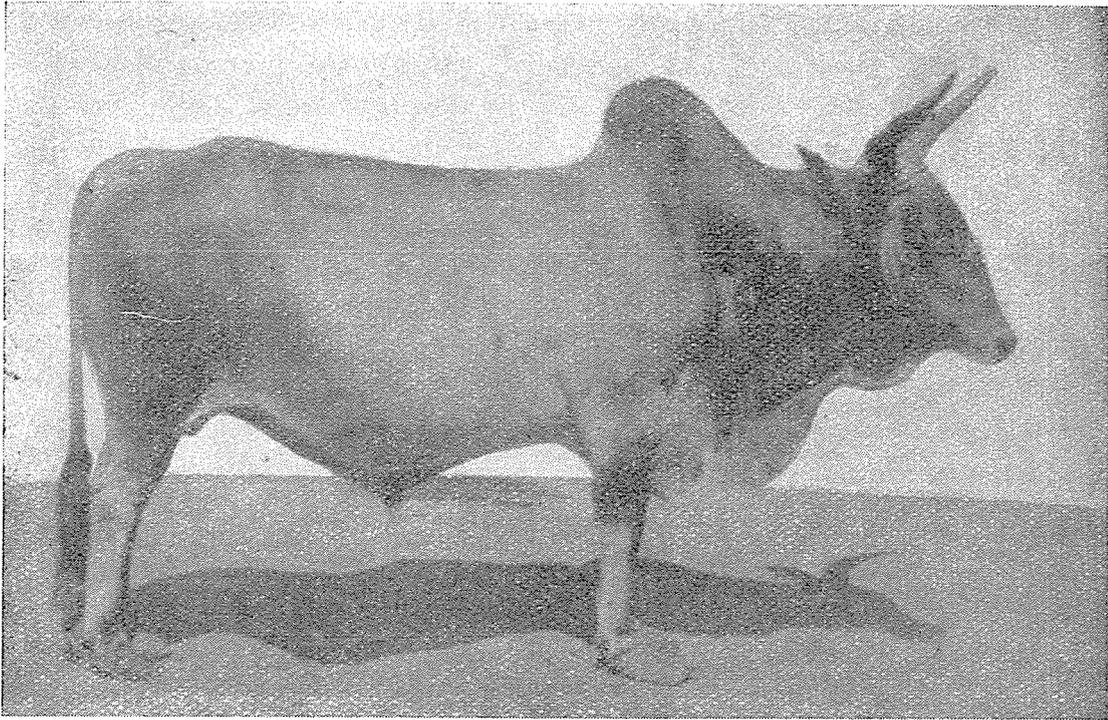
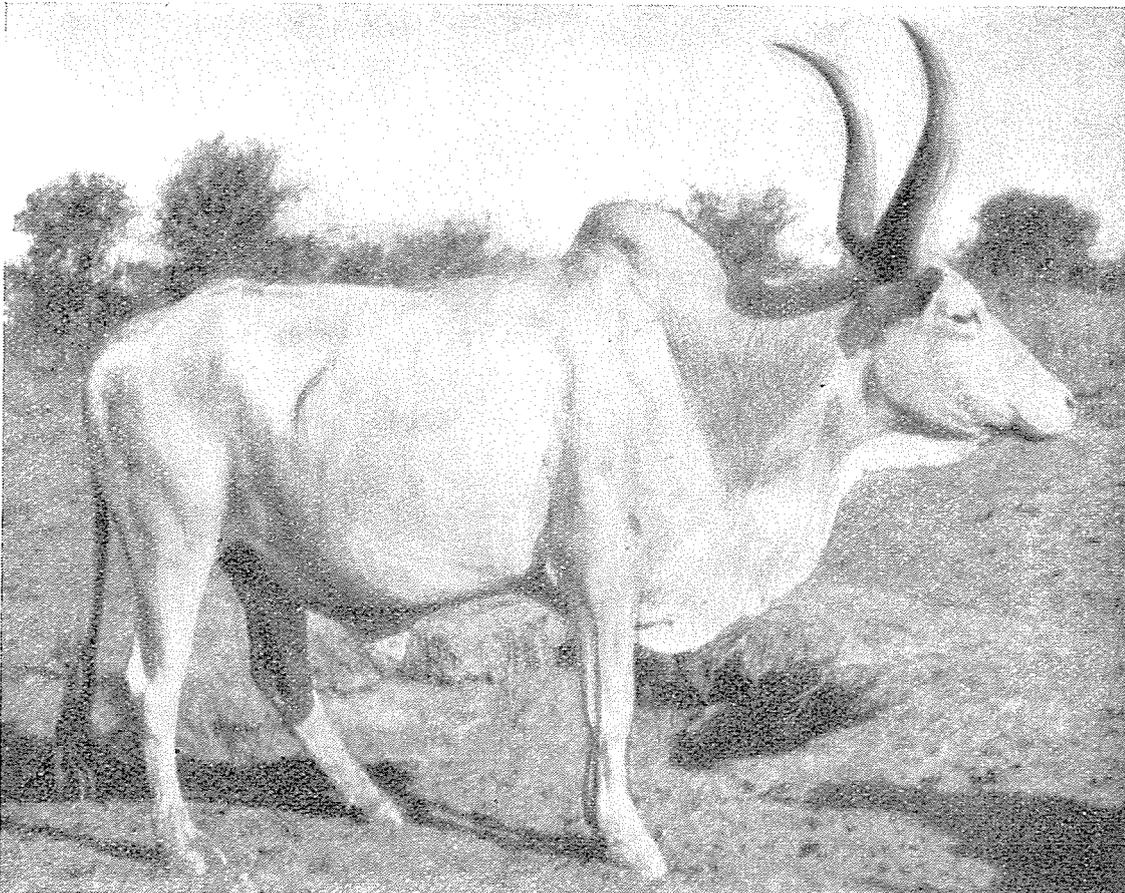


FIGURE 32. [above] *Senegal Fulani steer*; [below] *Sudanese Fulani steer*.

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
<i>Jos</i>													
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
<i>Katsina</i>													
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

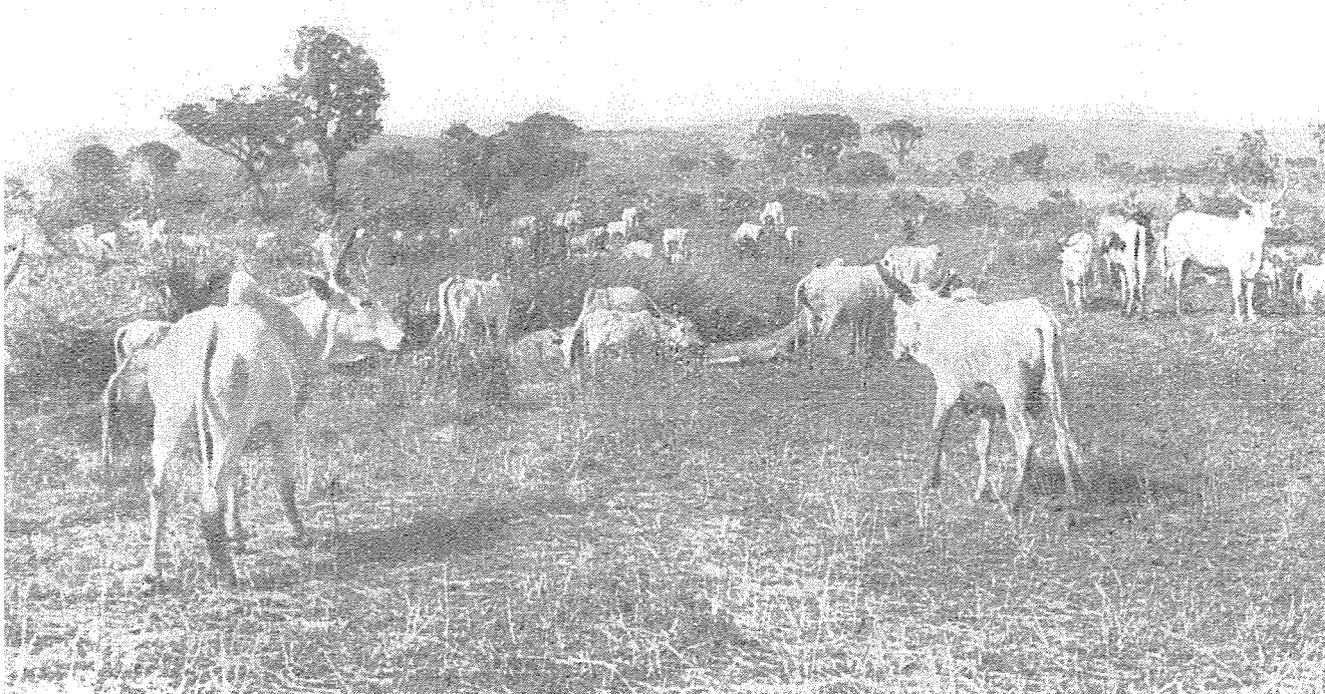


FIGURE 34. *A herd of White Fulani cattle in northern Nigeria.*

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-

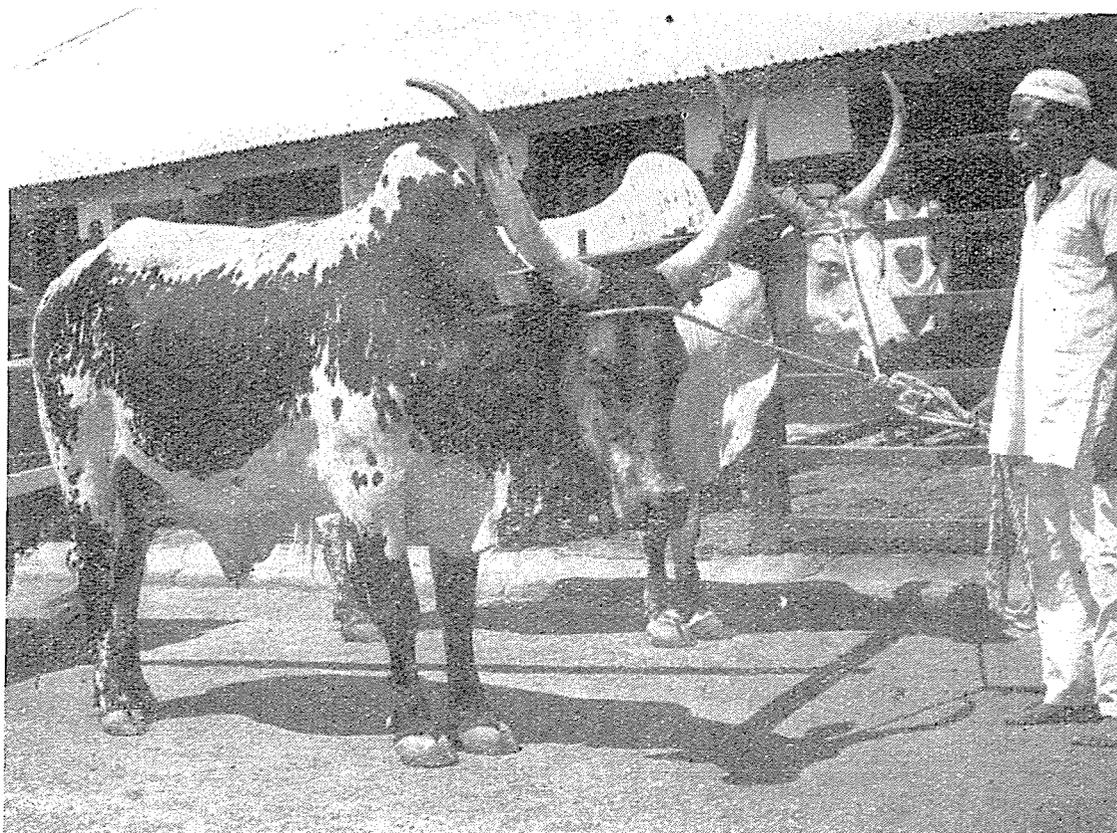
nuts, sesame, and, to a certain extent, cassava and yams. Cotton is grown on the heavier soils of the Guinea zone. *Eleusine coracana* and *Digitaria exilis* are grown on the poorer upland soils. In some parts of the areas, notably in the Kano district, trees such as *Acacia allida* and *Parkia* sp. 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.

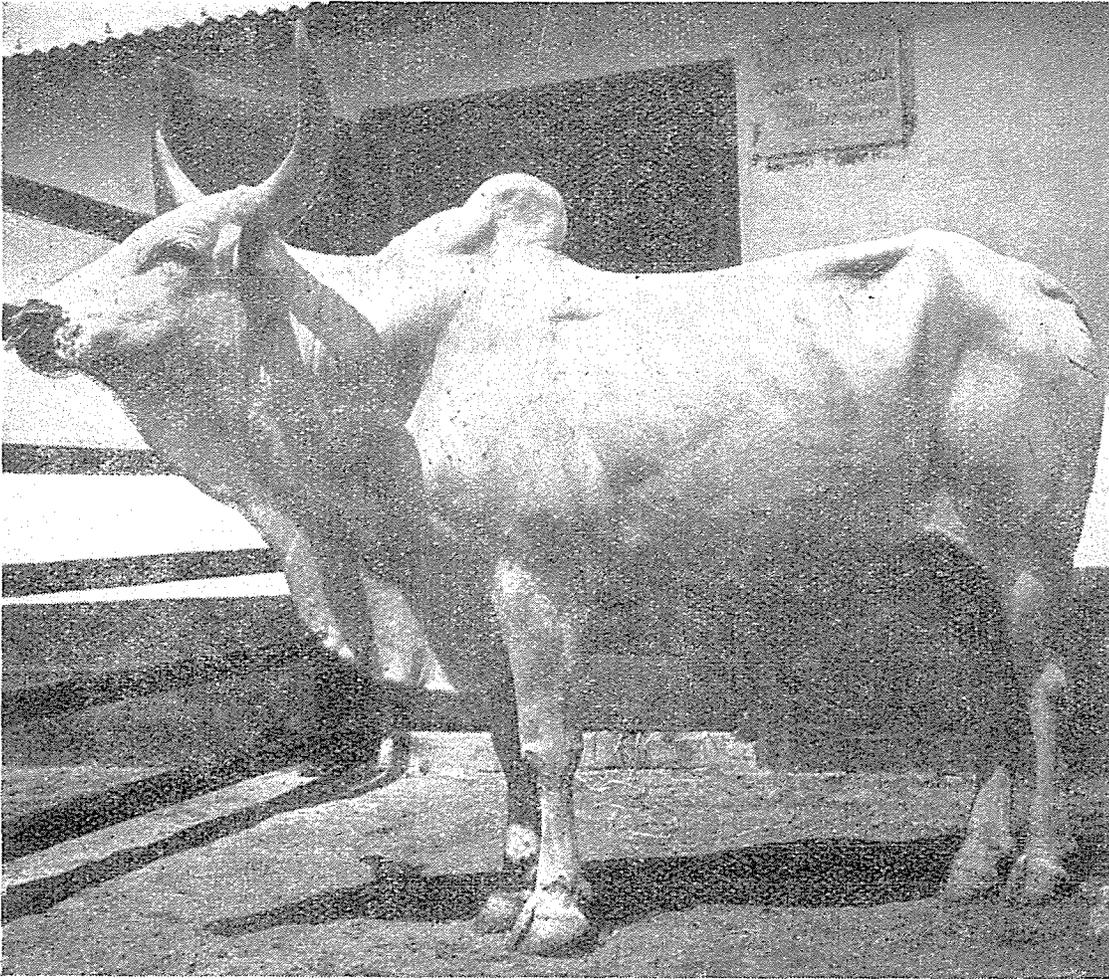
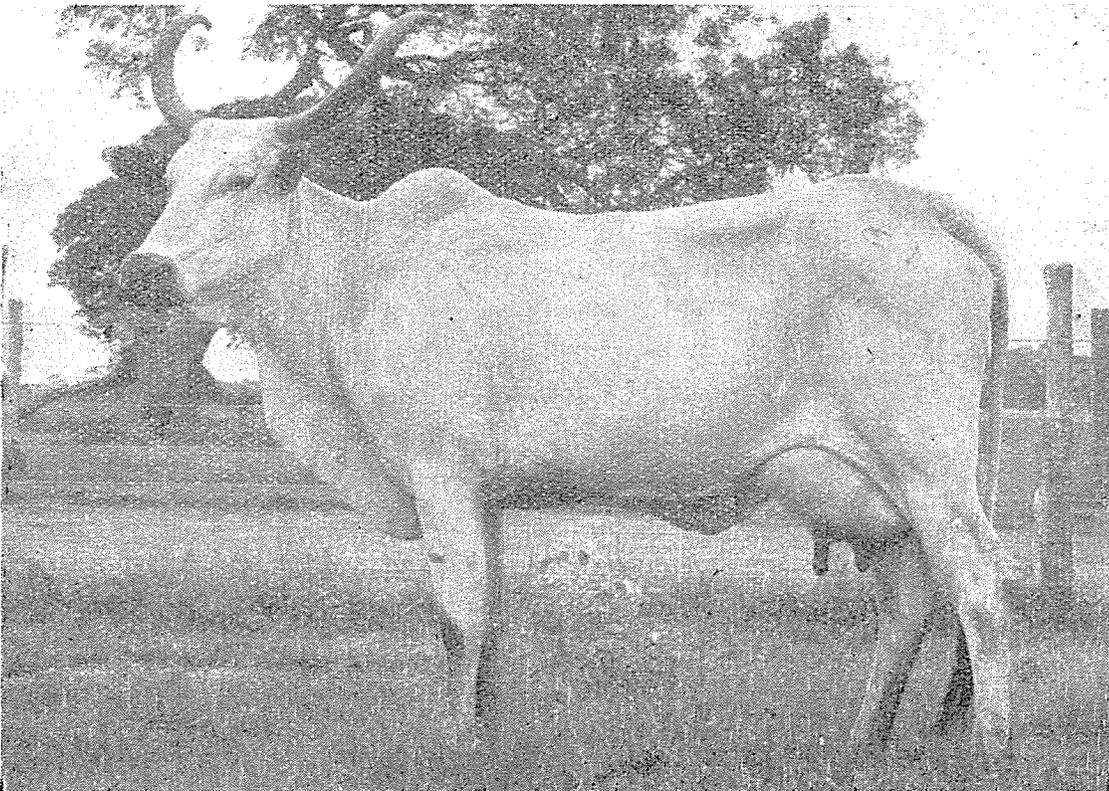


FIGURE 36. *White Fulani bull.*

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 palpalis*) 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'Borodji 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 *Mbouroua* 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 inhabited 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).

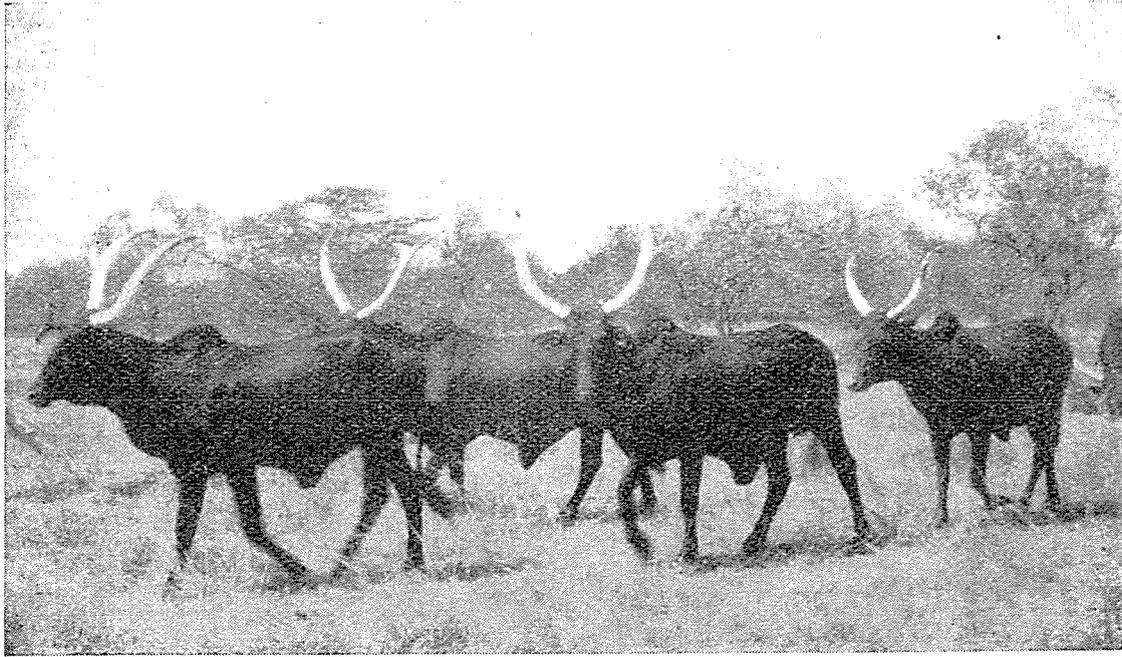


FIGURE 38. *M'Bororo cattle in Darfur Province, Republic of the Sudan.*

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 south-westerly 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
<i>Katsina</i>													
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
<i>Bamenda</i>													
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
<i>Bouar</i>													
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*.

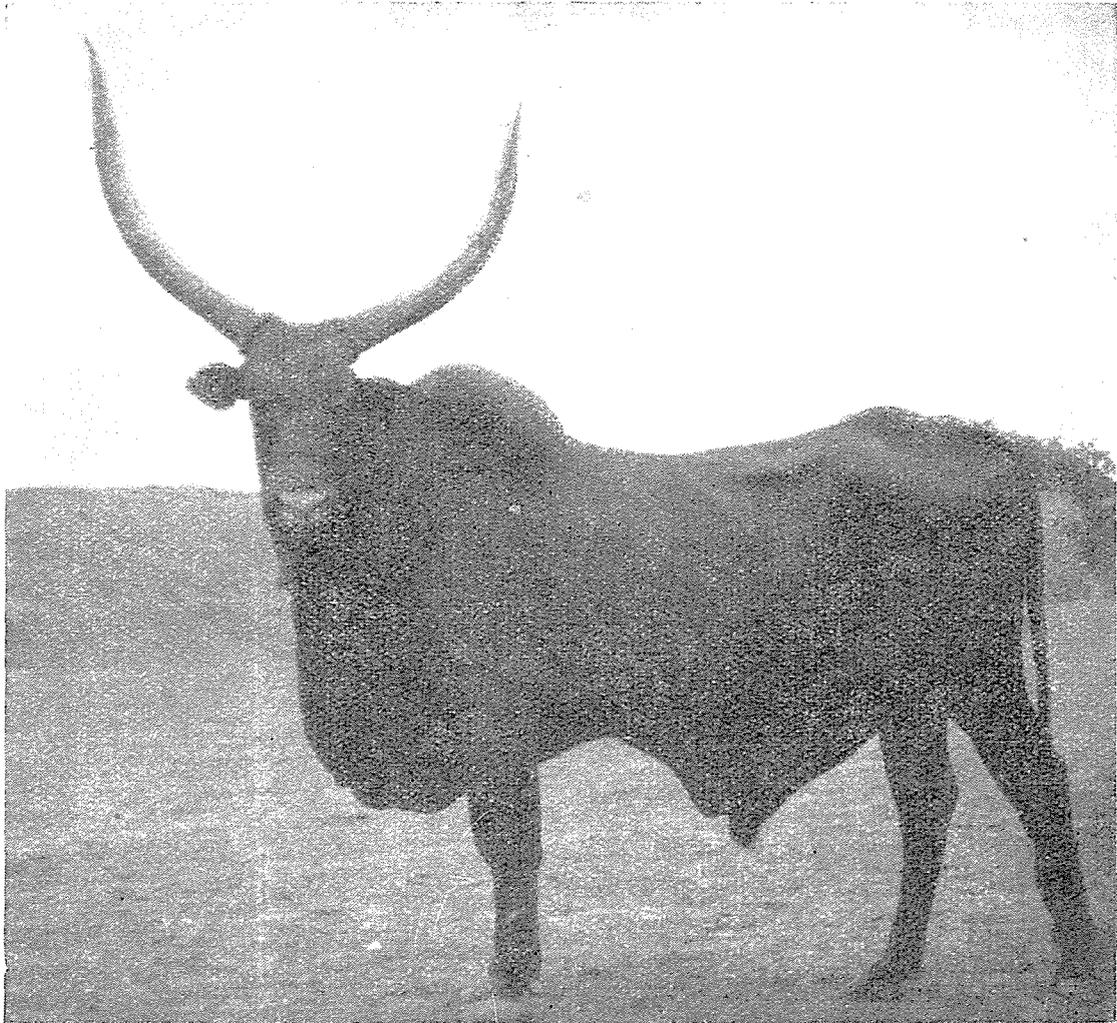


FIGURE 39. *M'Bororo bull.*

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

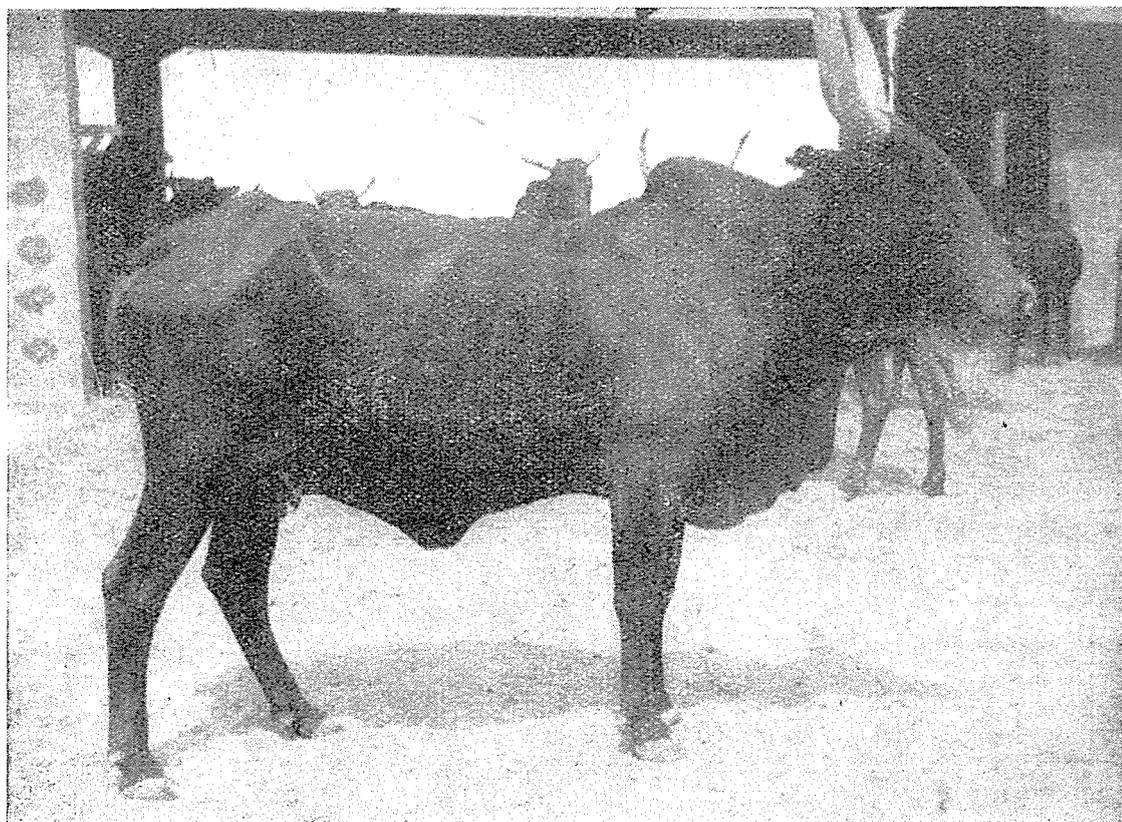
northern areas the cattle migrate toward rivers, valleys and drying swamps during the dry season and return to their native areas at the beginning of the rains. In the mountainous regions of the east the cattle are taken to hilly grazing areas during dry periods. Supplementary feeds are never given.

#### 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.

## Group III

### N'DAMA

#### Origin

It is believed that the N'Dama type had its origin in cattle which accompanied Berber migrants from southern Morocco. The Fouta Djallon plateau in French Guinea is regarded as being its point of origin in West Africa, from which it has spread to the surrounding areas, where it has interbred with both the zebu cattle of the sub-saharan savannahs and the small shorthorned cattle of the coastal areas. The area occupied by the N'Dama showed its greatest increase in the periods following the rinderpest epizootics of 1890-1891 and 1918 when these cattle replaced herds of other types in Senegal and in the French Sudan which had been decimated by the disease (Doutressoulle, 1947).

While there is a certain amount of variation in the conformation of cattle from different parts of the area, there does not appear to have been a sufficient degree of differentiation to justify their consideration as discrete breeds. The type has, therefore, been discussed under a single heading as the "N'Dama" (which can be translated as "small cattle") including, as well as the cattle of Fouta Djallon, the Bambara and Borgou subtypes which have been described by Doutressoulle (1947).

#### Conditions in the native home of the breed

##### *Location, topography and soils*

N'Dama cattle are found in the southern part of the *soudanaise* and the northern part of the *guinéenne* climatic zones (Doutressoulle, 1947) in a belt of country approximately parallel to the equator and stretching from the Atlantic coast in Senegal and Guinea to the Borgou district in northern Dahomey. The northern and southern limits are, very approximately, at latitudes 14° N. and 8° N. The northern limit of the N'Dama approximates very closely to that of the tsetse area and, consequently, to the southern limit of the zebu cattle of the more open country to the north.

The true N'Dama is found in the Fouta Djallon plateau in French Guinea. From there it has spread northwestwards to southern Senegal, northeastwards to the River Senegal in the French Sudan, eastwards to the French Sudan south of the Niger and the northern part of the Ivory Coast where the Bambara type has developed, and further east to the Northern Territory of Ghana, the Borgou area in Dahomey and Sierra Leone.

Much of the French Sudan is a great peneplain of a mean altitude of about 200 to 600 meters intersected by valleys and alluvial plains which are inundated for part of the year. The plateaus are very largely covered by a lateritic shield. Only in the Fouta Djallon plateau does the elevation rise above 1,200 meters.

### *Climate*

The climate of the area in which N'Dama cattle are found is characterized by a division of the year between a dry season and a rainy season dependent upon the movement of the intertropical convergence between the northerly dry continental air mass (harmattan) which is centered over the Sahara and the southwest monsoon of moist air coming inland from the Atlantic.

In January the convergence is at its farthest south and the whole of the area is dry, while in July it has moved north and the monsoon covers the whole region. Most of the rain occurs in a belt about 300 miles wide and about 100 miles south of the convergence and generally falls in heavy thunderstorms, although there may, on occasion, be cloud and prolonged rain for 24 hours or more. Heavy rainstorms occur which are of short duration, but are preceded by violent winds which can cause considerable damage.

In general, the dry season lasts approximately from late October or November to February or March. The air is dry and midday temperatures are high, especially in April and May when daily maxima may exceed 43° C., but the nights are cool. The sky, although cloudless, is often obscured by a haze caused by fine dust particles, which greatly reduces visibility.

The rains are preceded by a period during which there are severe dust storms. Rainstorms begin in April and May and continue until October or November. The highest precipitation is in late August and early September. During the rainy months storms usually occur on 10 to 15 days in each month. The humidity is high, but temperatures are lower than in April and May (Kendrew, 1953).

While there is no great variation in the mean annual temperature through the area, precipitation increases from north to south. A division of the area is often made into a) the *soudanaise* zone in the

drier north where the dry season lasts from early November to late March or early April and the mean annual temperature is about 26° C., and b) the *guinéenne* zone where the annual rainfall varies between 1,050 mm. and 4,000 mm. and where the dry season extends between November and April, while the mean temperature varies between a minimum of 22° to 25° C. and a maximum of 28° to 34° C. Humidity in the *guinéenne* zone varies between 50 percent in the dry season and a maximum of 98 percent in the rains (Doutressoulle, 1947).

Climatological data for stations in the N'Dama area are given in Tables 41 and 42.

TABLE 41. — CLIMATOLOGICAL DATA FOR BOUAKÉ, IVORY COAST  
(8-YEAR MEANS)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °C. ....	24.4	26.9	28.6	28.4	27.2	26.4	25.0	24.5	24.9	25.5	25.7	24.4	26.0
Mean rainfall, mm. ....	0.8	16.3	36.7	84.9	136.8	143.6	285.1	381.0	263.3	136.3	54.2	5.2	1 544.2

SOURCE: Service de l'élevage de la Côte-d'Ivoire, *Personal Communication*.

TABLE 42. — CLIMATOLOGICAL DATA FOR BAMAKO AND SÉGOU  
IN THE FRENCH SUDAN

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, Bamako, °C. ..	25.0	27.7	30.6	32.2	31.7	28.9	26.7	26.1	26.1	27.8	27.2	25.0	28.3
Mean rainfall, Bamako, mm. ....	0	0	2	15	74	135	279	348	206	43	15	0	1 117
Mean rainfall, Ségou, mm. ....	0	0	0	15	30	90	175	230	125	15	0	0	680

SOURCE: Bamako: Kendrew, 1953.  
Ségou: Service de l'élevage du Soudan, *Personal Communication*.

### Vegetation

In the *soudanaise* zone there is a close cover of non-thorny trees and bushes under which tall annual grasses spring up during the rains. The rainfall is sufficient for the production of crops and the largely sedentary human population grows considerable areas of rice, cotton and other crops.

Further south, in the *guinéenne* zone, the tree cover is thicker and the annual grasses are to some degree replaced by tall perennials. The vegetation is very subject to fire during the dry season.

On the plateaus there are large areas of open grassland, while forest occurs along the rivers (Doutressoulle, 1947).

### *Management practices*

In the French Sudan and the Ivory Coast the herds are sedentary and are (in the Sudan) usually owned by Bambara villagers who employ Peul herdsmen to supervise their cattle. As well as natural pastures near the villages the cattle are herded on the millet and maize fields after the harvest so that they may consume the residues of the crops.

In much of the area the herds make seasonal movements, which may be very short, as in northern Dahomey, or, as in the Borgou area, may extend over two or three days' march. The cattle are usually brought down from the plateaus and hills where they pass the rains, to river banks and depressions which, flooded during the rains, give green grazing when exposed during the dry season (Doutressoulle, 1947). (*Cf.* the *toich* system of the Nilotic stock owners of the Republic of the Sudan.)

The average composition of herds in the Kayes (Sudan) area has been given as 55 cows, 3 bulls, 18 young cattle between 1 and 4 years, 22.5 calves and 1.5 oxen. In the Kita (Sudan) area the average herd consisted of 447 cows, with 3 bulls, 16 young stock, 30 calves and 4 oxen (Service de l'élevage du Soudan, *Personal Communication*).

In northern Sierra Leone the cattle are maintained under a pastoral and nomadic system utilizing grazing as and where it becomes available. In this area there is usually a shortage of grazing in the dry season. Cattle owners often give their stock a lick containing, as well as salt, various other substances, including, leaves, roots and bark.

### **Physical characteristics of the breed**

Doutressoulle (1947) has described three varieties of this type of cattle: the true N'Dama of the Fouta Djallon plateau; the Bambara or Méré of the southern part of the French Sudan (which is the product of crossbreeding between the N'Dama and the Peul zebu); and the Borgou of northern Dahomey and the neighboring territories, showing signs of the influence of the M'Bororo zebras to the north, as well as that of the West African Shorthorns of the coastal area.

The N'Dama (Figures 41 and 42) are small, humpless cattle, sturdy and thickset, and with long lyre-shaped horns. The head is short

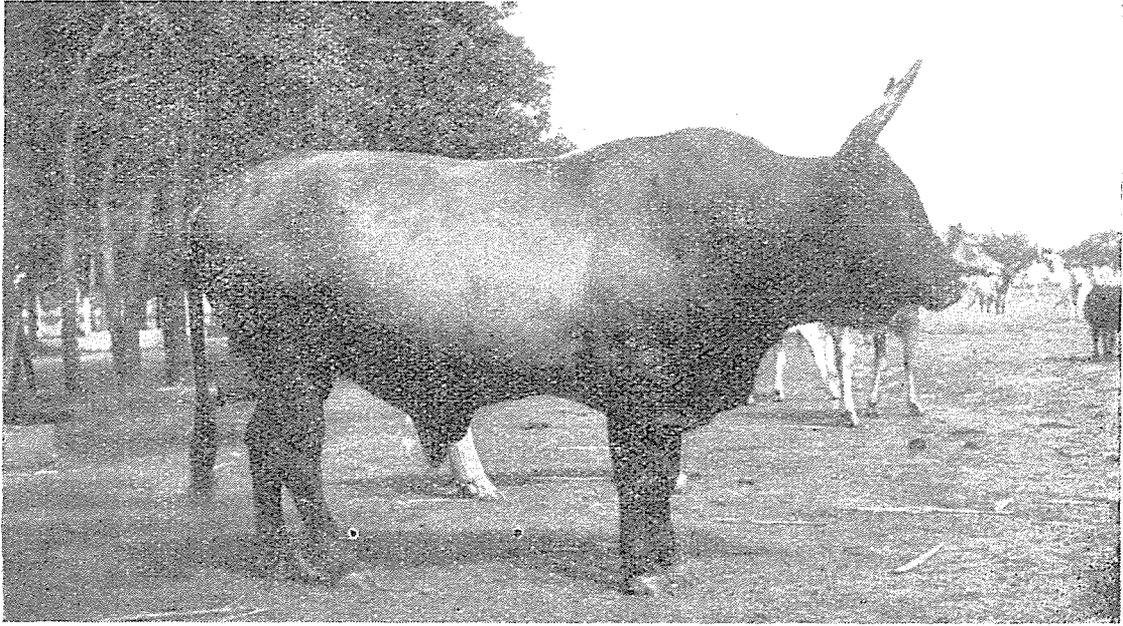
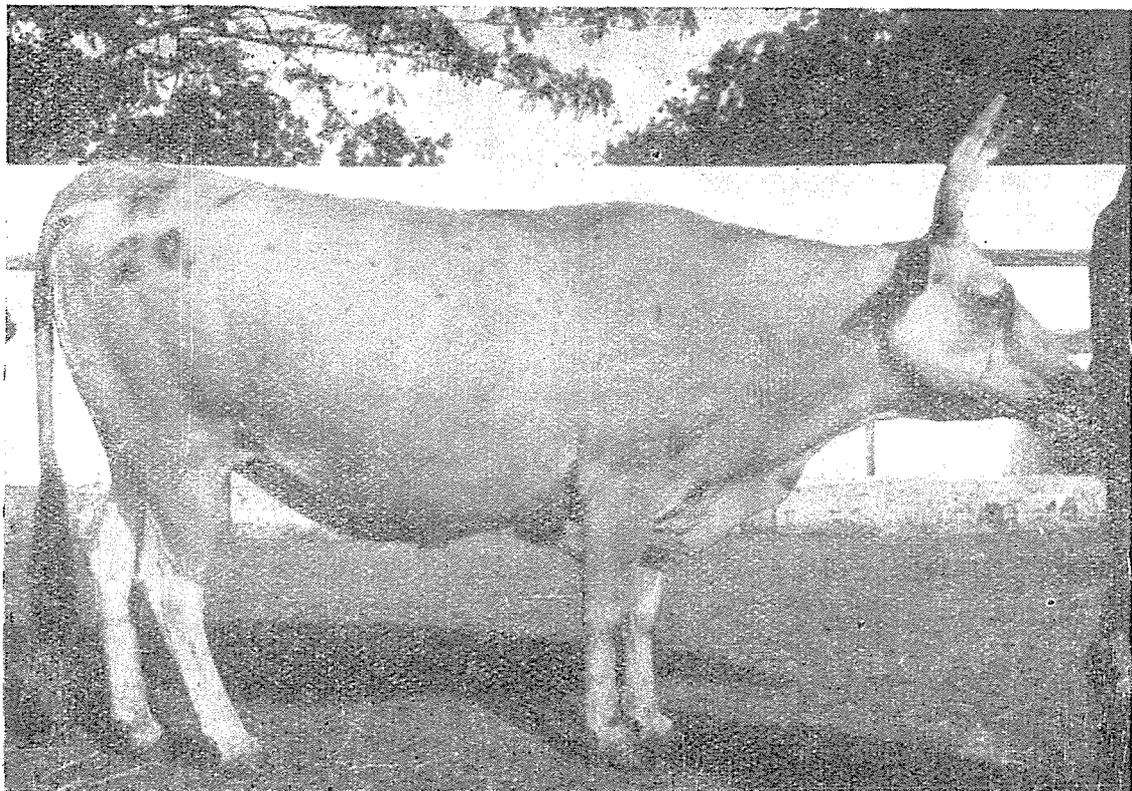


FIGURE 41. *N'Dama bull, Ghana.*

FIGURE 42. *N'Dama cow, Ghana.*

Courtesy of G. M. Gates



and broad with a straight profile. The orbital arches are not accentuated and the forehead is flat. The horns are about 20 cm. or more in circumference at the base and are of circular cross section. The usual length is from 45 to 50 cm. (Service de l'élevage du Soudan, *Personal Communication*). The horns grow from the flat poll in an outward and slightly backward direction, then turn forwards and upwards before inclining inwards and slightly backwards at the sharply pointed extremities. The color of the horns is generally white with dark extremities, except in cattle of the Bambara subtype with brown coat coloration, the horns of which are wholly dark in color (Doutressoulle, 1947).

The neck is of medium length and deep and strong in the male. The topline from the withers to the tail setting is flat and well muscled and is approximately straight with a slight tendency to rise to the hindquarters. The rump is of moderate length and slight slope with adequate breadth posteriorly. The sacrum is not prominent. The tail is long with a well-developed switch. The ribs are well sprung and the musculature of the shoulders, back, and hindquarters is well developed and rounded. The dewlap and umbilical fold are not accentuated. The limbs are short and fine and the hoofs are reported to be sufficiently durable when the cattle are employed in draft work.

The pigmentation of the skin, which is of medium thickness, can vary from black to light brown. The muzzle and surrounds of the eyes are usually light in color but may be dark. The hairy coat is soft and short.

In the Fouta Djallon area the coat coloration is generally yellow or fawn with darker extremities but very dark coloration, approximating to full black, can be seen as well as pied with black or fawn on a white ground and, rarely, full white. The skin is generally of light pigmentation, but black may occur in an appreciable portion of animals. The typical coloration in the Bambara cattle varies from wheaten yellow to red in the north of the subtype area to brown in the south with pale pigmentation of the muzzle, tongue, etc., except where the coat coloration is dark. In the Borgou cattle, the coloration is basically white, with superimposed patterning with gray, black or fawn on the flanks, leaving the topline and underline white (Doutressoulle, 1947).

The height at withers of bulls varies from 95 to 100 cm., and that of oxen from 110 to 120 cm. The liveweight of cows is between 210 and 280 kg., while oxen in exceptionally good condition may reach 330 kg.

In Senegal a large and a small variety of the N'Dama have been distinguished. The average liveweight and height at withers of 14 oxen and 33 cows of the larger variety were: oxen 293 kg. and 112.9 cm.,

cows 237 kg. and 111.9 cm. Similar measurements were made on the smaller variety: average liveweights of oxen and cows were 232 and 210 kg. respectively, while the average height at withers was 108.1 and 101.1 cm. respectively. The range in height at withers of animals of the larger type was 105 to 118 cm. Among the smaller type the range in height at withers was, for cows, 95 or less to 105 cm. and for bulls 100 to 112 cm. (Larret *et al.*, 1948).

The average birthweight of calves has been reported as follows: Sudan, males 16 kg., females 14 kg.; Ivory Coast 14 to 21 kg.; Sierra Leone (Teko Stock Farm), 13.5 to 18 kg.

Average liveweights and measurements of N'Dama cattle in the French Sudan, the Ivory Coast, and Sierra Leone are given in Tables 43, 44, and 45.

TABLE 43. - AVERAGE LIVEWEIGHTS AND MEASUREMENTS OF N'DAMA (BAMBARA) CATTLE IN THE FRENCH SUDAN

	Mature male	Mature female	Mature ox
Liveweight, kg. ....	300	230	260
Length from shoulder point to pinbone, cm. ....	123	120	140
Height at withers, cm. ....	110	104	118
Width of hips, cm. ....	40	41	47
Heart girth, cm. ....	150	142	183

SOURCE: Service de P'élevage du Soudan, *Personal Communication*.

TABLE 44. - AVERAGE LIVEWEIGHTS AND MEASUREMENTS OF N'DAMA CATTLE AT MUSAIA STOCK FARM, SIERRA LEONE

	Male			Female			Ox
	1 year	2 years	mature	1 year	2 years	mature	mature
Liveweight, kg. ....	136	220	363	138	151	238	319
Length from shoulder point to pinbone, cm. ....	91	102	114	84	91	104	107
Height at withers, cm.	96	107	110	96	102	106	114
Width of hips, cm. .	28	33	42	28	30	38	77
Heart girth, cm. ....	116	140	165	119	125	147	164

SOURCE: Director of Agriculture, Sierra Leone, *Personal Communication*.

TABLE 45. - AVERAGE LIVeweIGHTS AND MEASUREMENTS OF N'Dama CATTLE AT MIRANKRO, IVORY COAST

	Male			Female		
	1 year	2 years	mature	1 year	2 years	mature
Liveweight, kg. ....	84	300	419	81	234	353
Length from shoulder point to iliac wing, cm. ....	75	77	85	63	81	84
Height at withers, cm. ....	104	106	115	94	109	112
Width of hips, cm. ....	39	39	49	27	36	40
Heart girth, cm. ....	142	156	173	122	143	164

SOURCE: Service de l'élevage de la Côte-d'Ivoire. *Personal Communication.*

### Functional characteristics of the breed

N'Dama heifers are reported to calve for the first time at from 3 years (Sudan, Ivory Coast) to 3 ½ years (Sierra Leone) of age. The average interval between subsequent calves in the French Sudan has been reported to be 16 months. Cows continue to breed for 10 to 12 years.

Young bulls are first used at between 2 ½ and 3 ½ years and are reported to be quick to service.

When the nutritional status of the cattle is kept level calvings occur throughout the year, but under the local system of management the majority of calvings occur soon after the termination of the rains.

TABLE 46. - AVERAGE MILK PRODUCTION OF N'DAMA COWS AT MUSAIA STOCK FARM, SIERRA LEONE, 1944-1950

Year	Average number milked	Average milk per cow per lactation, lb.	Average length of lactation, days
1944	26	390	152
1945	16	722	203
1946	18	1 077	337
1947	18	1 108	294
1948	21	1 225	285
1949	19	1 381	263
1950	18	1 151	237

SOURCE: Colonial Office, 1953.



FIGURE 43. *N'Dama draft oxen, Ghana.*

Courtesy of G. M. Gates

Milk yield is generally small. A report from the French Sudan has given 350 to 450 liters in 5 to 6 months as the average annual lactation yield. The butterfat content of the milk is reported to be high. Doutressoulle (1947) reports that daily yields of 2 to 3 liters are obtained from Borgou cows. Average milk yields of N'Dama cows at Musaiia Stock Farm in Sierra Leone are given in Table 46.

N'Dama cattle give a good beef carcass. Average oxen killed during the rains are reported to yield from 45 to 50 percent of usable meat, while the best may kill out at 54 or 55 percent. The meat is of good quality and close-grained but lacks intermuscular fat (Doutressoulle, 1947).

The oxen are used for draft work, both for haulage and tillage (Figure 43). They are little suited for work which is either prolonged or requires violent effort and are best utilized in large teams which are worked only in the cool hours of the morning (Doutressoulle, 1947).

N'Dama cattle are reported to be, at least to some extent, resistant to trypanosomiasis and can be kept in tsetse bush country where other cattle types, such as, for instance, the zebus of the subsaharan savannahs, are unable to thrive. N'Damas are also reputed to be resistant to piroplasmiasis but are susceptible to rinderpest, haemorrhagic septicaemia, and bovine tuberculosis.

No resistance to tick infestation has been reported.

## Performance in other areas

Herds of N'Dama cattle have been established in Nigeria with the aim of testing their resistance to trypanosomiasis, improving the small native shorthorned humpless cattle, and introducing cattle into tsetse-infested country. The original herd at Ilorin, 200 miles north of Lagos was founded with cattle which were imported from the Gambia in 1935. Later importations were made in 1939 and 1947 from French Guinea. The latter group of 73 cows and 20 bulls was established in orchard bush country in Oyo Province. Climatic conditions are similar to those in the Ivory Coast. Climatic data for the area are given in Table 47.

At Oyo the cattle have been maintained on grazing and hay with, in the November-April dry season, supplementary feeding of hay, sweet potatoes, and cassava as well as a concentrate mixture including Guinea corn or maize, cotton seed, palm kernel meal, locust beans

TABLE 47. - FIVE-YEAR CLIMATOLOGICAL MEANS FOR THE ILORIN-OYO AREA IN NIGERIA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °C. ....	25.6	27.5	28.9	29.2	26.9	25.6	24.7	24.4	25.0	26.1	25.8	25.6	26.3
Mean relative humidity, % .	79.0	75.6	76.8	80.6	80.4	86.0	85.8	87.2	89.2	87.8	81.2	85.0	82.
Mean rainfall, mm. ....	0	6.4	35.3	95.5	132.1	183.6	100.1	150.6	201.2	229.4	11.9	2.0	148.1

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

TABLE 48. - AVERAGE LIVeweIGHTS AND MEASUREMENTS OF N'DAMA CATTLE AT ILORIN, NIGERIA

	Male			Female		
	1 year	2 years	mature	1 year	2 years	mature
Liveweight, kg. ....	116 (29)	192 (13)	287 (4)	113 (14)	184 (13)	245 (25)
Length from shoulder point to pinbone, cm. ....	96 (3)	—	135 (5)	94 (4)	102 (4)	124 (5)
Height at withers, cm. ...	91 (3)	—	107 (5)	89 (4)	94 (4)	104 (5)
Depth of chest, cm. ....	51 (3)	—	69 (5)	51 (4)	53 (3)	64 (5)
Width of hips, cm. ....	28 (3)	—	38 (5)	25 (4)	30 (4)	41 (5)
Heart girth, cm. ....	117 (3)	—	155 (5)	114 (4)	127 (4)	155 (5)

Numbers sampled in brackets.

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

and pigeon peas. During the night the cattle were kept in open-fenced enclosures. Calves were suckled until they were weaned at between 6 and 9 months of age.

The average birthweight of 43 bull calves was 15.3 kg. and that of 31 heifer calves was 14.8 kg.

Average liveweights and body measurements of cattle at the Ilorin Farm are shown in Table 48.

Heifers have calved for the first time at about 3 ½ years and calves have been born at all seasons of the year. Young bulls have been first used for service at about 3 years of age and have continued in breeding work up to their 10th or 12th year. Bulls are reported to have been rather shy to service.

Milk yields of 504 lb. in 209 days and 272 lb. in 189 days have been recorded. The cattle at Ilorin and Oyo have fattened satisfactorily on grazing.

Oxen used for draft work (carting and tillage) have been worked for approximately 200 six-hour working days in a year. At haulage work a pair has pulled a load of about 7 ½ hundredweight over about two and one-half miles in an hour.

N'Dama cattle at Ilorin and Oyo have been found to be resistant to trypanosomiasis but susceptible to rinderpest and to foot-and-mouth disease and haemorrhagic septicaemia. Calves have been found infested with roundworms. A moderate susceptibility to ticks and lice has been reported (Ryall, T.E., *Personal Communication*).

N'Dama cattle have been introduced into Léopoldville Province in the Belgian Congo, where they are maintained, with few exceptions, in herds under European management. The climate is equatorial or semi-equatorial with annual rainfall varying from 800 mm. or less with a six-month dry season near the coast, to 2,000 mm. with a dry season confined to June and July in the north and northeast. The savannah vegetation of the cattle-breeding areas includes open grasslands, grasslands with scrub and scattered trees and open forest.

The cattle are maintained on plantations, missions and farms primarily for the supply of meat to the local population. Management is extensive, the cattle being pastured on natural savannah grazing during the day and enclosed in kraals at night, except in the smaller herds which are often pastured in fenced paddocks. Ticks are controlled by spraying or dipping with an acaricide.

The N'Dama has been found to be an excellent cattle type for beef production on relatively poor savannah grazing in this area and oxen are reported to reach an average liveweight of 350 kg. on maturity (Merckx, 1956).

N'Dama cattle were exported from Senegal in 1825 and later, to the islands of Martinique and Guadeloupe in the West Indies. Be-

tween 1870 and 1914 imports, also of Senegal cattle; were made into the Virgin Islands. These have been crossed with cattle of the British Red Poll breed and the progeny have been reported to have been successful both for meat and milk production.

#### Crosses with other breeds of cattle

As well as crosses between N'Damas and the zebus of the north and the West African Shorthorns of the coastal area, Doutressouille (1947) mentions the following crosses with exotic breeds:

1. *Charollais*. Two bulls were imported into the French Sudan in 1927. The first generation ( $F_1$ ) animals showed a considerable degree of variation. When the  $F_1$  females were put to a Charollais bull the  $3/4$  Charollais offspring were more uniform. Two  $3/4$  Charollais bulls which were used for breeding weighed 500 kg. and 525 kg. respectively. The milk production of  $3/4$  Charollais females was 5 to 6 liters daily. Average liveweights and measurements of  $1/2$  Charollais and  $3/4$  Charollais cattle are given in Tables 49 and 50.

TABLE 49. — AVERAGE LIVEWIGHTS AND MEASUREMENTS OF FIRST CROSS  $1/2$  CHAROLLAIS —  $1/2$  N'DAMA CATTLE

	Male			Female		
	2 teeth	4 teeth	6 teeth	2 teeth	4 teeth	6 teeth
Liveweight, kg. ....	195	250	300	200	250	320
Height at withers, cm. ....	115	116	119	119	119	123
Heart girth, cm. ....	141	150	154	151	160	167

SOURCE: Doutressouille, 1947.

TABLE 50. — AVERAGE LIVEWIGHTS AND MEASUREMENTS OF  $3/4$  CHAROLLAIS —  $1/4$  N'DAMA CATTLE

	Male			Female		
	2 teeth	4 teeth	6 teeth	2 teeth	4 teeth	6 teeth
Liveweight, kg. ....	—	—	—	150	350	375
Height at withers, cm. ....	112	112	127	117	120	124
Heart girth, cm. ....	151	170	180	150	160	168

SOURCE: Doutressouille, 1947.

2. *Normande*. A Normande bull was imported in 1927 into the French Sudan. The first generation (F<sub>1</sub>) N'Dama (Bambara) x Normande offspring were less successful than those from the Charollais bulls. The average liveweight of mature F<sub>1</sub> females was 275 to 300 kg.

#### Sources of breeding stock and information regarding the breed

Doutressoulle (1947) estimated that there were 1,300,000 cattle of taurine type in French West Africa. It is probable that the greater part of these were N'Damas. A report from Sierra Leone estimated that there were, in that colony, 58,000 cattle, all of which were thought to be N'Dama. Doutressoulle (1948) estimated that there were 300,000 cattle of the N'Dama and derived types in the French Sudan.

Further information regarding N'Dama cattle can be obtained from:

Service de l'élevage et des industries animales, Abidjan, Ivory Coast, French West Africa.

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

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

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

The Director of Agriculture, Western Region, Ibaden, Nigeria.

The Director of Agriculture, Department of Agriculture, Sierra Leone.

## WEST AFRICAN SHORTHORNED CATTLE

### Origin

Doutressoulle (1947) is of the opinion that the shorthorned West African humpless cattle, as well as the N'Dama, had their origin in herds brought south by Berber tribesmen from southern Morocco. He mentions, however, the opinions of Pierre (1906), that the present cattle population of the coastal region was descended from Iberian cattle introduced by the early Portuguese navigators, and of Pecaud (1912), that they were derived from the indigenous Somba cattle.

Cattle of this type have been referred to as West African Shorthorn, "Race des Lagunes," "Somba," Nigerian Dwarf Shorthorn

or "Muturu," "Bakosi," and Dwarf Shorthorn (Mason, 1951a; Doutressouille, 1947; Colonial Office, 1953).

It is considered that the local point of origin of the type was the mountainous region of Attacora in northern Dahomey where the Somba cattle are now found (Doutressouille, 1947).

Doutressouille (1947) distinguishes a subtype, the Baoulé, in the central Ivory Coast in the Bouaké area and showing the effect of crossing with the N'Dama to the north.

The Somba cattle were not affected by the rinderpest epizootic of 1892 and so were able to colonize areas in the neighborhood of the Attacora mountains which had been destocked by the disease. A considerable amount of crossing with other types such as, for instance, the Borgou, took place in these areas.

### Conditions in the native home of the breed

#### *Location, topography and soils*

Doutressouille (1947) gives the southern parts of the Ivory Coast, Togoland, and Dahomey in addition to the Attacora mountains in northern Dahomey as the habitat of the West African shorthorned cattle as well as the Baoulé area in the central Ivory Coast. Mason (1951a) also reports West African Shorthorns in the Gambia (where they are dying out), in the coastal areas of Ghana, between the Niger and Benue rivers and the sea in Nigeria as well as in isolated hilly areas along the eastern border (the "Muturu" subtype) and, from a 50-year-old account, in the coastal regions of Liberia.

The land near the coast of much of the area is low and sandy with, in many places, lagoons open to the sea or closed from it by sandbars. Inland the altitude increases to 70 or 100 meters and, further north in the Bouaké area, to 338 meters, and lateritic soils appear as well as sands and loams.

#### *Climate*

The climate is controlled by the seasonal northward and southward movement of the intertropical convergence. In January, when the convergence is at its furthest south, the area is to some extent subject to the dry northerly harmattan wind which, however, is sometimes replaced by southwesterly winds.

During the greater part of the year the coastal areas are covered by the monsoon. August and September, however, as a result of an inversion of temperature in the mass of monsoon air, have little rain. The mean annual temperature is about 27° C. and neither the diurnal

nor the seasonal variation exceeds 7° C. Rainfall may exceed 4,445 mm. in the year, most of which falls between April and November.

Over much of the coast there are two rainfall maxima; almost two thirds of the rain falls in April, May and June and there is a second maximum in September. The Sierra Leone and Liberian coasts have, however, a single maximum in August.

Further inland the dry season is of longer duration and the seasonal temperature range is rather higher.

There is a narrow area on the Ghana, Togoland and Dahomey coasts which, with about 760 mm. per annum, has a considerably lower rainfall (Kendrew, 1953).

Climatological data for stations in Togoland (Sokodé in the Somba area and Lomé on the coast), Bouaké in the Baoulé area, and Abidjan in the coastal savannah area are given in Tables 51, 52, 53, and 54.

TABLE 51. — CLIMATOLOGICAL DATA FOR LOMÉ IN THE TOGO COASTAL AREA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °C. ....	26.5	27.5	28.1	27.8	27.2	26.1	25.1	24.5	25.2	26.2	26.9	26.7	28.6
Mean rainfall, mm.	10	32	48	24	139	189	60	14	40	79	33	13	602

Temperature: Data for a single year  
 Rainfall: 1888-1947 inclusive.  
 SOURCE: Politzer, J.. *Personal Communication.*

TABLE 52. — CLIMATOLOGICAL DATA FOR SOKODÉ IN THE SOMBA AREA, TOGO

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °C. ....	25.9	27.8	28.4	28.1	26.6	24.9	24.5	24.5	24.6	26.0	26.0	26.3	26.1
Mean relative humidity, % ..	28	49	53	61	76	80	82	83	82	71	60	37	63.5
Mean rainfall, mm. ....	0	26	20	139	197	152	278	340	242	45	26	0	1 465

SOURCE: Amégée, P.. *Personal Communication.*

### Vegetation

Much of the area, especially near watercourses, is dense tropical closed forest, but in some areas by the coast and on the inland plateaus there is savannah grassland where the more important grass genera include *Imperata*, *Rottboellia*, *Digitaria*, *Andropogon*, *Cymbopogon* and

TABLE 53. - 8-YEAR CLIMATOLOGICAL MEANS FOR BOUAKÉ  
IN THE BAOULE AREA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °C. ....	27.3	28.5	28.9	28.6	27.4	26.1	24.9	24.6	25.1	26.0	26.5	27.0	26.6
Mean relative humidity, % ..	55	61	65	69	75	77	79	80	80	78	75	65	71.6
Mean rainfall, mm. ....	10	37	104	147	135	152	80	117	208	133	38	25	1 186

SOURCE: Service de l'élevage de la Côte-d'Ivoire, *Personal Communication*.

TABLE 54. - 8-YEAR CLIMATOLOGICAL MEANS FOR ABIDJAN, IVORY COAST

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °C. ....	27.5	28.3	28.7	28.6	27.7	26.3	25.4	24.9	25.4	26.5	27.2	27.4	26.9
Mean relative humidity, % ...	79	80	77	78	81	83	80	81	82	82	81	81	80.4
Mean rainfall, mm. ....	40	53	100	124	360	496	213	54	71	168	201	78	1 958

SOURCE: Service de l'élevage de la Côte-d'Ivoire, *Personal Communication*.

*Paspalum*. During the short dry season the savannahs are much subject to fires. The greater part of the area provides an environment favorable to the tsetse fly.

Much of the forest is now devoted to both plantation crops, including cocoa, kola, and citrus, and to food crops such as plantains, cocoyams, maize and cassava, and considerable areas are under forest regeneration fallow (Commonwealth Bureau of Pastures and Field Crops, 1951).

#### *Management practices*

In much of the area cattle are maintained solely for social and ritual purposes, animals being exchanged in the bride wealth and slaughtered on ceremonial occasions. In the coastal and forest areas the cattle are generally left at liberty in the forest during the day, grazing along paths and clearings and obtaining much of their requirements from plants other than grasses. During the night they may be confined in an open enclosure for security, but nowhere in the area is any form of stabling employed by native stockowners.

In the Baoulé and Somba areas (central Ivory Coast and northern Dahomey) herdsmen of the nomadic or semi-nomadic Peul tribes are employed by the sedentary cultivators to take their cattle to graze during the day. In these areas cows may be milked on their return from grazing in the evening.

Movements to grazing are daily and local; there are no prolonged seasonal movements of the herds.

#### Physical characteristics of the breed

The West African Shorthorns (Figures 44 and 45) are small, thickset animals. The head is short and broad. The profile is straight. The orbital arches are well marked, lending a degree of concavity to the wide forehead. The poll is broad and straight and the short horns, of circular cross section in the male and oval in the female, spring from it in a sideways and upwards direction, curving forward at the extremities. Polled animals are of frequent occurrence, as are those with horns which are unattached to the bony core.

The head is carried low on the short and, in the bull, powerful neck. The topline is approximately straight from the withers to the tail-setting and the back is broad and well muscled. The barrel is well rounded but tends to lack depth behind the shoulder. The hind-quarters are of medium length and slight slope and the sacrum is not accentuated. The tail is long with a well-developed switch. The dewlap and umbilical fold are little accentuated. The limbs are short and fine of bone.

The skin is tight and its pigmentation is dark, as is that of the muzzle and surround of the eye. The coat coloration varies considerably. Black and, less frequently, various shades of brown occur both as whole colors and in combination with white. Grays and duns are less common.

TABLE 55. — AVERAGE LIVeweIGHTS AND MEASUREMENTS OF WEST AFRICAN SHORTHORNED CATTLE IN TOGO (*Race des Lagunes*)

	Male			Female		
	1 year	2 years	mature	1 year	2 years	mature
Liveweight, kg. ....	45	66	192	38	63	150
Height at withers, cm. ....	66	70	92	63	79	94
Width of hips, cm. ....	17	15	29	17	23	30
Heart girth, cm. ....	63	78	134	95	95	143

SOURCE: Service de l'élevage de la Côte-d'Ivoire, *Personal Communication*.

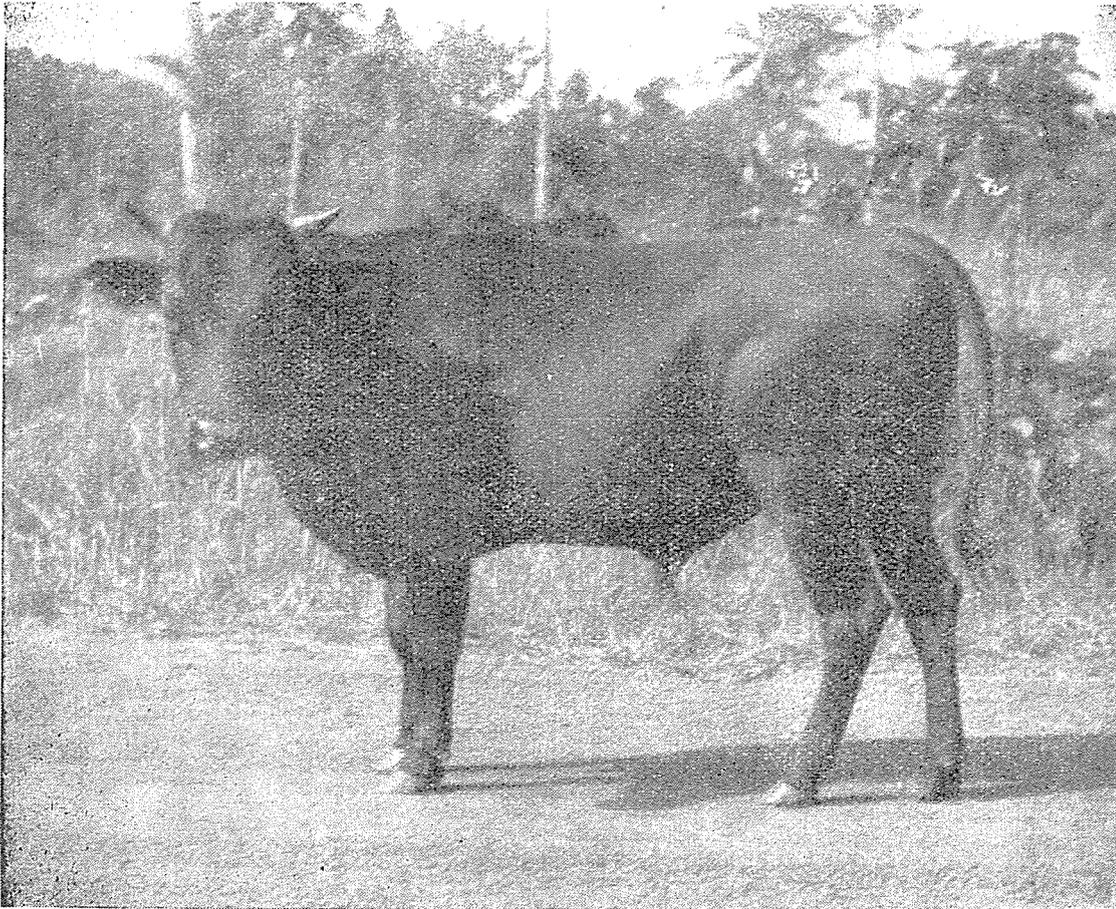


FIGURE 44. *West African Shorthorn bull.*

FIGURE 45. *West African Shorthorn cow.*

Courtesy of G. M. Gates

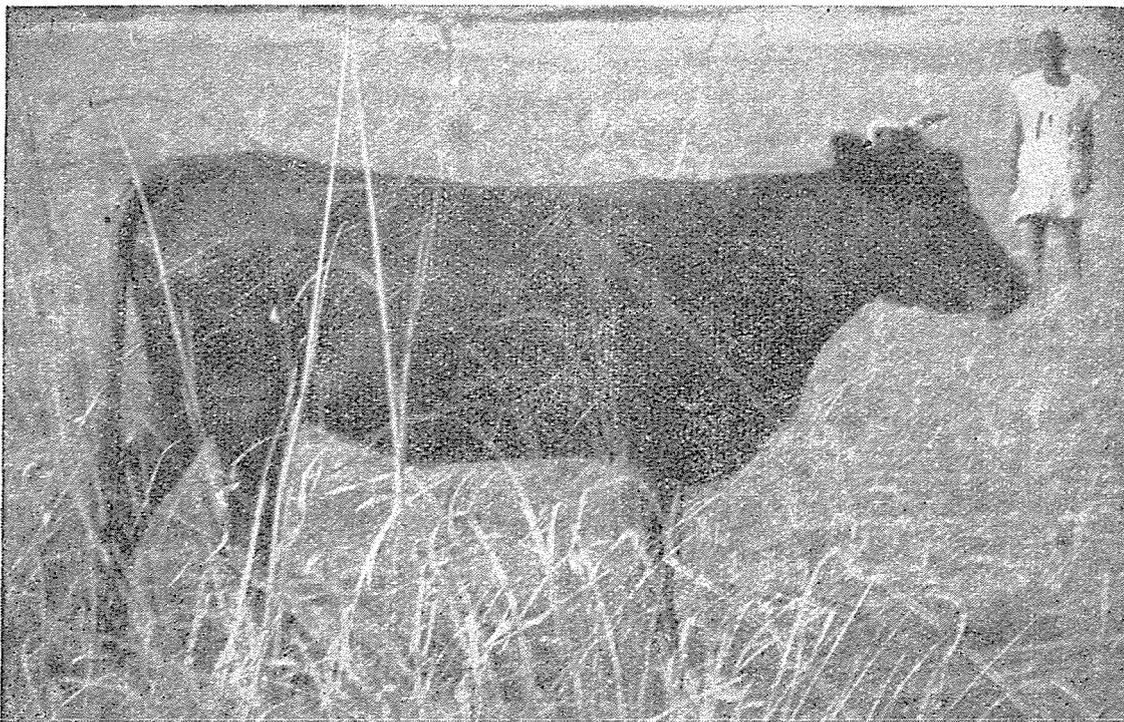


TABLE 56. — AVERAGE LIVeweIGHTS AND MEASUREMENTS OF WEST AFRICAN SHORTHORNED CATTLE IN THE IVORY COAST (BAOULÉ)

	Male			Female		
	1 year	2 years	mature	1 year	2 years	mature
Liveweight, kg. ....	104	137	200	98	197	289
Height at withers, cm. ....	85	87	106	57	98	106
Width of hips, cm. ....	23	24	25	21	32	42
Heart girth, cm. ....	111	123	136	109	135	169

SOURCE: Service de l'élevage de la Côte-d'Ivoire, *Personal Communication*.

TABLE 57. — AVERAGE LIVeweIGHTS AND MEASUREMENTS OF WEST AFRICAN SHORTHORNED CATTLE IN NIGERIA (MUTURU)

	Male			Female			Ox
	1 year	2 years	mature	1 year	2 years	mature	mature
Liveweight, lb. ....	168	246	451	143	227	350	—
Length from shoulder point to pinbone, cm. ....	71	81	86	69	81	84	86
Height at withers, cm. ....	86	99	104	86	94	96	107
Depth of chest, cm. ....	43	48	56	41	46	53	56
Width of hips, cm. ....	23	30	36	25	28	36	38
Heart girth, cm. ....	112	135	152	109	127	135	155

SOURCE: Gates, G. M., *Personal Communication*.

TABLE 58. — AVERAGE MEASUREMENTS OF WEST AFRICAN SHORTHORNED CATTLE IN THE SOKODA AREA, TOGO (SOMBA)

	Male			Female			Ox
	1 year	2 years	mature	1 year	2 years	mature	mature
Height at withers, cm. ....	91	99	116	90	110	114	115
Depth of chest, cm. ....	37	40	47	40	46	51	54
Width of hips, cm. ....	20	22	28	24	28	23	32
Heart girth, cm. ....	110	127	137	123	119	156	139

Means derived from measurements of 60 animals.

SOURCE: Amégée, P., *Personal Communication*.

The average birthweights of calves have been reported as: 25 kg. (100 calves in Togo coastal area) (Politzer, J., *Personal Communication*); and 22.7 kg. (*present* Ghana, 1952).

Average measurements of West African Shorthorns from various stations are given in Tables 55, 56, 57, and 58.

#### Functional characteristics of the breed

The age at first calving of cows of the West African Shorthorn type has been reported as follows: *a*) *Race des Lagunes*, 3 years (Ivory Coast) to 4 years (Togo); *b*) Muturu (Nigeria), 2 ½ to 3 years; *c*) Baoulé (Ivory Coast), 2 ½ to 3 years; *d*) Somba (Togo), 3 ½ years.

The average interval between subsequent calvings has been 12 to 14 months (Somba) or 24 months (*Race des Lagunes*). Where the nutritional status of the cattle was kept approximately level throughout the year there was no calving season, but elsewhere the majority of heats occurred in March, April and May. Cows have been observed to have a productive life of between 4 and 7 lactations.

Young bulls have been capable of service at about 2 years of age and have had a breeding life of up to 12 or 14 years.

Milk yield is low: 1 ½ to 2 liters a day have been recorded and a report from Nigeria suggested that 28 gallons (127 liters) was an average lactation yield. Lactation continued for 4 to 6 months. A butterfat percentage figure of 3.3 percent was reported from Togo.

West African shorthorned cattle give a beef carcass of good quality. Animals of the *Race des Lagunes* have given about 55 percent of useful meat when killed at between 4 and 6 years of age. Oxen of the Baoulé subtype have been killed at about 4 years of age with an average live-weight of 200 to 300 kg.

West African shorthorned cattle are not generally used for work. At government stations in Nigeria where they have been so utilized it has been found that their working capacity has been small and their stamina limited.

Cattle of this type appear to acquire a natural immunity to trypanosomiasis. This is known as premunition, whereby the trypanosomes occur in the blood in a state of balance with the host, but the immunity can be broken down if the animal is weakened by other disease, malnutrition, overwork, etc. and the normal symptoms of the condition appear. Resistance to piroplasmiasis has also been reported. Susceptibility to rinderpest, foot-and-mouth disease, haemorrhagic septicæmia, contagious abortion, tuberculosis and pleuro-pneumonia has been reported from various territories.

Ticks are prevalent throughout the area. Infection of calves with roundworms has been reported from a number of stations.

### Sources of breeding stock and information regarding the breed

There are reported to be, very approximately, about 100,000 Muturu cattle in Nigeria. No reports have been obtained as to numbers in other territories.

Further information on the West African shorthorned cattle can be obtained from:

Service de l'élevage et des industries animales, Abidjan, Ivory Coast, French West Africa.

Service de l'élevage et des industries animales. Lomé, Togo, French West Africa.

The Principal Veterinary Officer, Enugu, Nigeria.

The Director of Veterinary Services, Ibaden, Nigeria.

The Director of Agriculture, Enugu, Nigeria.

The Director of Agriculture, Ibaden, Nigeria.

## *Group IV*

### **KURI**

#### **Origin**

Kuri, or as they are sometimes called, Lake Chad or Buduma, cattle are maintained by the closely related Kuri and Buduma tribes which are thought to be descended from the Kanembou tribe which migrated to the Kanem district from Libya and the French Sudan in historical times. A number of suggestions (Curson and Thornton, 1936; Ross, 1944; Koné, 1948; Gates, 1952) have been put forward to account for the derivation of these cattle, which are the largest in West Africa, are distinguished by gigantic bulbous horns, and bear little resemblance to any other cattle type in Nigeria or French West Africa.

#### **Conditions in the native home of the breed**

##### *Location, topography and soils*

The area in which the Kuri cattle are found is between approximately 13° and 16° north latitude and 13° and 17° east longitude, and embraces the islands and shores of Lake Chad, both in Bornu Province, Nigeria, and in Chad territory and N'Guigmi Province of the Colonie du Niger. The type also extends into the Sudan Savannah zone to the west and south of Lake Chad and to the borders of the Sahelian zone to its northwest.

With the exception of that part which extends into the Sudan Savannah zone, which is undulating with fixed sand dunes; the area is flat with extensive marshes near the shores of Lake Chad. The elevation above sea level is approximately 1,000 feet.

##### *Climate*

The area occupied by the Kuri cattle has the Sudan zone climate with a clearly defined wet season extending over the five months from May to September while the remainder of the year is very dry. During the period October to February the days are hot and dry and temperatures of over 110° F. are often recorded. The diurnal range in both

temperature and humidity is, however, considerable and the nights can be cold and sometimes foggy. During the rainy months storms move over the area from the southwest. At this time of year, although temperatures are lower than in the dry season, a feeling of oppression is induced by the increased humidity and frequently overcast sky.

Climatological data for Bornu Province, Nigeria, and for Fort Lamy in Chad territory are given in Table 59.

TABLE 59. - CLIMATOLOGICAL DATA FOR THE LAKE CHAD AREA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<i>Bornu Province, Nigeria</i>													
Mean temperature, °C. ....	23.9	23.9	26.7	29.4	32.2	29.4	26.7	26.7	26.7	26.7	23.9	21.1	26.4
Humidity, at 15.00 hrs., % .....	20	20	15	20	30	40	60	70	50	30	20	20	32.9
Rainfall, mm. ...	nil	nil	nil	nil	38.1	63.5	177.8	215.9	101.6	12.7	nil	nil	609.6
<i>Fort Lamy, Lake Chad Territory</i>													
Mean temperature, °C. ....	23.8	25.6	29.5	32.5	32.3	30.9	28.2	26.5	27.7	29.4	27.2	24.8	28.2
Humidity, % ...	33.7	30.9	27.1	32.8	43.5	49.5	62.3	70.6	66.6	53.5	41.0	39.5	45.9
Rainfall, mm. ...	nil	nil	nil	8.2	38.1	64.4	169.8	243.5	86.8	29.9	1.3	nil	642.0

SOURCE: Bornu Province: Reed, R. L., *Personal Communication*.  
Fort Lamy: Troquereau, *Personal Communication*.

### Vegetation

The vegetation of the area is a mixture of Sudan and Sahel zone vegetation. Around the shores of the lake, in the marshy area, tall reed grasses of the papyrus type grow profusely. The vegetation of the Nigerian shores of Lake Chad has been described by Golding and Gwynne (1939). Koné (1948) describes the vegetation from the French side. Along the banks of rivers and rivulets which drain into Lake Chad there is a dense growth of *Commiphora africana*, *Acacia raddiana*, *Balanites aegyptiaca*, *Acacia senegal*, *Cadaba farinosa* and *Calotropis procera*. Of the grasses, *Cenchrus echinatus* and *Andropogon* spp. are found. Elsewhere in the area other grasses occur, including *Panicum exile*, *Panicum elatum*, *Digitaria exilis*, *Echinochloa colona*, *Sporobolus* sp., *Pennisetum setosum*, *P. parviflorum*, *P. mollissimum*, *Chloris prieri*, *Dactyloctenium aegyptiacum*, *Digitaria gayana*, *Aristida mutabilis*, *Eragrostis tremula* and *Oryza brachyacantha*.

### *Management practices*

Most of the Kuri cattle are owned by the Kuri and Buduma tribesmen who live on the islands and marshy shores of Lake Chad. The cattle are usually seen in herds of 30 to 35 cows with a bull, and subsist mainly on the lakeside grasses. Several hours are spent each day in the waters of the lake which have a high potassium chloride content, either grazing or swimming between the islands and the shore. These cattle do not appear to thrive as well when they are taken away from the vicinity of the lake. The cattle are utilized mainly for milk and beef production and, although some are used as pack animals, they are not generally considered to be suitable for draft purposes.

### **Physical characteristics of the breed**

The Kuri (Figures 46, 47 and 48) is a tall animal, distinguished by its enormous horns and by its absence of hump. The head is long, with a straight profile and a wide forehead, to which the prominence of the orbital arches lends a degree of concavity. The ears are of medium size and are carried horizontally. The horns of the Kuri are, perhaps, its most remarkable feature. Typically they are long (70 to 130 cm.), circular in cross section, and about 35 to 55 cm. in circumference at the base. The direction of growth is that of a high lyre shape or wide crescent. Sometimes, however, the horns may be short — about 20 to 30 cm. — and as much as 24 inches in circumference at the base. These horns may have a surface which is roughened and ridged and a cross section which is flattened so that their appearance is that of "enormous ears." The coloration of the horns is generally light with the exception of the tips which are black. The horns, although their appearance is massive and lends an aspect of great weight to the head, are not heavy as their structure is cellular and porous. Loose horns can be seen in Kuri herds and polled animals are not uncommon.

The neck is short and flat. The body is long and the topline is straight, rising slightly from the withers, which, although thick, show no evidence of a hump, to the hindquarters which are of moderate slope. The tips of the dorsal vertebrae show a fused bifid structure. The limbs are long and the hoofs are large and open.

The most common coat coloration is white but gray shading over the shoulders and the extremities, red, and red and white are sometimes seen.

In areas further from Lake Chad Kuri herds show evidence of a degree of zebu ancestry and small cervico-thoracic humps may be

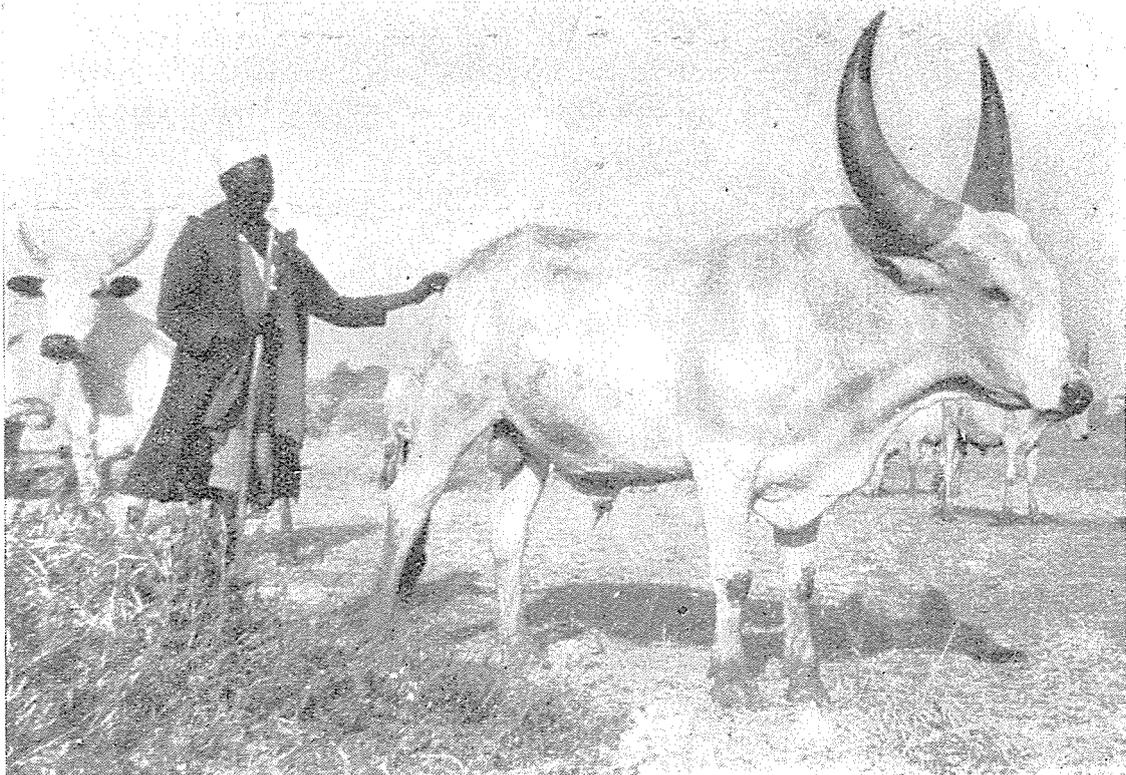
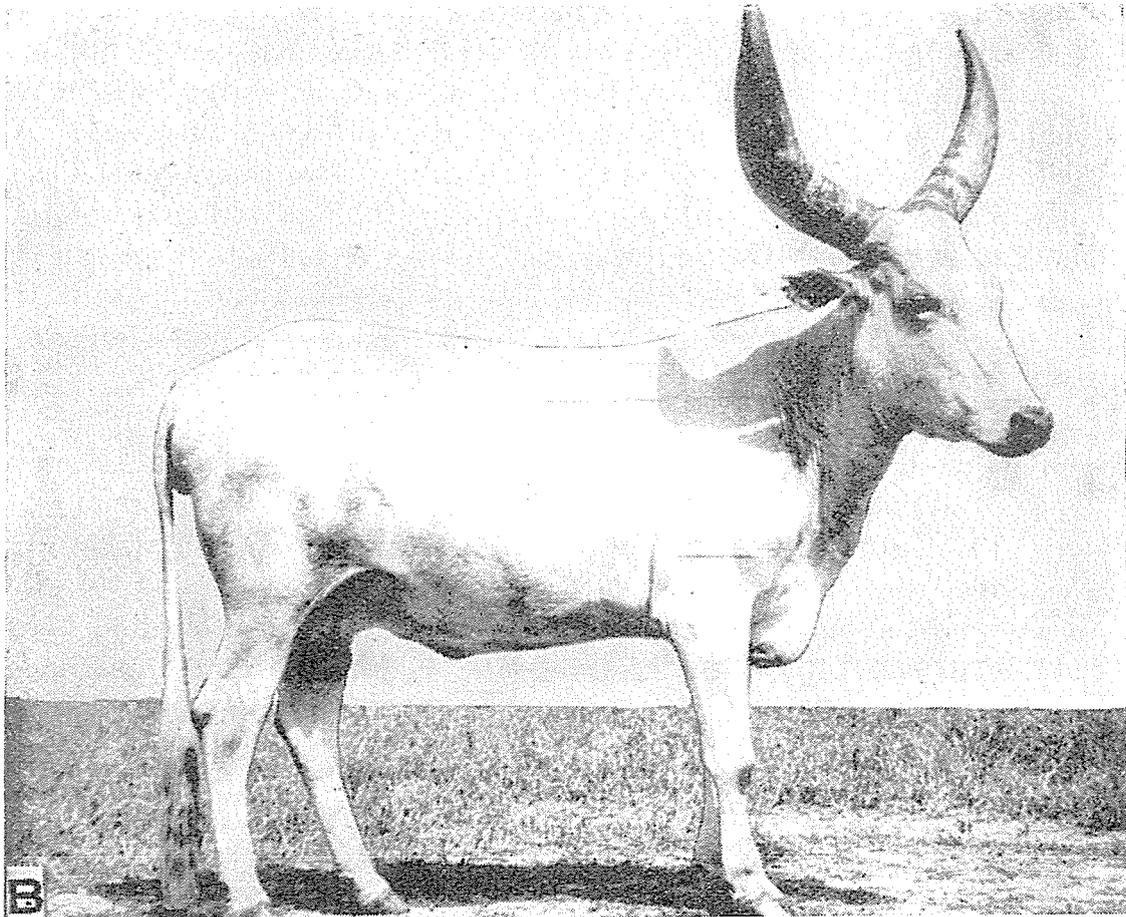


FIGURE 46. *Kuri bull.*

FIGURE 47. *Kuri cow.*

Courtesy of G. M. Gates



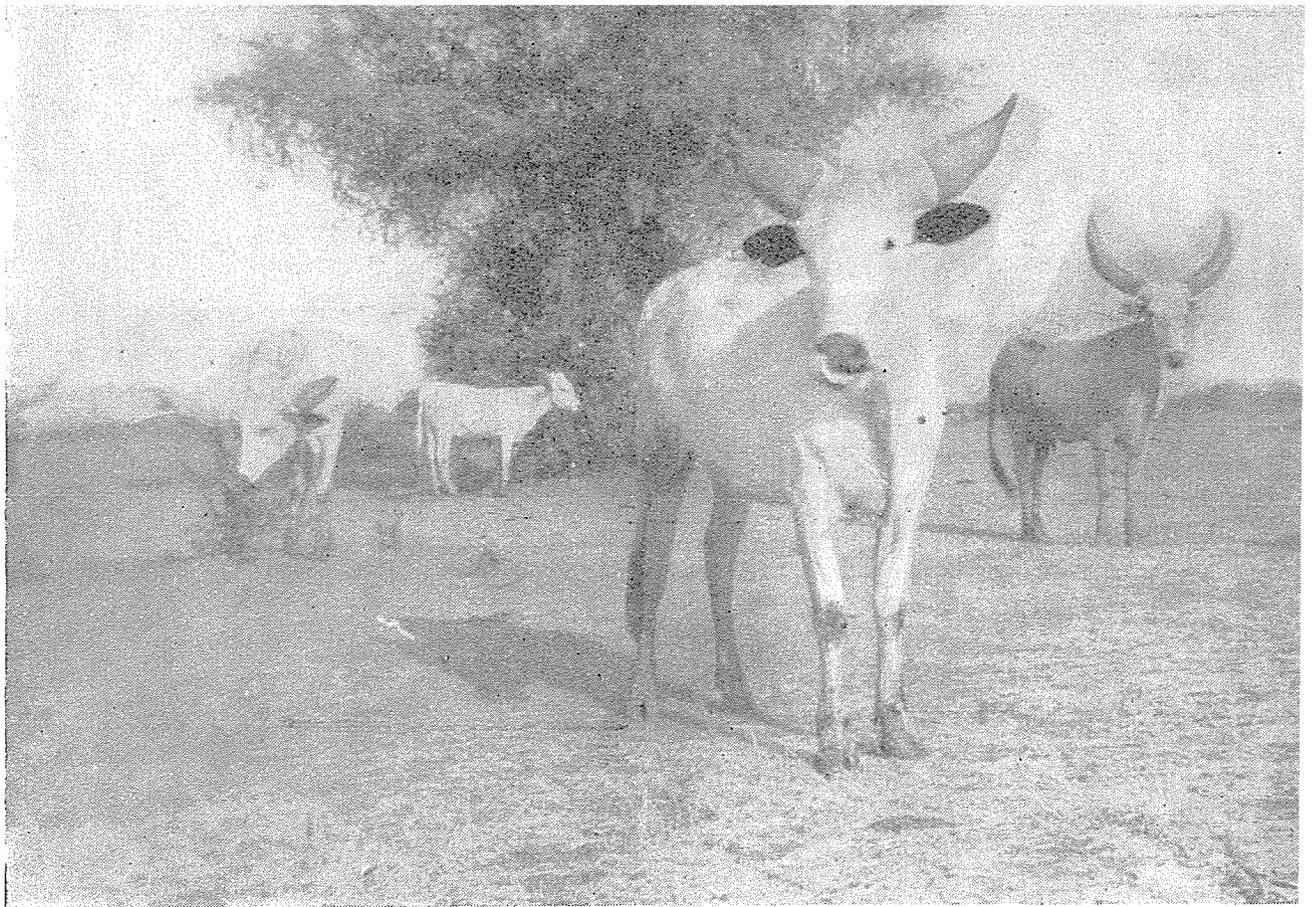


FIGURE 48. *Kuri cattle near Lake Chad.*

Courtesy of G. M. Gates

seen as well as an increased proportion of broken and pied coat colors (Doutressoulle, 1947; Reed, R.L., *Personal Communication*; Troquereau, *Personal Communication*).

The average birthweight of male calves has been 55 lb. and that of females, 50 lb. (Reed, R. L., *Personal Communication*).

Average measurements of Kuri cattle at the Government Cattle Farm, Maiduguri, Bornu Province, Nigeria and in French West Africa are given in Tables 60 and 61.

TABLE 60. - AVERAGE MEASUREMENTS OF KURI CATTLE AT MAIDUGURI

	Male			Female		
	1 year	2 years	mature	1 year	2 years	mature
Weight, lb. ....	290	500	1 100	280	460	800
Length from shoulder point to pinbone, in. ....	37	48	60	40	46	57
Height at withers, in. ....	42	46	60	41	46	55
Depth of chest, in. ....	16	19	27	17	20	25
Width of hips, in. ....	10	13	19	11	13	18
Heart girth, in. ....	46	52	76	46	50	68

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

TABLE 61. - AVERAGE MEASUREMENTS OF KURI CATTLE  
IN FRENCH WEST AFRICA

	Male	Female	Ox
Weight, kg. ....	650.0	400.0	550.0
Length from shoulder point to pinbone, cm. ....	122.3	116.3	124.0
Height at withers, cm. ....	146.0	136.0	151.0
Depth of chest, cm. ....	68.9	66.5	72.8
Width of hips, cm. ....	49.2	46.0	50.2
Heart girth, cm. ....	195.0	184.0	211.0

SOURCE: Malbrant *et al.*, 1947.

### Functional characteristics of the breed

The type is mainly utilized for the production of milk and meat. The cattle are well adapted to a warm and wet environment but they do not thrive so well in dry, sandy areas. Part of the milk is utilized for the production of butter.

As a draft animal, the Kuri, on account of its heaviness and lethargic temperament and slow movement, gives a poor performance. It is reported that even as pack animals they suffer from the sun and get tired quickly.

Females calve for the first time when they are 3 ½ to 4 years old, and thereafter produce a calf every 15 to 18 months. They breed throughout the year, although the usual breeding season is from July to October. The average number of lactations during a lifetime ranges from 6 to 8.

The males are used for service after 3 years of age and have a breeding life of about 8 to 10 years.

French authorities report that the average lactation yield of Kuris is 600 to 700 liters after feeding the calf. The peak production in a day is about 6 liters. Lactation duration is 6 to 10 months and the calves are not weaned until the end of the lactation. A government herd is being established to study the breed.

The Government of Nigeria has established a Kuri herd at Maiduguri Government Farm in Bornu Province. Average milk performance of Kuris at this farm is given in Table 62.

TABLE 62. - MILK YIELD OF KURI COWS AT MAIDUGURI GOVERNMENT FARM

No. of cows	Average production, lb.	Days in milk	Average calving interval	Remarks
Average cows, 18	2 776	280	445	several lactations from each cow
Superior cows, 6	3 656	280	445	

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

Kuris in French territory have been reported to make excellent slaughter animals. They respond to natural grazing and are ready for slaughter at 5 years of age when they weigh about 1,100 to 1,300 lb. They dress out at approximately 50 percent, yielding about 500 to 600 lb. of meat. The shoulder is heavy and the proportion of bone is high.

#### Sources of breeding stock and information regarding the breed

Further information regarding the Kuri may be obtained from the following sources:

The Director of Agriculture, Kaduna, Northern Nigeria.

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

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

## Group V

### ANKOLE

#### Origin

The Ankole cattle are usually referred to as being of the Sanga type which is considered by Epstein and other workers to have been evolved from the intermixture of the lateral-horned zebu and the Hamitic Longhorn (Bonsma, 1951). Curson and Thornton (1936) describe the routes which these cattle may have taken when accompanying human migrations. They state that "the southern stream probably passed through Uganda and followed the great lakes until the Zambesi was reached".

Ankole cattle have also been spoken of as Bahima (Uganda and the Belgian Congo), Watusi or Watusi Longhorn (Ruanda-Urundi and Tanganyika), Ruanda and Barundi (to the north of Lake Kivu) from the tribes and districts with which they are associated, while Curson and Thornton (1936) mention, in addition, the name Nsagala as being used in Uganda. In Ruanda-Urundi, the sacred cows, Inyambos, are of the Ankole type. The Bashi cattle of the Belgian Congo, which have developed from the intermixture of the local cattle of the district of that name and the Barundi, are a smaller variety of the Ankole in which the horns are finer and shorter.

#### Conditions in the native home of the breed

##### *Location, topography and soils*

The Ankole cattle type, together with its local strains and varieties, is located in an area between approximately 5° south and 3° north of the equator and between 27° and 32° east longitude, which comprises parts of the southwestern districts of Toro, Kigezi and Ankole in Uganda; the Bukoba district of Lake Province and the Kibondo, Kasulu and Ufipa districts of Western Province, Tanganyika; Ruanda-Urundi; and the district of Kibali-Huri in Eastern Province, the territory of

Buma and Irumi and the mountain lands to the west of Lake Albert, Kivu Province, Costermansville district, and the territories of Rutshuru, Masisi, Uvira, Fizi and Mwenga in the Belgian Congo.

The area in Uganda in which Ankole cattle occur is a highland plateau with an approximate average altitude of 4,500 feet above sea level. In Tanganyika they are found in the western section of Lake Province and the highlands of Western Province. Ankole cattle in Tanganyika occur, for the main part, on a strip of mountain grassland along the borders of Belgian territory. In the Eastern Province of the Belgian Congo, Ankole cattle are found in the mountainous areas where the altitude varies from 1,200 to 2,000 meters. The soil of this region is of granitic origin. They were formerly maintained in the alluvial plains of Semliki valley, but the area was evacuated owing to tsetse fly infection. In the zone north of Lake Kivu this cattle type is localized in a highland region of elevation between 1,600 and 2,000 meters. The soil in the whole of this area is of recent volcanic formation and, in the Rutshuru territory, is of more or less weathered lava. The western sector of Ruzizi valley is slightly undulating with an altitude varying from 750 to 900 meters. The soil is sandy clay with interspersed limestone. Along the banks of the river slightly saline lagoons occur. In the southern zone of Lake Kivu, where the smaller Bashi variety prevails, the region is mountainous with altitudes varying from 1,450 to 2,200 meters with a red clayey soil of basaltic origin which is intensely cultivated.

### *Climate*

In the Western Province of Uganda, where Ankole cattle are bred, there are two peak rainy periods. The first peak occurs during March to April while the second peak is in September to October. The average rainfall of the area varies from 40 to 50 inches. The mean maximum temperature during the day is about 80° to 85° F. while the diurnal variation may be about 25° F.

The climate of the Ankole area in Tanganyika is hot and dry, except in the hill country of Ufipa, Kasulu and Kibondo districts. A fairly high annual mean temperature of 70° F., with daily and seasonal variations exceeding 30° F., is experienced. The annual rainfall occurs in two periods and is about 30 to 40 inches. The tract where Ankole cattle are raised has a comparatively poor rainfall, but in Bukoba the annual rainfall is as high as 80 inches.

Climatological data from Bunia in the Eastern Province of the Belgian Congo, where an Ankole herd is maintained, are given in Table 63.

TABLE 63. - CLIMATOLOGICAL DATA FOR BUNIA IN THE BELGIAN CONGO  
(ALTITUDE 1,250 M.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Maximum temperature, °C. .	37.0	36.0	37.0	33.0	33.0	31.0	29.9	31.0	32.0	31.0	30.6	31.5	32.8
Minimum temperature, °C. . .	13.0	12.0	12.0	14.0	13.4	13.1	12.4	11.8	12.8	12.7	12.5	12.4	12.7
Mean temperature, °C. . . . .	22.0	22.8	22.9	22.9	22.4	21.0	20.5	20.8	21.1	22.5	21.2	21.8	21.8
Humidity at 07.00 hrs., %	89	87	90	87	86	81	88	87	86	87	85	89	86.7
Rainfall, mm. .	74	60	121	187	210	165	143	197	217	126	105	73	1 678

SOURCE: Herin, *Personal Communication*.

The climatological data given in Tables 64 and 65 are for the zone north of Kivu, the data in the first of these tables referring to the elevated area, while those in the second are from Lubarika Station in the Ruzizi valley.

TABLE 64. - CLIMATOLOGICAL DATA FOR LULENGA MISSION IN THE  
BELGIAN CONGO (ALTITUDE 1,850 M. 29° 22' E., 1° 24' S.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Maximum temperature, °C. .	27.8	28.8	29.5	29.2	27.2	27.0	28.0	27.9	27.5	26.0	27.0	30.0	28.0
Minimum temperature, °C. . .	9.0	10.0	9.8	10.0	8.0	9.0	9.0	9.5	9.0	9.0	10.0	8.4	9.2
Mean temperature, °C. . . . .	18.0	18.2	17.5	18.0	18.0	17.8	18.0	18.0	18.0	17.5	17.4	17.6	17.8
Average humidity, % . . . . .	81	80	83	86	85	82	81	81	83	86	84	83	82.9
Maximum rainfall, mm . . .	188	224	246	380	262	166	119	221	325	258	310	204	2 903
Minimum rainfall mm. . . . .	9	61	163	111	66	23	—	56	103	115	109	76	892
Mean rainfall, mm. . . . .	106	125	198	223	161	106	62	121	204	192	191	136	1 825

SOURCE: Herin, *Personal Communication*

TABLE 65. - CLIMATOLOGICAL DATA FOR LUBARIKA STATION  
IN THE BELGIAN CONGO (ALTITUDE 850 M. 28° 55' E., 2° 50' S.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Maximum temperature, °C. . .	36.0	34.0	33.0	33.0	32.5	32.5	32.6	34.1	36.0	35.5	35.4	34.0	34.0
Minimum temperature, °C. . . .	16.0	14.2	15.0	16.0	16.0	15.0	15.0	16.0	16.0	16.0	16.0	15.0	15.5
Mean temperature, °C. . . . .	25.0	24.6	24.4	24.4	24.4	24.4	23.8	24.7	25.1	25.4	24.8	24.3	24.6
Humidity (1950) % . . . . .	75.6	71.0	73.3	75.3	75.0	65.9	58.9	61.0	55.1	67.0	71.6	78.8	69.0
Rainfall, mm. (1939-1950) . . .	121.8	118.9	140.0	190.0	145.1	21.5	85.0	15.7	32.1	65.1	122.7	150.3	203.2

SOURCE: Herin, *Personal Communication*.

Climatological data for the southern zone of Lake Kivu are given in Table 66.

TABLE 66. - CLIMATOLOGICAL DATA FOR KABARE IN THE BELGIAN CONGO  
(ALTITUDE 1,925 M. 28° 43' E., 2° 29' S.)

	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Temperature, °C.	16.4	16.8	17.0	16.4	16.2	16.4	16.8	17.1	16.8	16.9	16.6	16.6	16.7
Rainfall, mm. .	150	163	167	155	58	48	29	39	111	166	189	174	1 449

SOURCE: Herin, *Personal Communication*.

### Vegetation

In the Western Province of Uganda where the Ankole is the principal cattle type, the communal grazing areas have poor grass cover but in other grassland areas the growth is luxurious. The area west of Lake Victoria and stretching across the country to Lakes Albert and George is covered with elephant grass (*Pennisetum purpureum*) growing in rain-forest areas. North of Ankole is the *Themeda* and *Acacia* area, while in most of the highland area of Kigezi, kikuyu grass (*Pennisetum clandestinum*) is dominant.

In Tanganyika the Ankole area is largely mountain grassland, which lies along the borders of Ruanda-Urundi. Extensive studies of the vegetation types of Tanganyika territory have been reported by Gillman (1949).

In the Belgian Congo the vegetation is of the eastern savannah type. The pastures are burnt in July to August, just prior to the rains.

In Ruanda-Urundi, during the rainy season (May), the pastures show excellent growth. The following genera have been observed: *Cynodon*, *Brachiaria*, *Panicum*, *Paspalum*, *Chloris*, *Themeda*, *Hyparrhenia*, *Pennisetum*, *Setaria* and others.

### *Management practices*

The breeders of Ankole cattle attach a social importance to their herds; to them cattle numbers are an indication of wealth. As the currency of the "bride wealth," cattle guarantee the stability of the native family, while, by different provisions in the deeds of transfer of animals between chiefs and subjects they contribute towards maintaining order in the tribes. Under modern economic pressure some cattle owners are beginning to understand the economic value, based on productivity, to be derived from the ownership of a herd. The cattle which are slaughtered on ceremonial occasions are also of importance in the religious and tribal customs. Milk and meat are utilized only to a limited extent, but the animals are regularly bled by some tribes, the blood forming part of the diet. Very limited use is made, and only in a few localities, of the draft power of the animals. In view of the above, disease is the only major factor, other than low reproductivity, that limits the growth of cattle numbers in the area.

Individual Ankole breeders in Uganda usually own a considerable number of animals. The owners are not normally the herdsmen, but the management of stock is left to other tribes. Cattle are kept many miles from the owners' homes, under semi-ranching conditions. Calves are usually well cared for and in recent times some supplementary feeding of maize, cassava, sweet potatoes, etc. has been practiced. The Bahima breeders of Ankole district in Uganda are showing increased interest in rearing male calves and the traditional Hima custom of slaughtering the majority of male calves shortly after birth is reported to be on the decrease.

In Tanganyika the area occupied by Ankole cattle is well-watered mountain grassland. The cattle are grazed during the day for a few hours only and corralled at night in an enclosure. Cows are regularly milked, but usually only once daily. The calves accompany their dams during the day but at night they are separated from their dams and are housed with good bedding.

The Bahima, Batusi and other herders in the Belgian Congo follow more or less the same management pattern. The practice of "farming out" cattle by wealthy landowners is also followed in Ruanda-Urundi.

As the herds are maintained on grazing, seasonal scarcity of herbage affects the growth of the animals. During dry seasons the cattle may be taken to marshy areas. Saline earth from certain of these marshes is fed to the cattle as a substitute for salt. Reid, N.R. (*Personal Communication*) has observed that impoverished pastures are the main limiting factor to reproduction and growth in Bukoba, and that the same factor, due to overstocking, operates in Ruanda-Urundi.

Breeders have often paid attention to breeding for abnormally large horns or fancy colors; beyond that, natural selection is allowed to determine the development of the cattle type. As all the animals, adult as well as young stock are run together, and as very little or late castration is practiced, almost all the young and old bulls have an opportunity to serve the cows.

### Physical characteristics of the breed

In Uganda, Ankole cattle (Figure 51) have been described as being large animals, with straight backs, and with predominantly cervical humps which, in the male, may show some development, but in the female are not prominent. The horns are long and sweeping, though polled animals, known locally as *Kigezi*, are occasionally seen. The predominant coat color is a dark reddish-brown, though deep red, red and white, light red, yellow, strawberry roan, and red with white spots are frequently seen. The average weight at maturity has been estimated to be 800 to 900 lb. in males and 700 lb. in females.

In Tanganyika, the cattle have been described as having large horns and small humps. Whole-colored reds and browns, with occasional white patches, are frequently observed. The horns are of enormous size and grow typically outwards, upwards and backwards. The animals are tall and the legs are long. McCall (Tanganyika Territory, 1926) gives the picture of an aged bull weighing 850 lb. with height to the top of shoulder of 58 inches. Girth measurement is about 68 inches. In an Annual Report (Tanganyika Territory, 1937) of the Department of Veterinary Science and Animal Husbandry, when a tuberculin test on a group of 14 Ankole cattle was carried out, it was recorded that the average skin thickness was 4.4 mm., with a range of 6.0 to 3.0 mm.

Belgian authorities described the cattle from the Eastern Province of the Belgian Congo (Figures 49 and 50) as fairly large in size, big-boned, long in the leg and with long and well-developed horns, the growth of which is frequently stimulated by irritation of the matrix, and as having a cervico-thoracic hump. The coat is usually red, or red and white in color. Some animals have dingy black hair. The

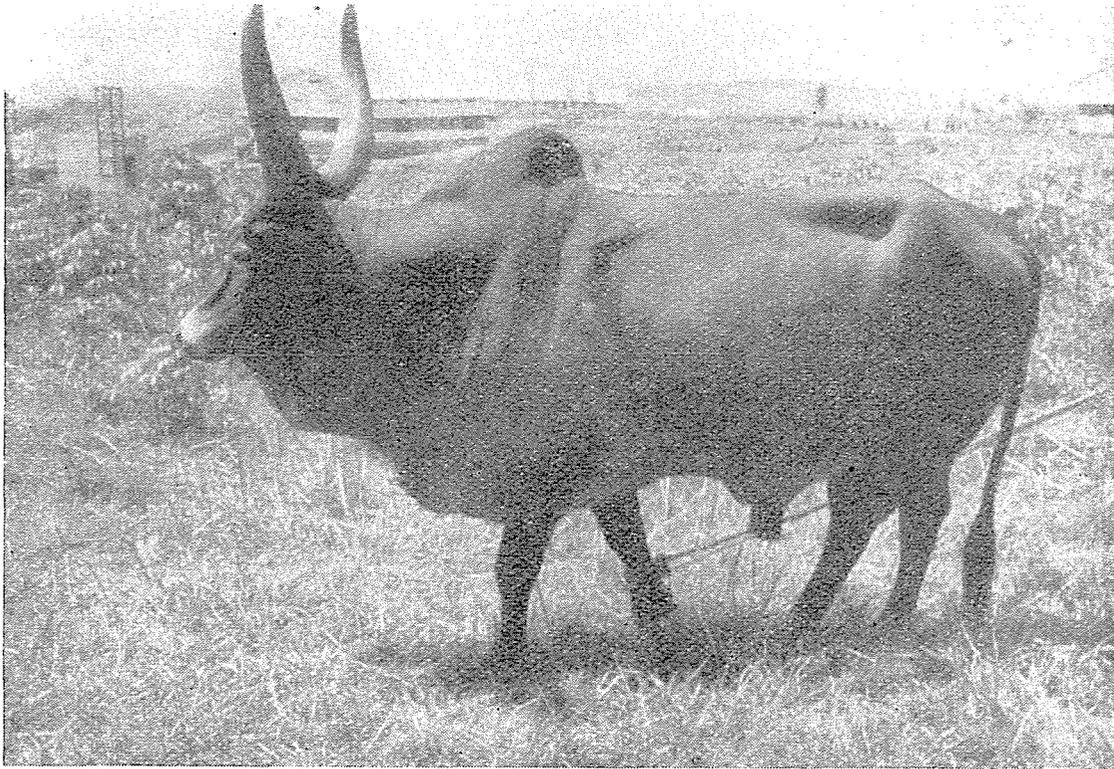
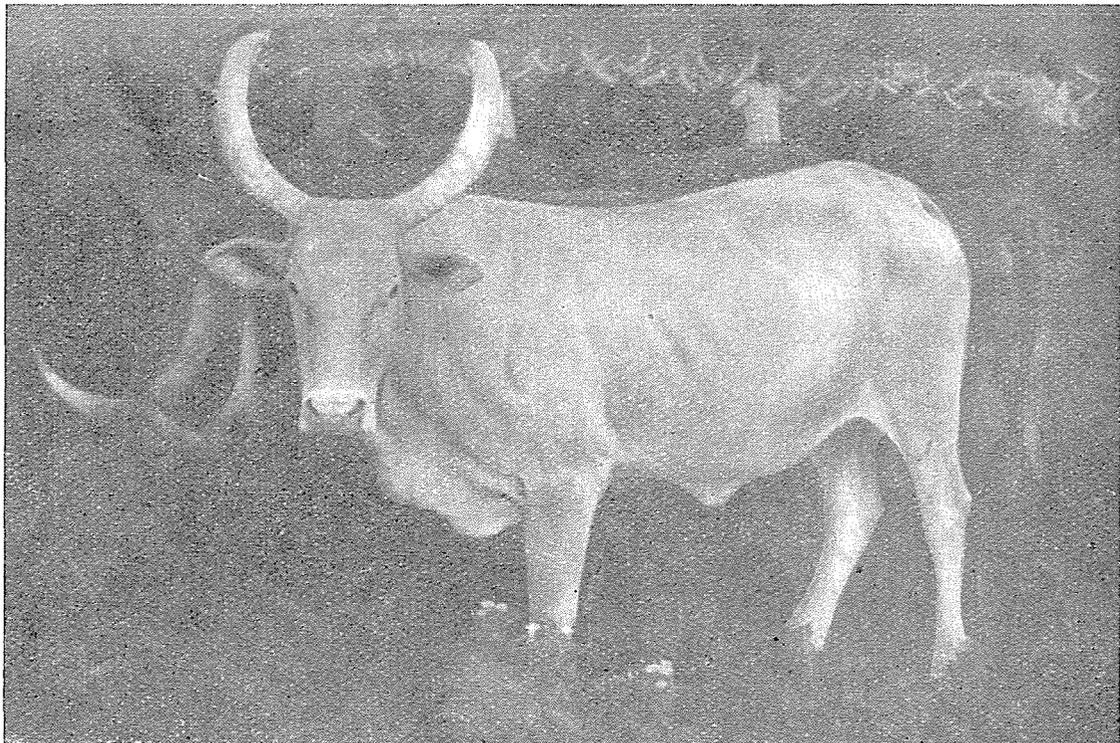


FIGURE 49. *Ankole cattle. Bahema bull.*

FIGURE 50. *Ankole cattle. Bahema cow.*

Courtesy of R. Druet



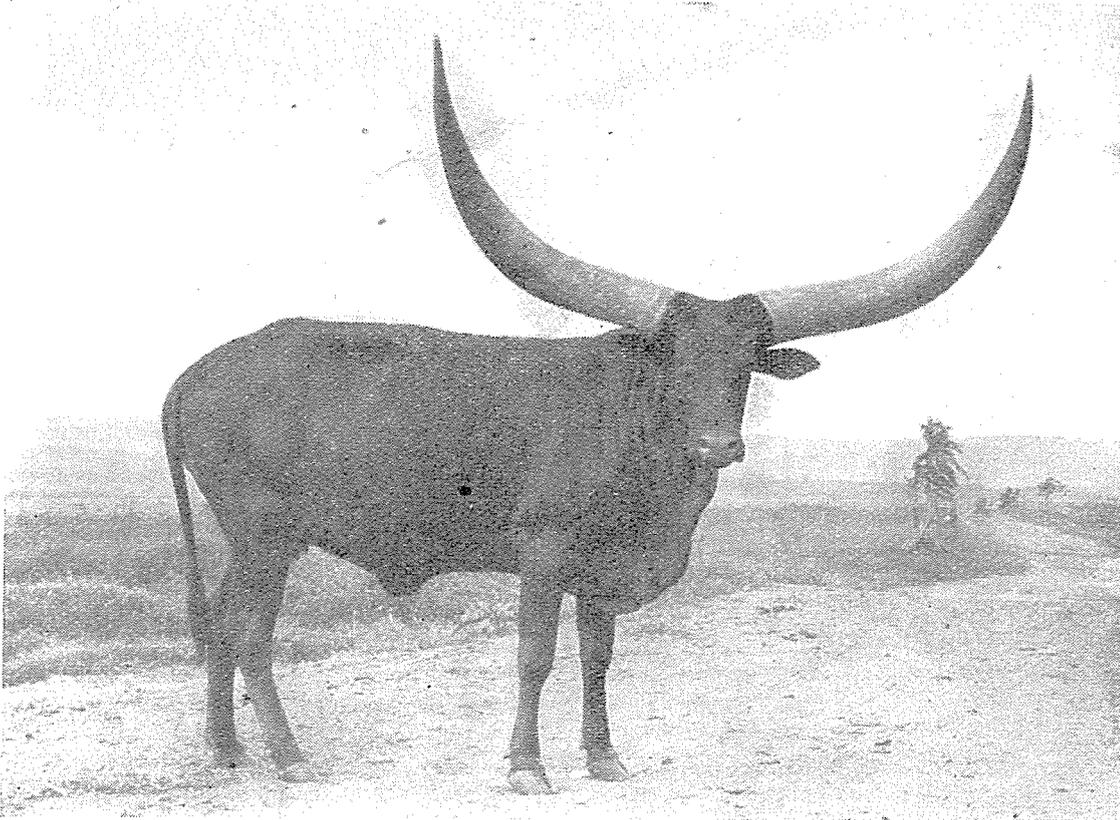


FIGURE 51. *An Ankole cow in Uganda. The horns measure 52 inches between the tips.*

Courtesy of Dept. of Information, Uganda Protectorate

hairs are short and neither coarse nor soft. The skin is slightly loose, of medium thickness and of dark pigmentation. The hoofs are hard.

¶The Ruanda or Barundi type (Figures 1, 52 and 53), bred in the Bahutu tribal districts located northeast of Lake Kivu and in the Ruzizi valley as well as in the mountainous region west of the Ruzizi river, is described as follows: the coat is brown; this color lightened to a bay shade is fairly common in the Ruzizi plain, while red, white and red, red and white, black and its compounds — white and black, black and white — also occur. The frame is good, lean in poor pasture regions, well muscled in areas which are not overstocked. The horns are as described above, but polled animals and cattle with mutilated horns occur throughout the area.

The Bashi type (Figure 54) is small with a fine skeleton and horns of reduced size.

The Ankole cattle in Ruanda-Urundi (Figure 55) are described as short-bodied, highset animals with short heads, narrow chests and elevated and pointed rumps. The withers may be topped by a more or less distinct hump, which is more obvious in the male than in the

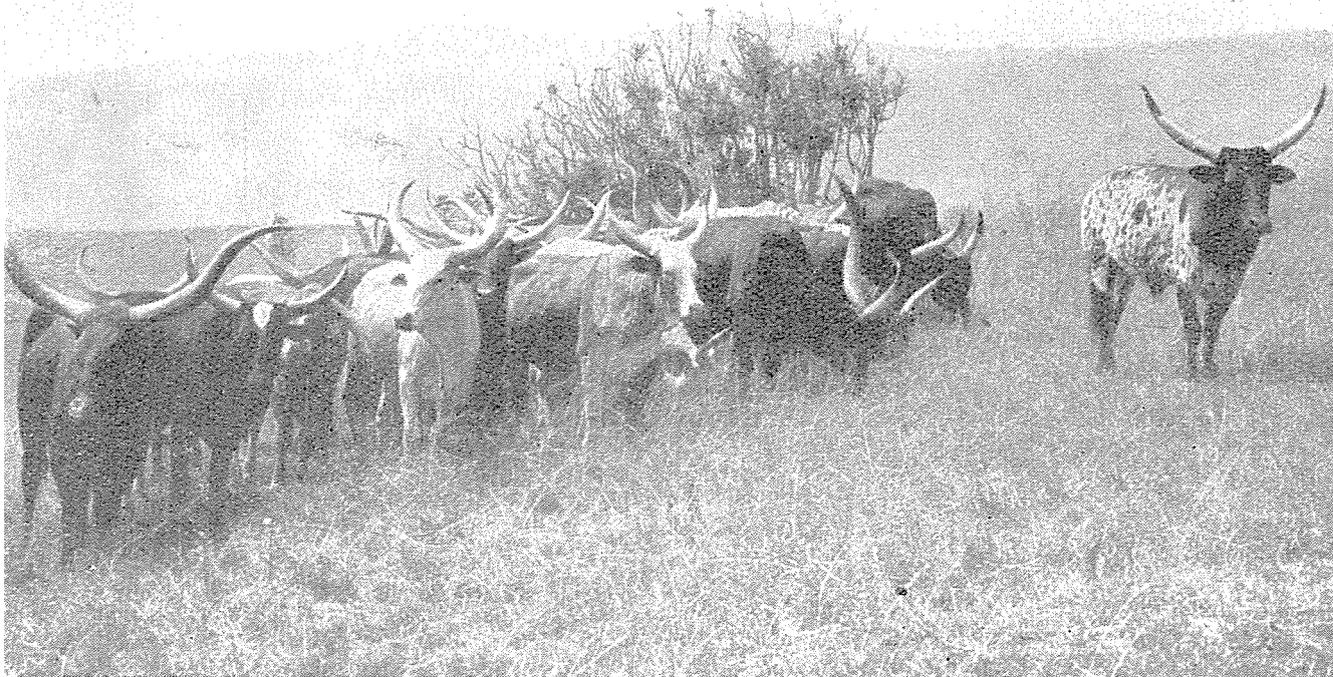


FIGURE 52. *A nkole cattle. A herd of work and beef cattle on the Nyamyaga Livestock Farm in Ruanda.*

Courtesy of Congopress: J. Mulders

female. The dewlap is deep. Both polled and horned animals occur. The horns, which may attain to a large size both in length and thickness, show variation in the direction of growth, the most characteristic being in a slightly spiralled lyre shape as is the case in the sacred cows (*Inyambos*) of the King of Ruanda. It is reported, however, that the offspring of polled animals may have horns.

The usual coat color is an even dark red, though shading from corn color to brownish red occurs. Piebald coats are also frequently seen. The mucous membranes are light or pigmented.

Average data on certain body measurements as reported by the veterinary authorities of the Eastern Province in the Belgian Congo are summarized in Table 67.

TABLE 67. - AVERAGE MEASUREMENTS OF ANKOLE CATTLE (BAHIMA)

	Male			Female			Ox mature
	1 year	2 years	mature	1 year	2 years	mature	
Weight, kg. ....	135.0 (43)	190.0 (21)	502.0 (8)	125.0 (41)	185.0 (47)	345.0 (8)	341
Length from shoulder point to pinbone, cm. ....	96.1 (43)	107.0 (21)	144.7 (8)	96.0 (41)	104.8 (47)	132.6 (8)	—
Height at withers, cm. ....	97.9 (43)	107.0 (21)	144.7 (8)	97.3 (41)	104.8 (47)	118.0 (8)	—
Depth of chest, cm. ....	47.3 (43)	52.0 (21)	73.0 (8)	46.8 (41)	50.7 (47)	63.6 (8)	—
Width of hips, cm. ....	28.4 (43)	33.6 (21)	43.2 (8)	28.0 (41)	33.6 (47)	39.0 (8)	—
Heart girth, cm. ....	129.0 (43)	139.0 (21)	260.3 (8)	127.7 (41)	138.2 (47)	186.6 (8)	—

Numbers sampled in brackets.  
SOURCE: Herin, *Personal Communication*.

Average data on certain body measurements for the Ruanda or Barundi cattle are summarized in Table 68.

TABLE 68. - AVERAGE MEASUREMENTS OF ANKOLE CATTLE  
(RUANDA OR BARUNDI)

	Male			Female			Ox	
	1 year	2 years	mature	1 year	2 years	mature	mature	
Weight, kg. ....								
	a)	136	231	410	143	204	315	365
	b)	136	231	425	103	202	300	358
Length from shoulder point to pinbone, cm. ...								
	a)	117	125	141	114	119	130	140
	b)	87	121	151	88	122	131	143
Height at withers, cm. ...								
	a)	115	119	133	110	117	127	132
	b)	103	115	132	90	112	118	130
Depth of chest, cm. ....								
	a)	—	—	—	—	—	—	—
	b)	45	55	70	42	52	61	66
Width of hips, cm. ....								
	a)	40	43	58	39	45	55	51
	b)	27	37	50	26	36	44	47
Heart girth, cm. ....								
	a)	134	145	181	127	143	165	174
	b)	134	146	188	118	143	166	177

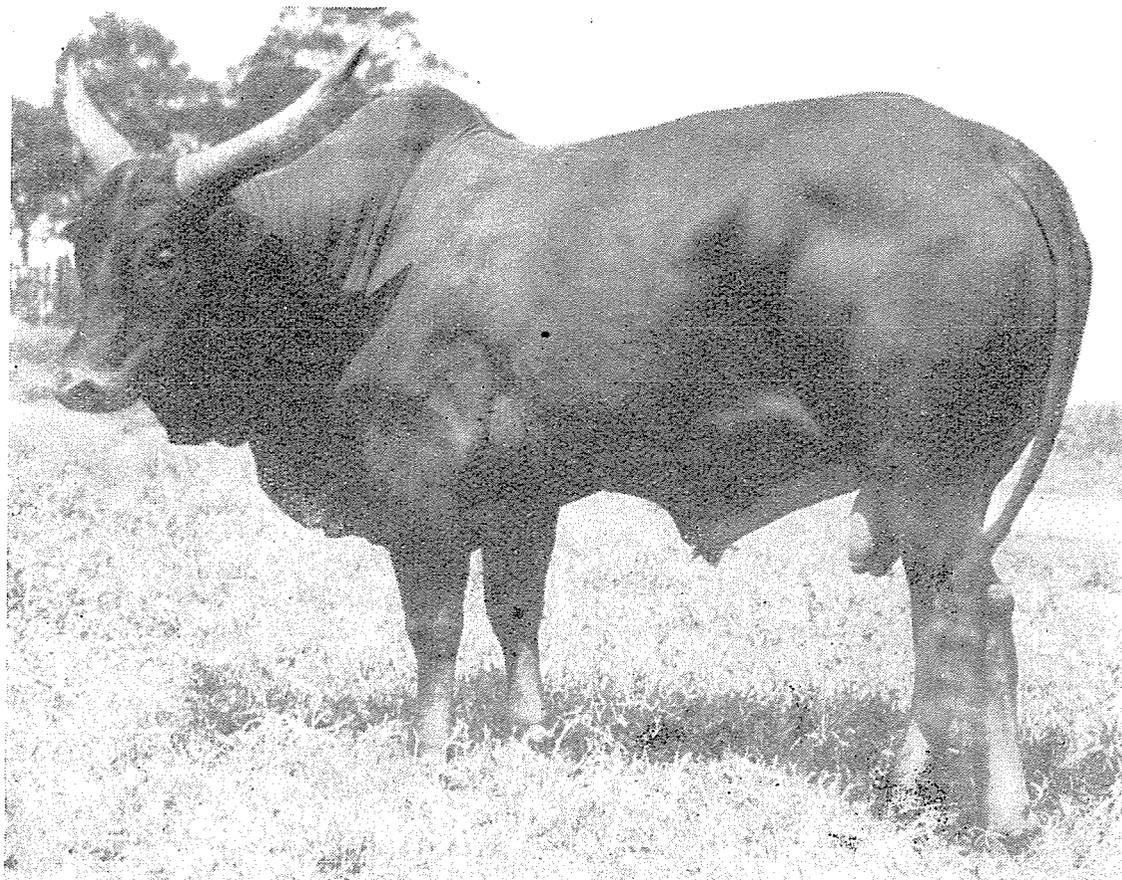
a) Data from volcanic regions.

b) Data from plains.

SOURCE: Herin, *Personal Communication*.

FIGURE 53. Ankole cattle. One of the breeding bulls at the INEAC Farm at Nyamyaga in Ruanda. This bull weighed 550 kg. at 7 years of age, a liveweight well above the average for the area.

Courtesy of Congopress: J. Mulders



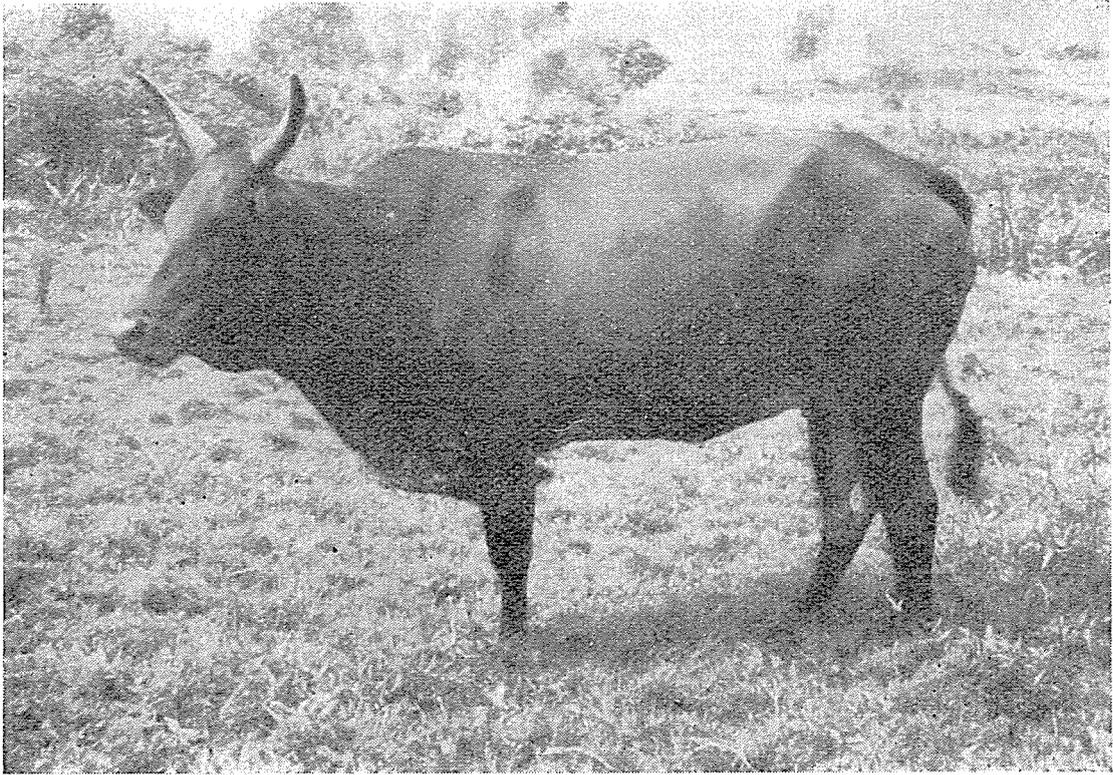
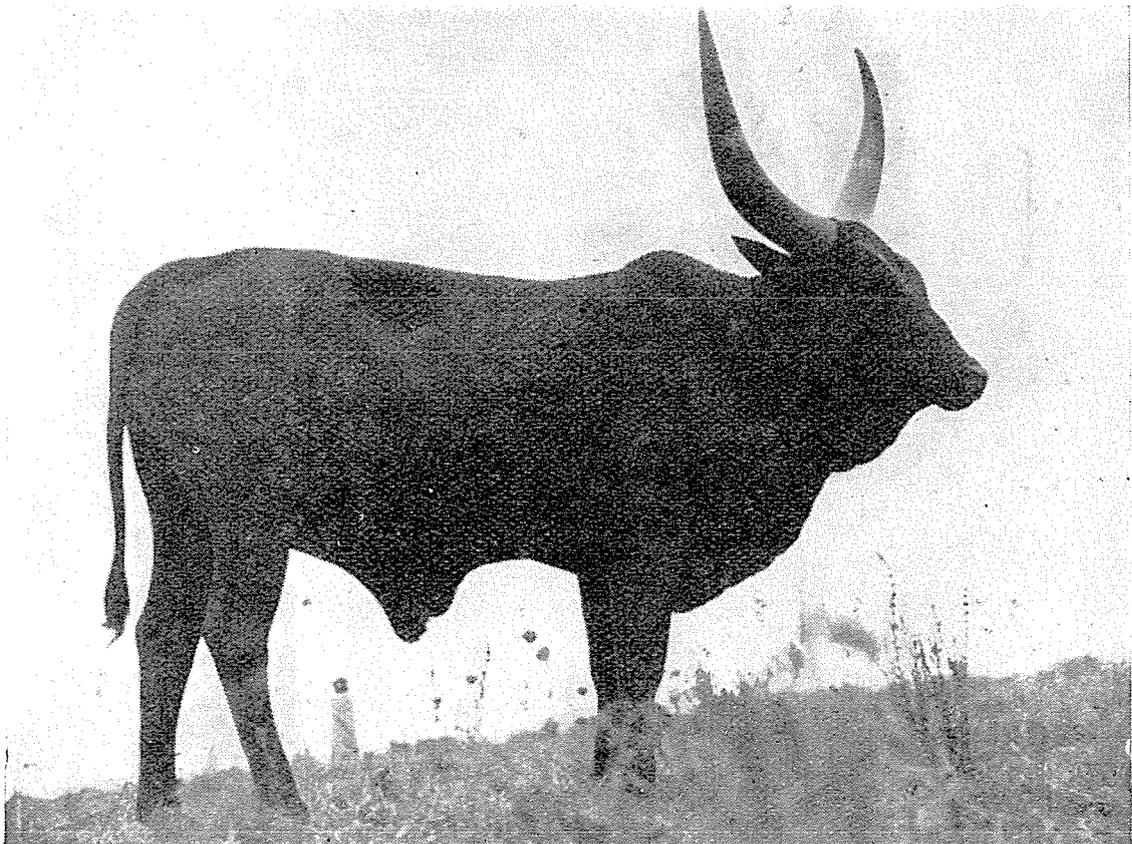


FIGURE 54. *Ankole cattle. Bashi cow.*

Courtesy of Ministère des colonies, Brussels

FIGURE 55. *Ankole cattle. A bull in Ruanda-Urundi.*

Courtesy of Congopress: J. Mulders



The average birthweight of males has been 17.25 kg., and that of females 15.20 kg.

Average data on certain body measurements for the Bashi cattle, which are localized in the Bashi tribal areas of the Province of Kivu in the Belgian Congo, are summarized in Table 69.

TABLE 69. — AVERAGE MEASUREMENTS OF ANKOLE CATTLE (BASHI)

	Male			Female		
	1 year	2/3 years	mature	1 year	2/3 years	mature
Weight, kg. ....	120.0	172.0	290.0	93.0	117.0	242.0
Length from shoulder point to pinbone, cm. ....	109.0	123.5	137.0	87.5	124.5	137.0
Height at withers, cm. ....	85.0	108.5	118.5	89.7	109.0	116.0
Depth of chest, cm. ....	43.0	52.0	57.2	38.5	51.7	57.7
Width of hips, cm. ....	31.2	41.0	46.0	27.0	38.7	43.0
Heart girth, cm. ....	120.5	135.0	160.7	109.5	136.2	152.0

SOURCE: Herin, *Personal Communication*.

The average birthweight of males has been 17 kg., and that of females 15 kg.

The principal measurements of Ankole cattle on the Songa Farm in Ruanda-Urundi are summarized in Table 70.

TABLE 70. — AVERAGE MEASUREMENTS OF ANKOLE CATTLE (RUANDA-URUNDI)

	Male			Female		
	1 year	2 years	mature	1 year	2 years	mature
Weight, kg. ....	140	225	458	100	190	350
Height at withers, cm. ....	—	112	135	—	110	124
Width of hips, cm. ....	—	35	47	—	33	45
Heart girth, cm. ....	—	150	190	—	135	160

SOURCE: Herin, *Personal Communication*.

### Functional characteristics of the breed

In Uganda the Ankole cattle are larger but have the reputation of being less hardy than the other cattle of the area. They have been said to be more susceptible to diseases, particularly rinderpest and trypanosomiasis, and also to unfavorable climatic conditions and

poor grazing. However, no data are available on these points. The bulls attain their maximum size at 5 years of age and the females calve for the first time at 3 ½ to 4 years. It is estimated that the calving interval may vary from 18 months to 2 years, depending upon grazing conditions. Very little information has been recorded on the productivity of the breed.

In Tanganyika also, on account of its supposed susceptibility to tickborne diseases and other epizootics, the Ankole has not received much attention. Buckley (1953) reports a production of 9.21 lb. of milk per day per cow in 1952 from an Ankole herd maintained at the Government Stock Farm, Mpwapwa, since 1938.

In the Eastern Province of the Belgian Congo, where the Ankole are bred by the Bahima tribe, it has been observed that the heifers calve for the first time at between 4 and 5 years of age, when they usually have 6 permanent teeth. Breeding tends to take place in two seasons of the year, from September to October, and between March and April. The males start service at 3 years of age and have been reported to be slow in service except under improved management conditions.

The average milk production and lactation duration derived from the records of 72 cows was 302 liters in 212 days. Among these 72 recorded cows, the 34 which had a production higher than the average, were classified as follows:

12 cows	produced	300 to 350 liters
9 "	"	350 to 400 "
2 "	"	400 to 450 "
6 "	"	450 to 500 "
4 "	"	500 to 550 "
1 cow	"	550 to 600 "

The individual butterfat content of the milk varied from 3 to 7 percent, the average being 4.5 percent.

The average calving interval varied from 16 to 20 months. Cows produced about 8 calves during a lifetime.

The cattle are not utilized for draft purposes by the local people.

It has been observed that Ankole cattle do not fatten easily on the grassland of the region. The males and steers are sold for slaughter when they have 2 permanent teeth.

The veterinary authorities in the Eastern Province of the Belgian Congo reported that the average liveweights at markets were: bulls 301 kg.; bull calves 157 kg.; old cows 250 kg.; oxen 230 kg.; young bullocks 176 kg.

The dressing percentage is reported to be 45.

The following information was reported from a herd of Ankole cattle established by INEAC (Institut national pour l'étude agronomique du Congo belge) at Nioka Station:

The average age of heifers at first calving was 42.7 months. The bulls were put to service at the age of 4 years. The daily milk yield of cows was 1.5 to 2.5 liters containing 4.4 percent butterfat. The average lactation period was 240 days and the average calving interval was 12 months.

On good pastures Ankole cattle fatten well. At 4 years the bullocks weigh about 303 kg. and dress at about 50 percent when slaughtered.

The functional behavior of the Ruanda or Barundi cattle of Ankole type bred in the northern zone of Lake Kivu and in the Ruzizi valley has been reported as follows:

In the volcanic region the cows have their first calves when about 4 years old. The liveweights of the calves vary from 25 to 30 kg. The males are first used for service at about 2 to 2 ½ years of age and are observed to be very quick in serving. The active breeding life is about 10 years.

In the Ruzizi valley the cattle mature fairly early; about 31 percent of the heifers are bred when they have 4, and 67 percent when they have 6 permanent teeth. The males start service at the age of about 2 years.

In the volcanic region the daily milk yield averages 3 to 4 liters with a lactation period of about 6 months. The butterfat content is 5 to 6 percent. The average calving interval is about 18 months and it has been estimated that there are about 7 lactations in an average lifetime.

On the Ruzizi plain, on alluvial sandy soil with good feeding, the average lactation production reported for 135 recorded cows was 960 liters of milk in 240 days. The largest amount of milk yielded in one day was 8.3 liters. The butterfat content varied from 4 to 7 percent.

The bullocks are used as draft animals. They are put to work at the age of about 2 ½ years, when the average liveweight is about 300 kg. They are active and willing workers. A pair of oxen can haul a load of 800 kg. in a rubber-tired cart. They can travel about 3 ½ km. in an hour or approximately 16 km. in a working day of four hours. When plowing hard dry soil Ankole oxen can work for between four and five hours in a day.

The cattle show fairly good adaptability to fattening on grassland on alluvial soil. They weigh about 358 kg. at 3 ½ years and dress out at about 50 percent though 55 percent is not unusual. It has been reported that the meat is well marbled. In the volcanic region cattle are not ready for slaughter until they are 4 to 6 years old,

and yield about 175 to 225 kg. of dressed carcass. The dressing percentage in this region is about 45 to 50.

The cattle bred by the Bashi owners to the south of Lake Kivu produce about 420 liters of milk in 240 days with an average butterfat percentage of about 6.0. The calving interval is about 2 years. The animals in this region are slow maturing and about 69 percent of cows do not calve for the first time until they are over 4 years of age.

The bulls start service when they are 3 to 4 years old, and are usually kept in the herds until they are 10 years old.

Although not much utilized for that purpose, Ankole cattle have been found to be tractable but slow draft animals.

In Ruanda-Urundi the Ankole has been observed to be slow maturing. Heifers calve for the first time at the age of about 4 1/2 years. The animals are not very prolific and the calving interval is about 2 years. The milk yield is approximately 3 liters per day from a good cow, in addition to the amount taken by the suckling calf.

Slaughtered animals show a dressing percentage of 40 to 45. However, the animals respond well to improved feeding.

A herd has been established at Songa Farm since 1936. Initially, two herds of Ankole were established, one of polled and the other of horned animals, but as it was observed at a later date that the animals without horns neither bred true for the polled character, nor showed marked superiority over those with horns, this part of the experiment was discontinued. Birthweights and production figures from the horned animals are given in Table 71.

TABLE 71. — DATA ON HORNED ANKOLE CATTLE AT SONGA FARM IN RUANDA-URUNDI

Year	Birthweight, kg.	Number of days lactation	Average milk yield, liters	Average butterfat content, %	Average monthly weight increase of calves, kg.
1938	—	335	766	5.45	9.70
1939	23.3	336	695	4.76	8.75
1940	24.0	—	684	—	—
1941	23.0	—	755	4.96	—
1942	24.0	377	725	4.96	9.40
1943	22.3	387	833	4.96	9.40
1944	23.0	381	829	5.00	9.10
1945	23.5	400	920	—	9.20
1946	—	—	—	—	—
1947	—	—	—	—	—
1948	—	—	—	—	6.40
1949	23.4	—	676	—	10.00

SOURCE: Herin, *Personal Communication*.

Herin (—), in the Annual Reports of the Songa Farm, records that calves born in the dry season showed a higher mortality rate than those born in the rainy season, and that calves born during the rainy season showed greater liveweight increases than those born in the dry season. The bullocks at the farm were good beef animals and when slaughtered dressed out at 55 to 60 percent of excellent meat.

#### **Sources of breeding stock and information regarding the breed**

Information regarding Ankole cattle in Uganda can be obtained from the Director of Veterinary Services, Kampala, Uganda. A herd of Ankole cattle was maintained at the Government Stock Farm, Mpwapwa from 1938 until it was transferred to the Western Province Pasture Research Station, Tumbi, Tanganyika, before being dispersed. Information on the Ankole in Tanganyika can be obtained from the Director of Veterinary Services, Mpwapwa, Tanganyika.

In the Belgian Congo a herd of Ankole (Bahima) is maintained by INEAC (Institut national pour l'étude agronomique du Congo belge) at Nioka. Information on the stock can be obtained from the Officer-in-Charge of the Provincial Veterinary Service, Eastern Province, Stanleyville, Belgian Congo. Information on the Ruanda-Urundi or Barundi type is available from the "Service vétérinaire provincial," Usumbura, Ruanda-Urundi. Information on the Bashi type of Ankole can be obtained from the "Service vétérinaire provincial," Costermansville, Province of Kivu, Belgian Congo.

## **BAROTSE**

### **Origin**

The Barotse cattle are of the Longhorn Sanga type. The animals possess cervico-thoracic muscular humps and large lyre-shaped horns. The Barotse and Baila are virtually identical and are allied to the Setswana cattle of Bechuanaland (Walker, C.A., *Personal Communication*).

### **Conditions in the native home of the breed**

#### *Location, topography and soils*

Barotse Province of Northern Rhodesia, where the Barotse cattle are found, forms the most westerly section of Northern Rhodesia. It is bounded by the Kwando and Zambesi rivers on the west and south, and by Angola on the north and west. The area is located approxi-

mately between 22° and 27° east longitude and 14° and 18° south latitude. The altitude varies from 2,000 to 4,000 feet above sea level. The Barotse valley includes the plain in which Lealui, the seat of the paramount native Chief of Barotse is located. This area is flooded every year during the months of March and April due to the rise of rain waters in the Zambesi river. The predominant soils are sandy or sandy loam.

### *Climate*

May to September is the dry season with easterly and southeasterly winds. The first part of this season, which may be called the post-rainy season, is good for plant growth with sufficient moisture in the soil; in the later part the temperatures begin to rise, although on an average they are dry, cool and comfortable months. The nights are always cool and ground frost can occur. Temperatures are at their highest between September and November, in the second half of which the rainy begin and continue until early April. With the exception of the rain months, the sun shines brightly throughout the year.

Climatological data for Mongu, the provincial headquarters for Barotse Province, are summarized in Table 72.

TABLE 72. — CLIMATOLOGICAL DATA FOR MONGU

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °F. ....	74.2	74.4	74.1	73.3	68.7	64.3	64.7	70.0	76.8	79.2	76.2	74.2	72.50
Humidity, % ...	67	67	63	52	41	38	32	27	25	35	50	62	46.60
Rainfall, in. ....	8.66	7.73	6.23	1.25	0.2	—	—	0.01	0.75	1.40	3.9	7.95	34.39

SOURCE: Meteorological Department for Northern Rhodesia.  
Average for 10 years.

### *Vegetation*

The natural vegetation of the pastoral areas has been described as low grass savannah with open woodland. The grass cover varies in density. The locally important grasses are of the genera *Paspalum*, *Hyparrhenia*, *Brachiaria* and *Eragrostis*. Crop residues are also utilized as stock feed.

### Management practices

As well as their general function of producing milk, beef, and work, the cattle play an important social role. They are used for the payment of the bride wealth and also for ceremonial purposes.

The cattle, which are very largely dependent on grazing, remain in the riverain areas in the dry season but are taken inland away from the flood plains of the rivers during the rains. They are also tethered on crop residues as a simple method of manuring garden lands. The calf is allowed to suckle the dam but some milking is done to provide milk for preparing *mafi*, a fermented milk product for human consumption.

### Physical characteristics of the breed

The Barotse cattle (Figures 56 and 57) are large in size, heavily boned and have, in general, large lyre-shaped horns, although there are wide variations in the shape and size of the horns. The hump, which is small or vestigial in the female, is of medium size in the male, muscular in texture and cervico-thoracic in position. The usual coat colors are brown, black, dark russet and fawn. Whole white coloration is rare. The skin is loose and of medium thickness with dark pigmentation. The hairs are short and of medium softness. The dewlap is of moderate size and the ears are medium in size. The hoofs are characteristically large, but are reported to be not very durable.

The birthweights of males and females, as reported from a herd of Barotse cattle established at the Government Experimental Farm at Masabuka, have been 60 lb. and 55 lb. respectively. Liveweights of males at the same station were 312 lb. at one year of age, 700 lb. at 2 years, and 1,350 lb. at maturity. Average data on liveweights and body measurements of Barotse cattle are summarized in Table 73.

TABLE 73. — AVERAGE LIVeweIGHTS AND MEASUREMENTS OF BAROTSE CATTLE

	Male			Female			Ox
	1 year	2 years	2 years 9 mths.	1 year	2 years	2 years, 9 mths.	mature
Liveweight, lb. ....	238	525	777	231	434	756	1 090
Length from shoulder point to pinbone, cm. ....	—	137	144	—	127	138	—
Height at withers, cm. ....	93	114	121	100	117	126	132
Heart girth, cm. ....	—	151	169	—	140	154	190

SOURCE: (Male, Female): Black, J.G., *Personal Communication*.

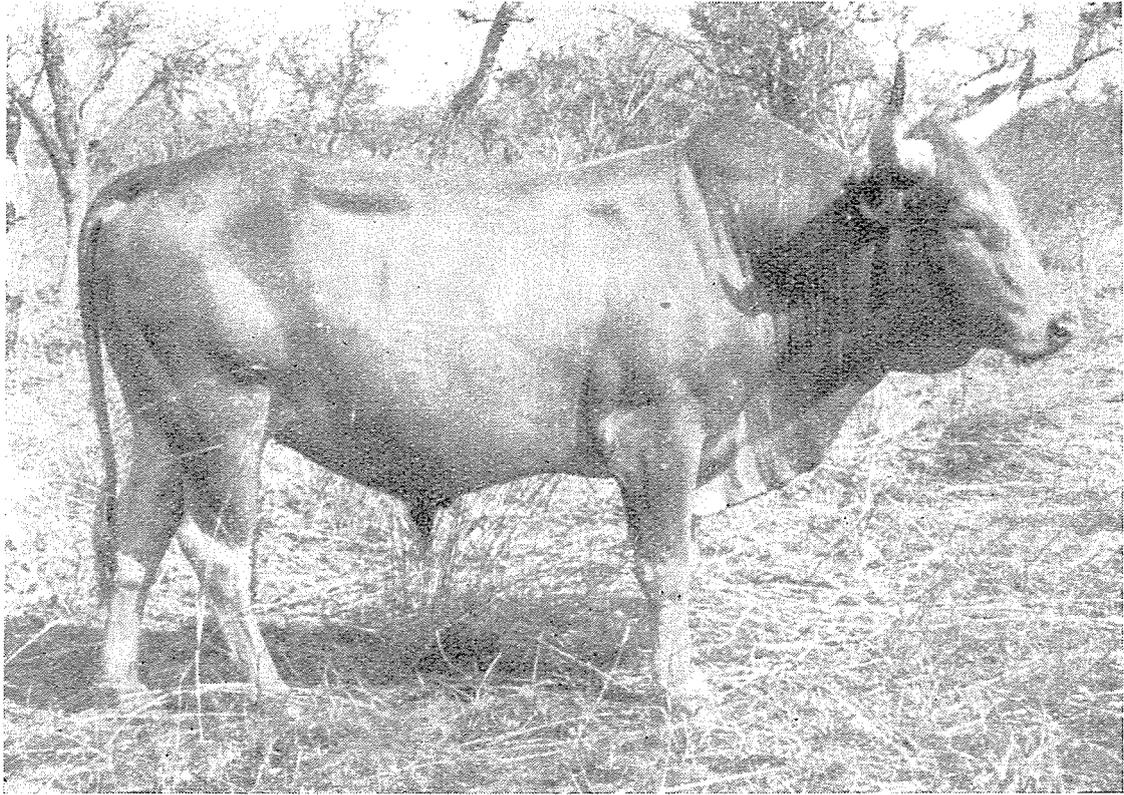
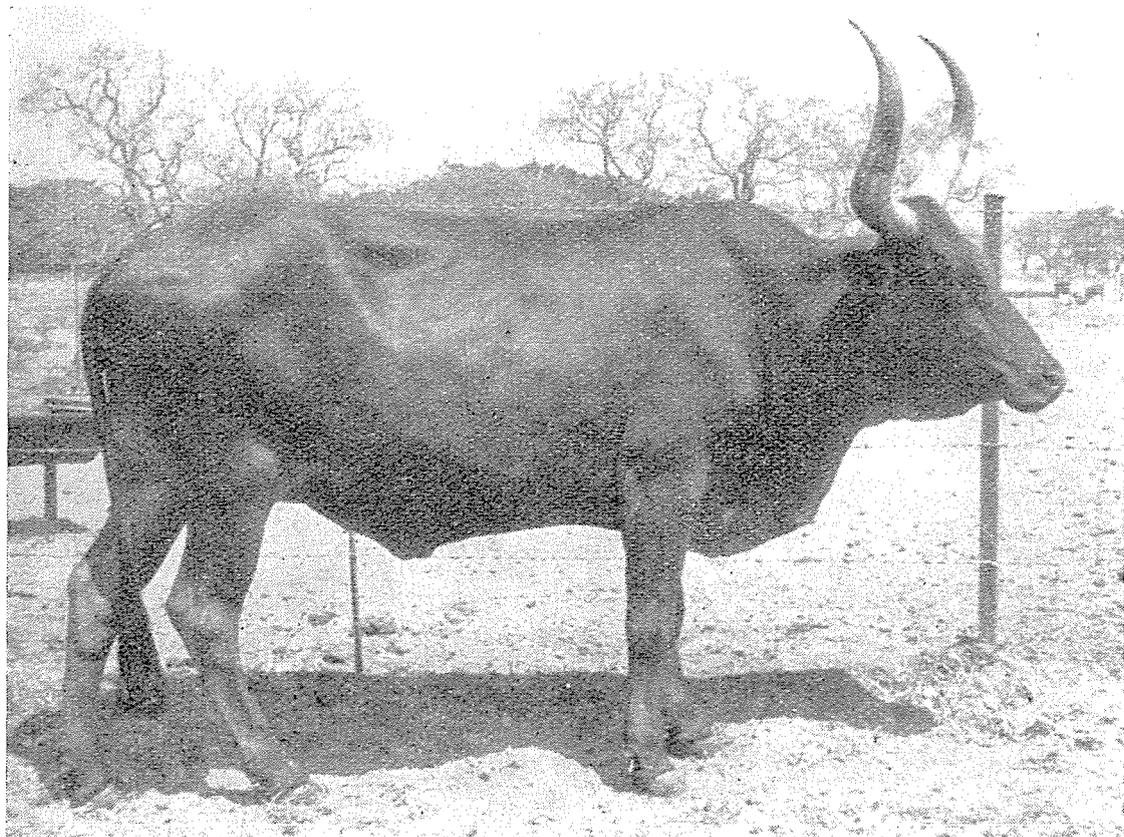


FIGURE 56. *Barotse bull.*

FIGURE 57. *Barotse cow.*

Courtesy of J. G. Black



## Functional characteristics of the breed

The Barotse is reported to be hardy, slow maturing and sufficiently adaptable to the hot conditions of the region. On account of its size, it shows good possibilities for development for beef production.

The females calve for the first time at over 3 years of age and the males start service when they are about 2 years old. The average breeding life of males is estimated to be about 12 years. They are reported to be shy breeders. Animals used for draft are put to work when they are 2 to 3 years old. Although they are even-tempered, their working capacity is limited by the poor durability of their hoofs.

The beef qualities of these cattle have been under investigation at the Experimental Farm at Mazabuka. It is reported that animals slaughtered at 5 years of age weighed 1,200 lb. The dressing percentage was 52.9. It was also noted that the average percentage of bones in the carcass was 18.1. Faulkner and Brown (Colonial Office, 1953) report that the best of a few recorded Barotse cattle showed a capability of yielding half a gallon of milk per day at the peak of the lactation in addition to feeding the calf.

It has been observed that Barotse cattle are not heavily infested with ticks.

Records of performance of the Barotse herd maintained at Mazabuka Government Experimental Station (Northern Rhodesia, 1952, 1953) are summarized in Table 74.

TABLE 74. — PERFORMANCE RECORDS OF A BAROTSE HERD

No. of cows in herd at beginning of each breeding season						Total progeny produced, 1947-52	Total progeny mortality	Corrected liveweight of beef produced - 100 cow unit			Average weight of calves, males and females, lb.				
1947	1948	1949	1950	1951	1952			In 4 years, lb.	In 5 years, lb.	In 6 years, lb.	1 year	2 years	3 years	4 years	5 years
—	37	20	64	76	60	180	28	32 120	60 669	93 451	211	450	705	971	1 150

## Sources of breeding stock and information regarding the breed

It has been estimated that there are over 228,000 head of Barotse cattle in Barotse Province.

Further information may be obtained from the Director of Veterinary Services, Mazabuka, Northern Rhodesia.

## BASUTO

### Origin

There seems to be some justification for considering the Basuto cattle as a type distinct from other cattle varieties in southern Africa. Bisschop, J.H.R. (*Personal Communication*) is of the opinion that, notwithstanding the presence among them of exotic and Africander grades, the majority of these cattle conform in general body build and, more particularly, in the shape of the head and horns, to a definite type which is quite separate from any other known indigenous cattle type, and that these conformational characteristics are sufficiently specific to permit of the use of the term "Basuto cattle."

These cattle are thought to have accompanied the Basuto Bantu tribes on their migration southward through Africa to their present habitat and to have been remotely derived from the admixture of zebu and Hamitic cattle which is assumed to lie at the origin of the Sanga group of cattle types.

### Conditions in the native home of the breed

Ecological conditions in Basutoland are broadly similar to those which are described in the section on the Africander (p. 268) and the management practices of the Basuto bear some resemblance to those of the Nguni (p. 169).

### Physical characteristics of the breed

The Basuto cattle (Figure 58) are animals of only moderate size and weight, usually fairly well proportioned conformationally, but lean of musculature. The head is long, particularly in cows and steers, straight or slightly convex of profile and with a slightly dished forehead, the convexity of which is accentuated by the prominence of the supra-orbital processes. The horns, which may be either round or oval in cross section, seldom measure more than 18 to 24 inches along their greatest curvature. They come away from the head in an outward and slightly upward and backward direction and then turn forward, upwards and outwards. Up to about 5 percent of cattle in Basuto herds are naturally polled.

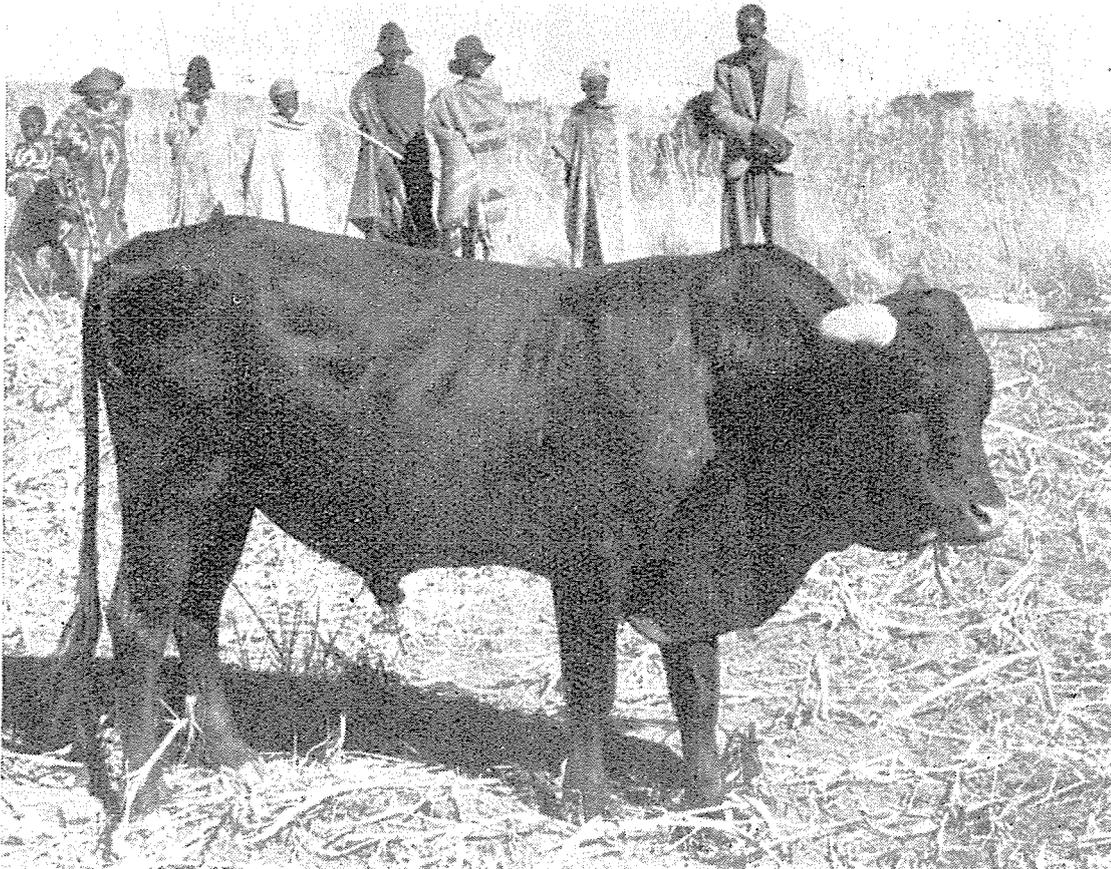


FIGURE 58. *Basuto bull.*

Courtesy of J. H. R. Bisschop

The muscular cervico-thoracic hump is well developed in the male but small in the female and castrate. The dewlap, particularly in the cow, is not strongly developed.

The body is of fair length and depth but often tends to lack width through the heart. The topline is straight but is often narrow and sharp, although the loins are usually of fair width and strength. The ribs, which tend to be straight and flat in front, show good curvature further back, giving good digestive capacity. The umbilical fold is small in both sexes.

The rump is of fair length but slopes considerably from hooks to pins. Owing to its narrowness between the pins, it tends to be triangular in plan. The sacrum lies approximately horizontally and shows a distinct notch in front of the tail root. The tail is set on high and is long and slender, with the vertebrae extending down to the hocks.

The udder is small and carried close up against the belly. The teats are small and generally pigmented.

The front legs are generally well placed but, as a result of the narrowness of the pinbones, the hind legs are often cow-hocked. The skeletal bones are light, small, dense and hard.

The hides of most of the cattle which have been inspected have been pigmented. The hairy coat is short and smooth. An inner coat is discernible. Black is the most common coat coloration; other colorations include duns, reds, red and blue roans, and black, red and black-and-tan color-sided "nkone" patterns (Bisschop, J.H.R., *Personal Communication*).

#### **Crosses with other breeds of cattle**

It appears probable (Bisschop, J.H.R., *Personal Communication*) that the cattle types which have been referred to as the Uys, Kemp and Tintern Black have been derived from indigenous South African cattle similar to those of the Basuto, which were crossed with cattle from the Netherlands introduced at the time when South Africa was a Dutch colony. Cattle derived from the cross were introduced into Natal at the time of the Great Trek in the second quarter of the nineteenth century. Herds of these cattle appear to have been maintained as approximately closed breeding units and a recognizable type has been developed to which the name "Drakensberger" is now applied.

The cattle have pigmented hides and short, sleek black coats. The female has no hump, while that of the male is small and cervico-thoracic in position. The head is of medium length with a broad forehead and muzzle, and the horns are short, growing from the poll in an outward and forward direction. Drakensberger cattle are reported to be well adapted to the local environment of the Orange Free State and Natal, with the ability to produce milk and meat at a reasonable level under extensive husbandry conditions (Weideman, 1948; Van Rensburg *et al.*, 1947).

#### **Sources of breeding stock and information regarding the breed**

Further information on the Basuto cattle can be obtained from:

The Director of Livestock and Agricultural Services, Basutoland.

The Director of Animal Husbandry and Dairying, Department of Agriculture, P. O. Vallis, Pretoria, Union of South Africa.

## NGUNI

### Origin

The nomenclature "Nguni" has been approved by a committee appointed by the Secretary of Agriculture of the Union of South Africa (Union of South Africa, 1950) to make an investigation into the indigenous breeds and types of livestock in South Africa. The type had previously been referred to as "Zulu" or "Swazi" according to the tribe of Nguni Bantu in whose possession it was found.

Various authors who have speculated on the remote origins of indigenous African cattle (Epstein, 1933, 0000; Curson and Epstein, 1934; Curson and Thornton, 1936; Bisschop, 1937) have suggested that the Nguni cattle may have had their origin in an intermixture of the now extinct Hamitic Longhorn and the Lateral-Horned zebu and, as such, have been included in the category of "Sanga" in classifications of African cattle. Cattle of Nguni type would appear to have had their origin in northeastern Africa, from whence they accompanied the Bantu migrations to southern Africa.

### Conditions in the native home of the breed

#### *Location, topography and soils*

Nguni cattle are found in Zululand (northern Natal), Swaziland, and in southern Mozambique. The part of the area which lies in Natal and Swaziland has been described as being "the region from the Komati river, north of Swaziland to the Tugela river as its southern boundary. In Swaziland the Drakensberg mountains and the Lebombo ranges form the western and eastern boundaries respectively. In Zululand the western boundary of the area runs slightly to the east of Vrijheid and to the south approximately through Babanango as far as Mapumula, with the coast as the eastern boundary". (Union of South Africa, 1950).

The coastal belt is gently undulating country with marshes and lakes near the sea and with a maximum altitude of 500 feet. In the southern part the soils vary from red sandy loams in the west to sandy soils in the east while in the north there are deep white sands.

Inland from the coastal strip the country becomes more undulating and hilly and increases in altitude towards the Hlabisa hills and the Ubombo range in the west and beyond to the Nongoma and Sapanana

ranges. The soils change from sands in the east to fertile loams in the west.

To the west of the Ubombo range the area includes the Lebombo flats, a level valley of fertile soils and altitude in the neighborhood of 700 feet above sea level. The land rises westwards in a series of steps to the middleveld of Swaziland where the average elevation is about 2,000 feet. This is undulating country with soils of a fertility somewhat lower than those of the Lebombo flats and which has deteriorated as the result of continuous cultivation by the native peoples.

The highveld, a part of the Drakensberg range, lies to the west of the middleveld and rises to altitudes exceeding 5,000 feet. The land is broken and dissected by gorges and the slopes are generally too steep for cultivation (Swaziland, — ).

Away from the group of east-flowing rivers (including the Komati, the White and Black Umbuluzis, the Usutu, and the Pongola) which are fairly evenly distributed through the territory, watering facilities for livestock are very limited.

TABLE 75. — CLIMATOLOGICAL DATA FOR MBABANE, SWAZILAND  
(ALTITUDE 3,800 FT.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °F. ....	68	67	66	62	59	54	53	57	61	64	66	67	62
Mean rainfall, in.	9.9	7.6	7.9	2.6	1.3	0.5	0.9	1.1	2.1	5.0	6.8	8.4	54.0

SOURCE: Kendrew, 1953.

### *Climate*

In general, the climate of the Nguni area is warm with relatively high humidities, but there are very considerable climatological variations between the different parts of the region. Along the coastal belt 60 to 70 percent of the rainfall occurs in the summer months and annual precipitation is in the range of 30 to 40 inches. Further inland in Zululand temperatures are lower and the winter is drier. Annual precipitation ranges from 25 to 35 inches. The Lebombo flats and the contiguous area along the east side of the Lebombo range is markedly drier with annual precipitation between 15 and 25 inches. Day temperatures are frequently high. Mean maxima in excess of 95° F. occur in some areas for several months and absolute maximum temperatures of up to 115° F. have been recorded. The greater part of the area

is frost-free throughout the year (Kendrew, 1953; Union of South Africa, 1950). The mean annual rainfall at Sipofaneni in the lowveld has been 26.5 inches, while at Bremersdorp in the middleveld it was 36.8 inches and at Mbabano in the highveld, 54 to 55.6 inches. Annual mean maximum and minimum temperatures at [the same stations have been: 84.4° and 59.5° F. at Sipofaneni, 77.7° and 54.1° F. at Bremersdorp, and 72.7° and 52.8° F. at Mbabane (Swaziland, — ). Climatological data for Mbabane in Swaziland are given in Table 75 and monthly rainfall averages for Mpisi in Table 76.

TABLE 76. — 10-YEAR MONTHLY RAINFALL AVERAGES FOR MPISI CATTLE BREEDING STATION, SWAZILAND, 1941-1950

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Mean rainfall, in.	5.35	3.55	2.88	1.90	0.81	0.59	0.42	0.51	1.14	2.01	3.74	3.33	26.33

SOURCE: Barnard, 1951.

### *Vegetation*

The vegetation of the sandy coastal belt is sparse and consists largely of inferior grassland dominated by *Aristida* spp. of low nutritional value.

Inland of the coastal strip, towards the Hlabisa hills and the Ubombo range there is grassland and scrub (thornveld) of good nutritional value in large areas of which *Themeda triandra* is the dominant species.

In the Lebombo flats there is good savannah grazing which merges into mixed thornveld in the middleveld (Union of South Africa, 1950).

### *Management practices*

Cattle are kept extensively by the native population of the area. They are maintained largely for the provision of milk, but beasts are slaughtered on festive occasions and the meat from cattle that die from natural causes is eaten. The hides are utilized locally for household purposes. Oxen are used as draft animals.

Cattle play a predominant part in the social life of the people, particularly in relation to the bride wealth or "lobolo" system. The herds are not the property of individuals to be disposed of at will, but are regarded as being held in trust for the family, distributed in time, including the ancestors and descendants as well as the contemporary household. As there appears to be little or no consideration

of the quality of the cattle offered as the bride wealth, numbers are regarded as being of paramount importance and it has been difficult to obtain local co-operation in measures designed for the prevention of overstocking or the improvement of the conformation and productive capacity of the cattle, but which might entail a reduction in the size of the herds.

On farms under European management Nguni cows have been maintained for the production of beef calves by crossing with bulls of imported beef breeds. Nguni oxen are used extensively for draft purposes and are considered to be superior to the Africander in this function under the climatic conditions of Natal.

Beef exports from the Nguni area are predominantly to Durban and Johannesburg and a large proportion of the hides go to Durban and Lourenço Marques. Cream is collected at separating stations in the native areas and about 500,000 lb. of butter are exported each year to Johannesburg and Lourenço Marques.

#### **Physical characteristics of the breed**

Nguni cattle (Figures 59 and 60) show a very considerable variation in size which appears to be dependent on local nutritional conditions. In general they are cattle of medium size, with a fair depth of body, fairly short legs and a tendency towards the wedge-shaped "dairy type."

The head is of fair length with the width at the eyes only slightly greater than that at the poll, so that the broad forehead is nearly rectangular. The face constitutes about three fifths of the length of the head, is lean and fairly broad and tapers only slightly to the wide muzzle. The profile is straight or, in the bull, slightly convex. The orbital arches are slightly accentuated, so that the forehead may have a degree of lateral concavity. The ears are small and sharply pointed and are placed below and behind the horns. The horns are dense in structure and are lyre-shaped in the adult animal. They rise from a level poll often on well-defined pedestals in an outward and slightly backward direction, then grow upwards and forwards, turning inwards in the second half of their length and inclining backwards in the final 4 to 6 inches. The horns are round or slightly oval in cross section. They are usually of medium thickness and end in thin tapering points, but Faulkner (1947) refers to two horn types, one narrow and springing from the poll in a slightly upward direction, and the other thicker and with its initial growth horizontal. In the bull the horns are markedly shorter and thicker than in the female. The general line of growth of the horns, as viewed from the side, is in advance of the line

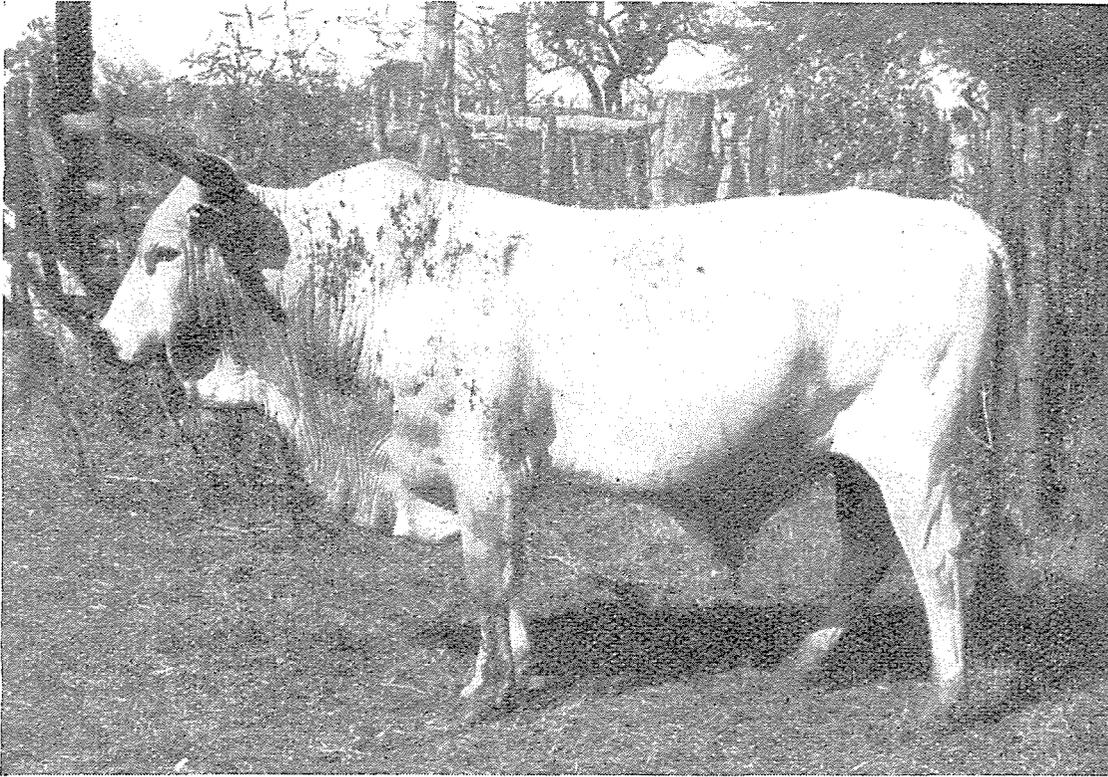
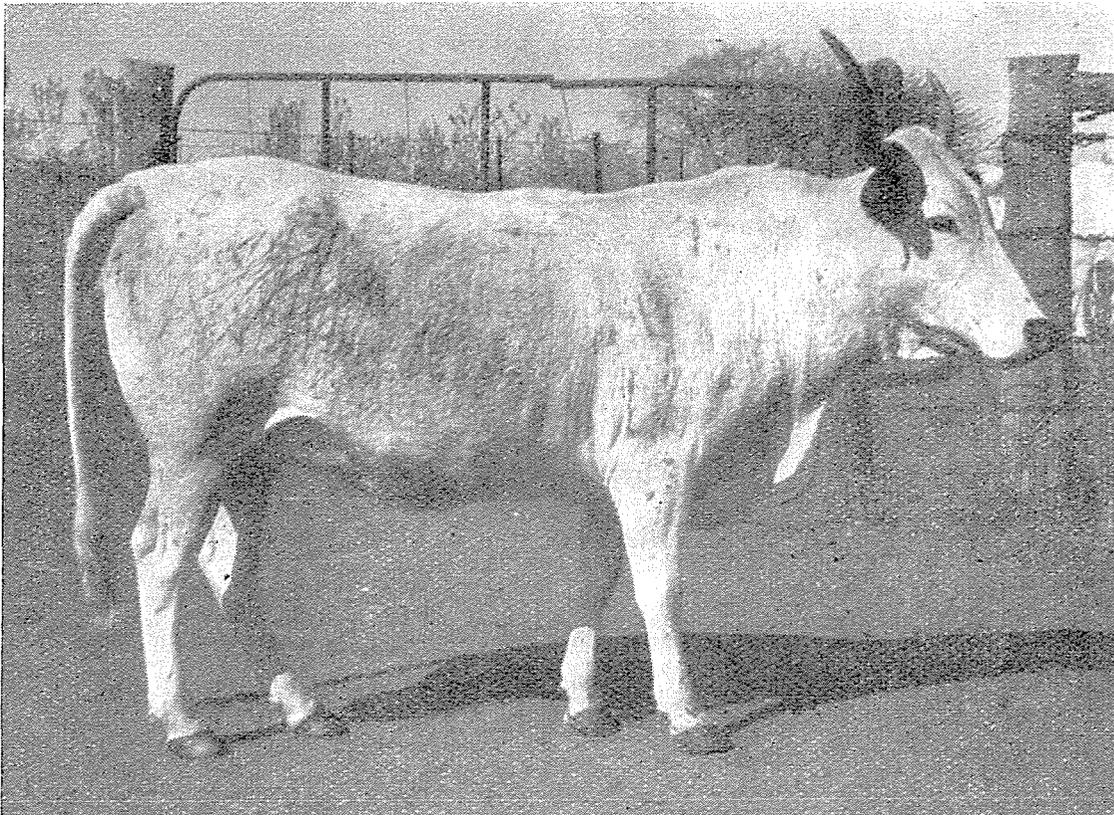


FIGURE 59. *Nguni bull at the Mpisi Cattle Breeding Station.*

FIGURE 60. *Nguni cow at the Mpisi Cattle Breeding Station.*

Courtesy of J. H. R. Bisschop



of the profile with which it makes an angle varying from 50° to 100° or more.

The neck is fairly long and lean. The hump is muscular and cervico-thoracic in position. It is well developed in the male but small in the female. The topline shows considerable variation. It tends to be narrow forward, widening to the rear, and fairly level or rising to some extent towards the rump. It is generally rather lean with a tendency to be "roofy." The rump is of moderate length and slope with a slightly prominent sacrum and tends to be narrow over the pinbones. The dewlap is of moderate or small size and the umbilical fold, while not generally apparent in the female is, together with the sheath, fairly prominent in the male. The limbs tend to be short. They are lean and light of bone and tend to be upright in position. The tail is long and thin with a full switch.

TABLE 77. - AVERAGE LIVEWEIGHTS AND BODY MEASUREMENTS OF NGUNI CATTLE IN SWAZILAND

Cattle	Age	Live-weight, lb.	Length of body, cm.	Height at withers, cm.	Height at hips, cm.	Chest girth, cm.	Depth of ches, cm.
Females	1 year	315	98	99	104	120	40
Females	2 years	457	118	113	118	138	53
Females	mature	723	135	122	122	157	60
Males	mature	1 385	152	133	132	177	67

SOURCE: Bonsma *et al.*, 1953.

In the majority of Nguni cattle the hide, which is of tough, fine texture, is darkly pigmented. There is a considerable variation in coat coloration which has been classified in considerable detail by the Union of South Africa Committee on Indigenous Livestock (Union of South Africa, 1950). Full whites, blacks, browns, reds, duns and yellows occur. The hides of white and yellow cattle are of lighter pigmentation than those with the coats of the other colors. Black and tan and brindle also occur and there are, in addition, a series of patterned and combination colorations. Bisschop (1943-1946) has suggested that a coloration (*nhlophekati*) in which the whole coat is white except for the areas around the muzzle and the eyes, and the inner surfaces of the ears, may be basal to this series which has been described in detail by the South Africa Committee on Indigenous Livestock (Union of South Africa, 1950).

The average liveweight of cows has been given as about 750 lb. with a range of 500 to 1,000 lb., and that of bulls about 1,100 lb. with a range of 950 to 1,300 lb. In areas in which the grazing is of poor nutritional quality cows are found measuring 3 ½ feet at the withers and with liveweights in the neighborhood of 500 lb. The Union of South Africa Committee on Indigenous Livestock Types (Union of South Africa, 1950) observed bulls of approximately 1,300 lb. liveweight and steers which they estimated to be 5 feet high at the withers and of more than 1,300 lb. liveweight. In a few cases steers estimated to be of 1,600 lb. liveweight were seen. Some liveweights and measurements of Nguni cattle at the Mpisi Research Station in Swaziland are given in Tables 77 and 78.

TABLE 78. - AVERAGE LIVeweIGHTS OF NGUNI CATTLE AT MPISI CATTLE BREEDING STATION

Cattle	Age in months	Number sampled	Average liveweight, lb.
Females	9 - 12	55	331.3
	12 - 24	295	447.6
	24 - 36	256	588.8
	over 36	1 135	788.3
Males	9 - 12	40	325.8
	12 - 24	99	521.0
	24 - 36	34	634.3
	over 36	35	1 223.8
Oxen	9 - 12	21	347.7
	12 - 24	172	459.9
	24 - 36	251	638.7
	over 36	168	810.9

SOURCE: Barnard, 1951.

The average body temperature of Nguni cattle at Messina Research Station before sunrise was found to be 101.25° F  $\pm$  0.64. This value was significantly greater than those obtained for the body temperatures of Shorthorns and Africanders (Bonsma, 1955).

#### Functional characteristics of the breed

Apart from the role they play in the social organization of the native peoples of the area, Nguni cattle are maintained for the production of crossbred beef, milk for local consumption and draft animals.

The females appear to be slow in reaching sexual maturity. Although, under local conditions, heifers are normally allowed to run with a bull, they seldom calve at less than 3 years of age. After the first calf, cows appear to calve down at regular intervals and a high

proportion are reported to continue breeding until they are 15 or more years old.

The Union of South Africa Committee on Indigenous Livestock Types (Union of South Africa, 1950) suggested, on the basis of local opinion, that Nguni cattle had a considerable potential value as milk producers. Native owners were reported to have claimed peak daily yields of 2 to 3 gallons of milk off grazing. The results obtained at the Mpisi Research Station have, however, been less promising (Barnard, 1953). The average yield of cows which calved in May to July was 384 lb. in 161 days and that of cows calving in November to January was 529 lb. in 217 days. In both cases the yields were those of cows which were also suckling their calves. The mean values of butterfat tests made at Mpisi and reported in 1952 and 1953 were 4.23 percent and 3.59 percent respectively (Barnard, 1952, 1953).

Fifty-five Nguni steers, of average age 55 months, which were exported to Johannesburg in 1951 and which had on arrival an average live weight of 907 lb. (as compared to 1,009 lb. before leaving Swaziland) had an average dressed weight of 521 lb., giving a dressing percentage of 57.7. The mean weight of the hides was 65 lb., and that of the offals 318 lb. (Barnard, 1952). A further sample sold in Johannesburg in 1952 had an average dressed weight and dressing percentage of 504 lb. and 55.4 (Barnard, 1953).

TABLE 79. - LIVeweIGHTS AND CARCASS DATA FROM NGUNI STEERS AT ONDERSTEEPOORT

Mean age, months	No. of steers	Mean liveweight, lb.	Mean carcass weight, lb.	Mean hindquarter weight, lb.	Mean forequarter weight, lb.	Dressing percentage
40	5	713	404	105	101	56.7
53	6	934	564	142	132	60.4
56	5	1 010	627	163	150	62.1

SOURCE: Bisschop, J. H. R., *Personal Communication*.

Slaughter tests have been carried out on Nguni steers bred in the experimental herd of the veterinary laboratories at Onderstepoort and reared on the farm of the Institute. The results of these tests are summarized in Table 79. The final group of 5 steers (of average age 56 months) were slaughtered after 107 days pen-feeding. They were, however, very wild when brought in from the veld and, never really settling down to stall-feeding conditions, gained on the average only just over 1 lb. per head per day. On deboning, the carcasses

of the pen-fed steers yielded 87.3 percent of beef and 12.7 percent of bone. A tasting and judging panel found that rib roasts from the pen-fed Nguni steers were superior in grain and tenderness to roasts from Africander steers of the same age which had been stall-fed since weaning, although there was no difference between the respective roasts in juiciness and flavor (Bisschop, J. H. R., *Personal Communication*).

The hides from 12 Nguni steers of average age and liveweight, 53 months and 938 lb., had a mean wet weight of 69 lb. and a mean surface area of 49.71 square feet (Bisschop, J. H. R., *Personal Communication*).

The Union of South Africa Committee on Indigenous Livestock Types (Union of South Africa, 1950) observed that Nguni cattle do well in the eastern coastal area, which is regarded as being one of the most unhealthy for cattle in South Africa. They suggested that there might be, in Nguni cattle, hereditary physical characters which give a degree of resistance to diseases including heartwater, redwater, trypanosomiasis, and ophthalmia. Among these characters are the short coat and tough skin, which give some protection against tick-bite, and the pigmented surround to the eye, which appears to be a factor toward freedom from ophthalmia. At Mpisi Research Station it was observed that the resistance of Nguni cattle to the locally prevalent diseases appeared to be superior to that of the Africander herd.

Bonsma *et al.* (1953) found, however, that in a semi-arid subtropical environment in the Northern Transvaal Nguni cattle were less successful than Africanders and required 5.2 lb. of total digestible nutrients above their maintenance requirement to achieve a 1 lb. liveweight gain, as opposed to a total digestible nutrients requirement of 3.0 lb. per 1 lb. liveweight gain for Africanders.

### **Crosses with other breeds of cattle**

Nguni cattle are used extensively on farms managed by Europeans in southeastern Africa for crossing and grading up to European beef breeds and especially to the Aberdeen-Angus and Shorthorn. It has been observed that too large a proportion of exotic cattle in an animal's ancestry leads to a deterioration in its adaptation to the local environment. An attempt is commonly made to correct this effect by putting the crossbred cows to Africander bulls.

### **Sources of breeding stock and information regarding the breed**

The cattle population of the Nguni area has been given as 1,173,032 head. It was estimated that in this total 420,000 head were breeding cows, of which approximately 84,000 were likely to be free of the presence of exotic cattle in their ancestry (Union of South Africa, 1950).

Herds of Nguni cattle are maintained at the Mpisi Cattle Breeding Station, Swaziland, and at the Bartlow Combine Breeding Station of the Department of Native Affairs in the Ubombo district of Zululand in the Union of South Africa.

Further information regarding the Nguni cattle can be obtained from:

The Veterinary Department, Bremersdorp, Swaziland.

The Director of Bantu Agriculture, Department of Native Affairs, Pretoria, Union of South Africa.

## NILOTIC

### Origin

Nilotic cattle include those of the Shilluk, Nuer and Dinka tribes of Nilote peoples who live in the flood plain of the Nile system of rivers in the southern provinces of the Republic of the Sudan.

The cattle type appears to be of great antiquity and is generally supposed to have resulted from an intermixture of the original wild longhorned cattle of Africa (*Bos africanus*) with later incursions of Asiatic zebu (*Bos indicus*). There is no tradition among the people of their having entered the area from elsewhere, or of their having obtained their cattle from unrelated tribes.

On the northern and southern borders of the Nilotic area there has been some admixture with neighboring cattle types; notably in the Shilluk and northern Dinka herds by the Nile north of Malakal where the influence of the Northern Sudan shorthorned zebu is clearly apparent, and in the south and southeast where Nilotes come in contact with tribes owning the small East African zebu and the pyramidal humped Toposa-Murle cattle.

Within the area, raiding in the past and marriage exchanges and, to a small extent, purchases in the present, have mitigated against the development of the closed breeding groups which could become distinct breeds or varieties and, in general, such local differences in conformation and size as exist appear to be very largely of environmental origin.

While there is sufficient resemblance within the cattle population of the area to justify its consideration as a single type, the degree of variation between individuals is sufficiently high to make it inadvisable to refer to it by the more specific term "breed."

### *Location, topography and soils.*

The distribution of the Nilotic cattle is confined to the seasonally inundated flood plain of the Nile system in the Provinces of Upper Nile and Bahr el Ghazal and part of Equatorial Province. The northernmost limit is set by the Bahr el Arab where the Baggara Arabs of Darfur are encountered and further to the east, where the Abialang Dinka to the north of Bentiu have their villages on the north bank of the Bahr el Ghazal, by the boundary of Upper Nile Province, which confines the area occupied by the Shilluk and northern Dinka who extend on both banks of the White Nile as far as approximately latitude 12° N. East of Malakal, the Eastern Nuer have their villages to the north of the River Sobat as far as the Ethiopian border. The spread of Nilotic cattle to the west and southwest is prevented by the presence of tsetse fly in the wooded ironstone country which, very approximately, follows the line Aweil-Wau-Tonj-Rumbek-Juba. The southern limit to the Nilotic area is indefinite, but the cattle become predominantly of the small East African zebu type between Terakeka and Juba on the Bahr el Jebel (White Nile). To the east of the Bahr el Jebel there are large areas of country which, although flooded during and after the rains, are waterless during the dry season and in which it is, therefore, impossible to maintain cattle.

The whole of the area is a flat clay plain sloping very gently from southeast and southwest towards the main river channels. During the rains a combination of river spill and accumulation of rain water results in the whole area being inundated, with the exception of low islands and ridges on which the inhabitants have established their homesteads and where they carry out their crop cultivation. This flood water clears by drainage to the rivers and by evapo-transpiration as the dry season advances, the last parts to be exposed being the low-lying areas near the rivers known as *toich*.

The soils of the plain are predominantly heavy alkaline clays and loams. The higher areas are generally of sandy material, while the *toichs*, which are waterlogged for the greater part of the year and may never dry out, are of mainly clayey material (McLaughlin, E. A., *Personal Communication*).

### *Climate*

The climate is that of a tropical continental area. The dry season, which is of eight months' duration at Renk in the extreme northern extension of the Nilotic cattle down the Nile, shortens towards the south and, at Bor, towards the south of the area, is five months long. Average annual rainfall at Renk is 525 mm. while at Bor it is 858 mm.

Precipitation is at its highest in the southwest of the area. Temperatures seldom vary more than 5° C. from one place to another on the plain.

Climatological data for Malakal in Upper Nile Province and Wau in Bahr el Ghazal Province are given in Tables 80 and 81.

TABLE 80. — CLIMATOLOGICAL DATA FOR MALAKAL, UPPER NILE PROVINCE (ALTITUDE 390 M.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean maximum temperature, °C.	35.8	37.2	38.9	38.6	35.8	33.0	31.0	30.8	32.2	33.9	35.6	35.7	34.9
Mean minimum temperature, °C.	18.5	19.9	22.1	23.7	23.2	22.0	21.6	21.5	21.8	21.9	19.7	18.3	21.2
Mean relative humidity at 08.00 hrs., %	28	23	26	46	66	77	84	87	84	78	52	34	57
Mean relative humidity at 14.00 hrs., %	17	14	15	25	42	52	61	64	60	51	28	20	37
Mean rainfall, mm.	0	0	4	32	88	116	175	183	140	70	9	1	818

SOURCE: SDIT, 1955.

TABLE 81. — CLIMATOLOGICAL DATA FOR WAU (BAHR EL GHAZAL PROVINCE)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean Maximum temperature, °C.	35.8	36.8	37.9	37.1	35.0	33.2	31.7	31.4	32.7	34.1	35.5	35.8	34.8
Mean minimum temperature, °C.	17.6	19.1	21.1	22.4	21.8	21.1	20.7	20.5	20.5	20.6	19.5	17.9	20.2
Mean relative humidity at 08.00 hrs., %	46	42	48	65	73	78	83	85	82	79	70	56	67
Mean relative humidity at 14.00 hrs., %	21	20	22	34	44	50	56	56	52	46	30	23	38
Mean rainfall, mm.	1	6	24	65	135	166	191	209	167	124	14	1	1 103

SOURCE: Ireland, 1948

### Vegetation

The greater part of the flood plain is covered by open grassland with dispersed areas of woodland. The dominant grass species are *Hyparrhenia rufa* in areas of greater flooding and *Setaria incrassata* where slightly drier conditions prevail. The woodland is mainly composed of *Acacia seyal* and *Balanites aegyptiaca*; pure stands of *Acacia*

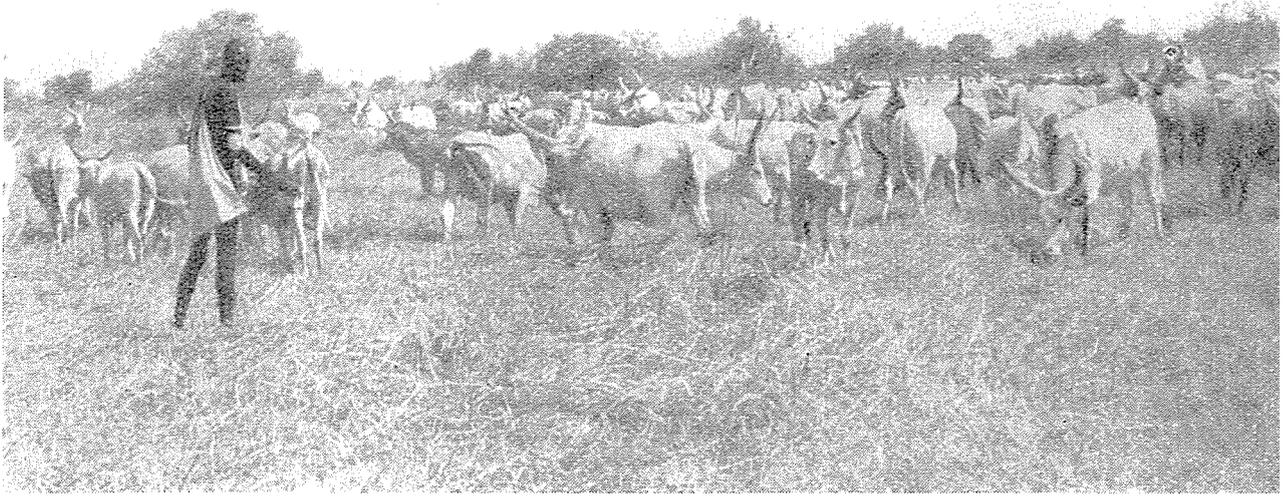


FIGURE 61. Nilotic cattle. "Dinka" cattle grazing on toich near Jonglei Post, Upper Nile Province, Republic of the Sudan.

Courtesy of J. D. M. Jack

*seyal* are frequent, and there are large areas of parkland in which *Balanites aegyptiaca* is the tree species. On the higher land there is woodland of *Acacia* spp. and *Balanites aegyptiaca* and, on sandy soils, the palms *Hyphaene thebaica* and *Borassus flabellifer* Linn. var. *aethiopicum* together with, in the north, the short annual grasses, *Eragrostis* spp. and *Aristida* spp., and further south, in dense woodland, tall annuals such as *Rottboellia exaltata*, *Leptochloa chinensis* and *Hyparrhenia* spp.

The *toichs* (Figure 61) are open grasslands dominated by different grass species according to the degree to which inundation is complete and the period over which it is extended. Where inundation is complete and prolonged *Echinochloa* spp. dominate the plant population; where inundation is sporadic *Phragmites communis* or *Hyparrhenia rufa* tend to be the dominant species (SDIT, 1955).

A form of shifting cultivation using hand implements is practiced in the area. The main crop is dura (*Sorghum vulgare*) for local consumption. Maize (*Zea mays*) is grown in some districts, as well as small crops of sesame, curcurbits and pulses. Tobacco is cultivated by most of the inhabitants on a very small scale for their own consumption. It is tended with great care and appears to be the only crop that they attempt to water in times of drought.

### *Management practices*

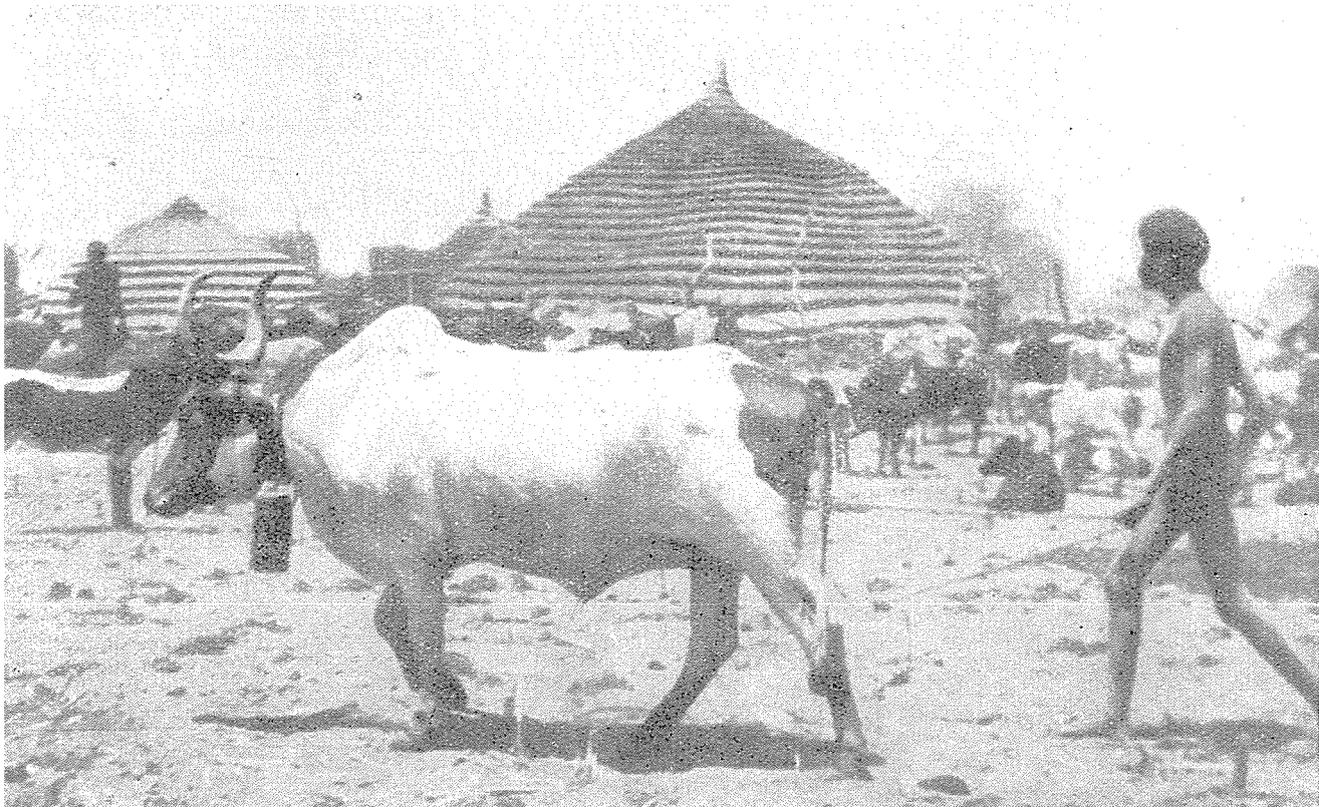
Livestock play an important and integral part in the primitive subsistence economy of the area. The people rely on milk and meat to supplement their otherwise inadequate diet. Cattle play a predominant part in the social and ritual life of the people and, as the cur-

rency of the "bride wealth," are essential to the continuation of the present social system.

The permanent homesteads are situated on the relatively small areas of higher land which remain above the level of the seasonal inundation. During the middle and late rains the cattle graze those parts of the higher land which are not occupied by the grain crop, as well as the more shallowly flooded land nearby. During this period the necessity for remaining near the grain crop, together with the extensive flooding, restricts the movement of the people, and grazing within reach of the homesteads may become inadequate, so that losses among cattle which are weakened by undernutrition and exposure to flooding and storms may be severe. After the rains flooding continues for several weeks, during which the cattle continue to graze near the homesteads. When the harvest is over, the straw of the grain crop is grazed *in situ*. In early December the water has fallen sufficiently for the grass to be burnt so that a young green regrowth becomes available for grazing. When the harvest is completed the people move with their herds toward the rivers, where they burn the grass on the *toich* and graze their cattle on the regrowth. The cattle remain on the *toich* from January until the early rains in April or May when a return is made to the homesteads which are reached in June and preparations for the grain crop begun. The distances moved from the permanent homesteads to the *toich* seldom exceed 120 km. (SDIT, 1955) and are usually considerably less.

FIGURE 62. Nilotic cattle. "Dinka song bull" steer, Bar el Ghazal Province, Republic of the Sudan. The structures in the background are luaks or cattle shelters.

Courtesy of E. A. McLaughlin



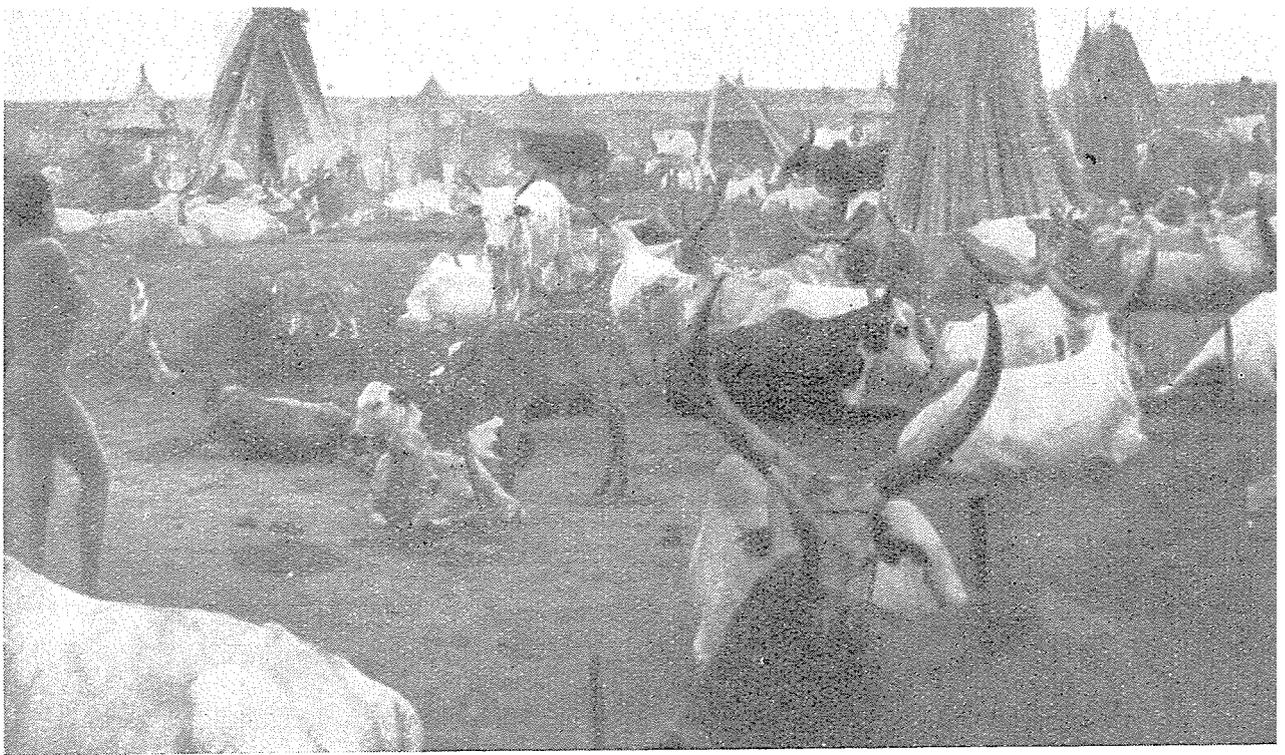


FIGURE 63. A cattle camp in Bahr el Ghazal Province, Republic of the Sudan.

Courtesy of E. A. McLaughlin

Biting flies (Tabanids and *Stomoxys* spp.) during the day and mosquitoes at night prey upon both cattle and man when the herds are grazing near the homesteads. The cattle are housed at night in *luaks*, large circular grass-thatched shelters (Figure 62). A dung fire is lit in the center of the *luak* at dusk and is kept burning throughout the night, so that its smoke will serve as a deterrent against mosquitoes. When the herds are away from the villages during the dry season, the cattle are tethered in large groups during the night and dung fires are placed among them as an insect deterrent (Figure 63).

During the rains cattle are taken out to graze at between 09.00 and 10.00 hrs. and remain out until 15.00-16.30 hrs. If biting flies are troublesome the cattle may be brought back to the camp for between one and two hours at midday. In the dry season grazing hours are rather longer: the cattle are taken out at between 08.00 and 09.00 hrs. and do not return until 17.00 or 18.00 hrs., shortly before sunset. During the rains the cattle, if they are not grazing in or near water, are taken to drink daily at midday. In the dry season watering is twice daily. Normally the cattle have access to green-growing grass throughout the year.

In general, the cattle graze for only five or six hours a day in the rains and eight or nine hours in the dry season, while between 15 and 19 hours are spent standing tethered in the *luak* or camp. During this time no cut or preserved feed is given to the cattle. In spite of this long fasting period it has been observed that cattle do not appear

to be excessively hungry or thirsty when they are released in the morning. Night grazing is never practiced.

Normally, grazing is sufficient at all times of the year, although there may be temporary local shortages if the fall of the river is delayed or if it should rise unexpectedly. In much of the area, however, there may be shortages during and immediately after the rains and, in the west in particular, the increase in cattle numbers consequent upon the success of disease control measures has resulted in overcrowding of the *toich* in the dry season.

Bulls are allowed to run with the cows. Although there may be sufficient bulls to effect the service of all the cows as they come in heat, it has been observed that one bull will establish itself as the "master" of the herd and will prevent younger or weaker bulls from serving cows even if their numbers are beyond its own capacity. When the cattle return to the camp, a bull may be allowed to walk among the cows for a short time after they have been tethered. Bulls are said to be selected on the basis of their dams' milk-producing reputation, but a degree of negative selection is effected by the practice of castrating exceptionally well-grown young bulls at between 1 and 3 years of age so that they may become the pet "song bulls" of the young warriors (Figure 62).

Calves suckle their dams and are allowed all the milk for the first 15 days, when milk is considered to be "unclean" for human consumption. After this, the calf is permitted to suckle in order to stimulate milk ejection and again at the completion of milking. The young calf remains in the camp tethered to a peg until it is 3 to 4 months old, when it enters a calf herd in which it remains until it is weaned on the completion of its dam's lactation. After weaning, the calves join the main herd as soon as they are considered to be sufficiently well grown.

Milking is carried out twice daily at about 08.00 hrs. and 18.30 hrs. It is customary for the gourds in which milk is collected to be rinsed in cow's urine before milking, and the cow's udder is frequently plastered with fresh cow's dung after milking is completed, probably with the intention of deterring the calf from suckling. It is believed that inflation of the cow's vagina stimulates milk ejection.

Liquid milk is consumed by the cattle-owning tribes either fresh or, preferably, slightly sour, and forms the basis of the diet at the dry season camps. When sufficient milk is available it may be churned in a gourd and used for making clarified butter which is consumed locally. It is very rare for milk or milk products to be disposed of outside the immediate family circle. In times of grain famine the cattle may be bled from the jugular vein and the blood mixed with milk which is boiled to form a "porridge" (McLaughlin, E. A., *Personal Communication*).

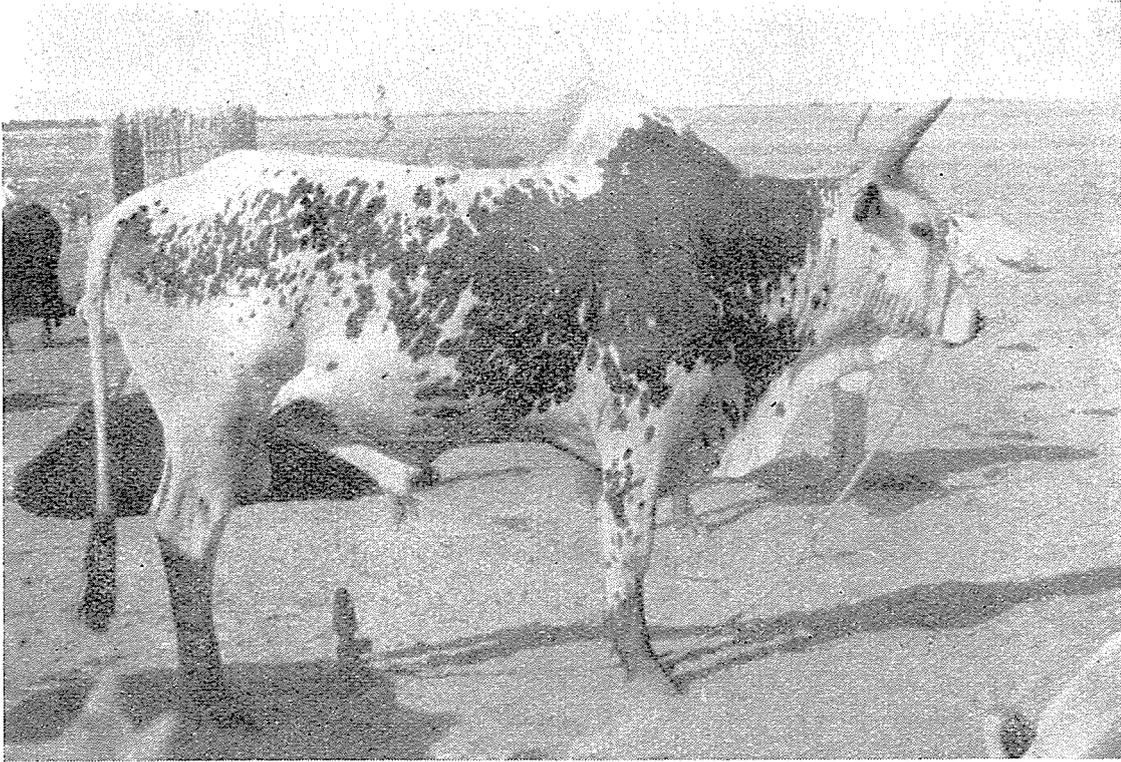
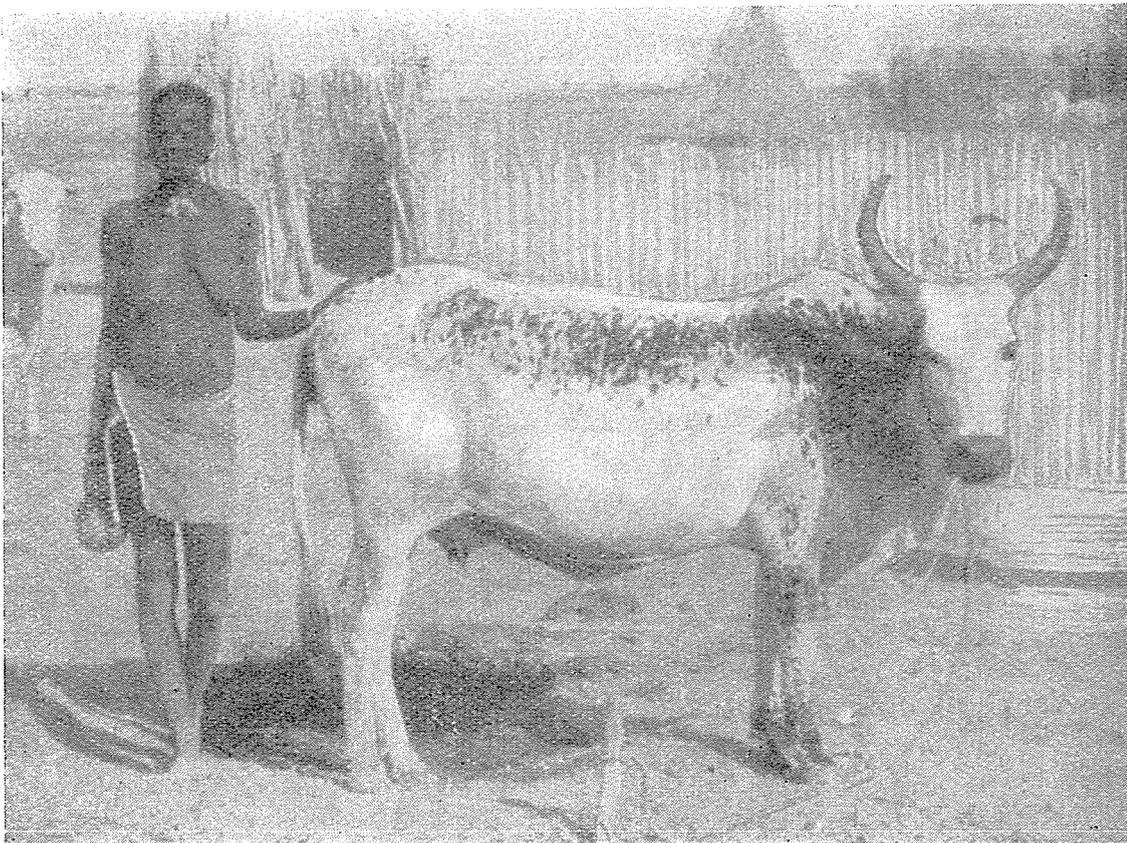


FIGURE 64. *Nilotic "Nuer" bull, Eastern Nuer district, Upper Nile Province, Republic of the Sudan.*

FIGURE 65. *Nilotic "Nuer" cow, Eastern Nuer District, Upper Nile Province, Republic of the Sudan.*

Courtesy of E. A. McLaughlin



### Physical characteristics of the breed

Nilotic cattle (Figures 64 and 65) are of an undifferentiated type which has developed as a result of a form of natural selection under the difficult conditions imposed by an environment dominated by seasonal and prolonged flooding and the prevalence of insect pests. They are of medium size, long in the leg and generally tend to be lacking in spring of rib and depth of chest.

There is a tendency for cattle in the east of the area to be of greater size and superior conformation than those in the west. This differential has been associated with superior fertility of the pastures in the eastern districts and a more level supply of grazing throughout the year.

The head is of moderate length. The face is lean and the profile is normally straight with a variation between slightly convex and slightly concave. The horns spring from a concave poll on well-developed pedestals, and are lyre-shaped, growing in an outward and backward, then upward, inward, and forward direction, with the tips inclined backwards. The size of the horns varies greatly. In the southern parts of the area — in Bor district and the Aliab valley — horns tend to be immense, with the diameter of the horn at its base 20 cm. and its length up to 152 cm.; elsewhere horns tend to be of medium length and do not normally exceed 30 to 40 cm. in length. The largest horns appear to occur in the castrated male, although cows with very large horns can be seen in the south. Bulls generally have horns of medium length which often terminate in very sharp points. Polled animals occur throughout the Nilotic area. In the northern part of the area loose unattached horns are seen. It is noteworthy that this anomaly is common among Northern Sudan short-horned zebus and its occurrence among Nilotic cattle in places contiguous with districts in which the Northern Sudan shorthorned zebu is the cattle type may be due to an exchange of genetic material across the type boundary. The ears are of moderate size and are held horizontally.

The hump is muscular and cervical to cervico-thoracic in position. It is of small to moderate size in the female and castrated male, but in the bull it is sometimes of considerable size and may lean over slightly to one side.

The topline rises from the withers to the rump and tends to be more or less sharply ridged. The rump is of moderate length and slope and the sacrum is less accentuated than in Northern Sudan zebu. The dewlap is fairly well developed and may be about 25 cm. deep, while the umbilical fold in the female is about 25 to 30 cm. long and up to 23 cm. deep (SDIT, 1955).

Coat coloration shows great variation and includes almost every possible combination of colors, including white, gray, dun, brindle roans, whole reds, browns and blacks and patterns of these colors, singly or in combination, on a white ground. Lighter areas around the eyes and muzzle are common. Whites and grays are most common in the extreme south of the area in the Bor and Aliab districts, while in the northeast, in the Eastern Nuer district, red spotting on the flanks of an otherwise white animal occurs. The skin is moderately loose. Its pigmentation is generally fairly dark but tends to be intensified in animals of light coat coloration.

The average liveweight of 52 mature cows at Malakal Government Dairy in 1954 was 254 kg. and the average liveweight of 10 steers, approximately 3 years old, was 240 kg. The average birthweight of calves is reported to be about 30 kg.

The average height at withers and heart girth measurement of Nilotic cows at Malakal Dairy in 1954 were 115 cm. and 162 cm. respectively (SDIT, 1955; McLaughlin, E.A., *Personal Communication*). Liveweights and measurements of Nilotic cattle are given in Tables 82, 83 and 84.

### **Functional characteristics of the breed**

Nilotic heifers calve for the first time at between 3 and 4 ½ years of age. The calving interval between subsequent calves under tribal conditions is estimated to be between 1 and 3 years, and the productive life of a cow is variously estimated to be between 4 and 12 lactations. A bull is first used for breeding at about 3 years of age and the period during which it remains in the herd is reported to be about 4 to 6 years. While some calves are born in every month of the year, the majority of calvings are reported to take place between October and early January from services when the cows are grazing on the *toich* between January and April.

Nilotic cows are capable of only small milk yields. It has been estimated that under tribal conditions average daily yields are in the neighborhood of 4 to 5 lb. of milk from a cow that is suckling her calf twice daily at milking time. Very exceptional cows are said to give 11 to 14 lb. during the first 20 days after calving as well as feeding a calf. At Malakal Government Dairy, in 1953-54, the average yield of 47 cows, which were also suckling their calves was 896 liters in 263 days (SDIT, 1955). In 1950-51 the average yield of all cows at the dairy was 1,230 lb. of milk in 37 weeks with calf suckling (Sudan Veterinary Service, 1951).

TABLE 82. - AVERAGE MEASUREMENTS OF NILOTIC CATTLE  
IN UPPER NILE PROVINCE

	Male			Female			Ox
	1 year	2 years	mature	1 year	2 years	mature	
Weight, kg. ....	55	130	350	55	130	225	380
Length from shoulder point to pinbone, cm. ....	53	76	94	53	76	96	99
Height at withers, cm. ....	81	102	122	81	102	108	131
Depth of chest, cm. ....	—	—	—	—	—	—	—
Width of hips, cm. ....	15	25	36	15	25	36	38
Heart girth, cm. ....	89	132	165	89	132	155	179

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

TABLE 83. - AVERAGE MEASUREMENTS OF NILOTIC CATTLE  
IN EASTERN BAHR EL GHAZAL PROVINCE

	Male			Female	Ox
	1 year	2 years	mature	mature	
Weight, kg. ....	70	130	300	220	300
Length from shoulder point to pinbone, cm. ....	66	74	102	99	114
Height at withers, cm. ....	88	102	127	125	151
Depth of chest, cm. ....	48	60	75	73	83
Width of hips, cm. ....	21	22	44	38	55
Heart girth, cm. ....	104	120	152	145	185

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

TABLE 84. - AVERAGE MEASUREMENTS OF NILOTIC CATTLE  
IN WESTERN BAHR EL GHAZAL PROVINCE

	Male			Female	Ox
	1 year	2 years	mature	mature	
Estimated weight, kg. ....	60	120	280	180	280
Length from shoulder point to pinbone, cm. ....	63	70	100	84	104
Height at withers, cm. ....	95	108	138	110	136
Depth of chest, cm. ....	41	50	70	59	63
Width of hips, cm. ....	22	29	42	36	48
Heart girth, cm. ....	110	123	165	142	160

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

The meat from Nilotic cattle is generally considered to be superior to that of Northern Sudan cattle. Considerable quantities of meat are consumed by the Nilotes, and it is probable that almost every beast is eventually eaten. The dressing percentage of Nilotic steers is reported to be about 50 percent.

Nilotic bulls and steers can be trained for draft work in which they are docile but slow. On a government station where they are used they are first put to work at 6 years of age, have a useful working life of about eight years and are not normally required to work for more than four hours a day.

Nilotic cattle are susceptible to the main epizootic diseases of the area — rinderpest and contagious bovine pleuro-pneumonia — which in the past have been an effective means of preventing any substantial increase in the cattle population. Rinderpest has been effectively controlled by prophylactic vaccination, but contagious bovine pleuro-pneumonia still causes quite large losses. The cattle are tolerant of the locally prevalent strains of foot-and-mouth disease, although a chronic form exists which causes the affected animal to develop a rough, thick coat and a characteristic form of respiration, and is responsible for the name of "panthers" which is applied to animals with this condition. Anthrax occurs sporadically. Trypanosomiasis is widespread, particularly in Bahr el Ghazal Province where the cattle graze in the wooded ironstone country during the rains, but has been successfully controlled in much of the area by the veterinary authorities (Jack, J. D. M., *Personal Communication*; McLaughlin, E. A., *Personal Communication*).

### **Performance in other areas**

Nilotic cattle have been taken into the wooded tsetse country in the southwestern Sudan where a herd of slaughter cattle has been maintained at Nzara in Equatoria Province. When protected by a trypanocidal drug they remained in good health for the short period that elapsed before their slaughter.

### **Sources of breeding stock and information regarding the breed**

It has been estimated (SDIT, 1955) that there were about 2,000,000 cattle of this type in the three provinces of the southern Sudan in 1954.

Government dairy herds, largely composed of Nilotic cattle have been maintained at Malakal in Upper Nile Province, and at Wau and Yirrol in Bahr el Ghazal Province.

Further information regarding Nilotic cattle can be obtained from the Director, Department of Animal Production, Ministry of Animal Resources, Khartoum, Republic of the Sudan.

## NIOKA

### Origin

The Nioka cattle have developed from the interbreeding of the Ankole (Bahima, Sanga type) and the Lugware zebu. They are reported to be an established type.

### Conditions in the native home of the breed

#### *Location, topography and soils*

The type is localized in the broken plateau area of the Haut-Ituri, Nioka, Mahagi, and Djugu regions in the Eastern Province of the Belgian Congo. The altitude of the area varies from 5,000 to 6,000 feet.

Nioka Station, where the Belgian Congo authorities maintain a breeding herd of Nioka cattle, has an elevation of 5,500 feet and is situated at 30° 22' east longitude and 2° 2' north latitude.

The soils in the area are of granitic origin. They are generally clayey sand and rocky in texture and are of poor fertility.

#### *Climate*

The climate is characterized by two rainy seasons. In spite of the relatively high altitude maximum temperatures throughout the year are above 30° C. The nights are cool and at times chilly and foggy. The variation between day and night temperatures is great. November to January are comparatively dry months. Humidity is high throughout the year. Some meteorological data for Nioka Station are summarized in Table 85.

TABLE 85. — CLIMATOLOGICAL DATA FROM THE INEAC STATION AT NIOKA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean maximum temperature, °C.	34	34	32	34	32	31	30	29	32	33	30	30	31.8
Mean minimum temperature, °C.	7	7	9	11	9	9	8	8	8	9	10	8	8.6
Mean temperature, °C. ....	19.8	19.6	20.0	20.2	19.6	18.6	17.9	18.3	18.9	19.1	19.2	19.4	19.2
Mean rainfall, mm. ....	17	91	92	126	117	98	113	148	151	116	72	52	1 193

SOURCE: Veterinary Service of the Belgian Congo, *Personal Communication*.

## Vegetation

*Hyparrhenia cymbaria*, *Loudetia arundinacea* and *Digitaria abyssinea* are among the more important grazing grasses, as well as species of *Cymbopogon* and *Afronardus*. The grasses grow rapidly during the rainy seasons but become woody during the drier months.

## Management practices

The cattle are maintained on pastures throughout the year. During the rainy seasons when grass is abundant the cattle thrive well, but during the drier months when there is scarcity of feed they lose weight. There are no extensive movements of cattle in search of better pastures. The cattle are grazed during the day, but are kept in an enclosure during the night for protection against wild animals.

## Physical characteristics of the breed

Variation in the general conformation of the Nioka cattle (Figures 66 and 67) is due to the mixture of two distinct parental types; the Sanga type Ankole and the Zebu type Lugware. The formation of the hump, for instance, varies from the rudimentary to a prominence similar to that of the zebu. They are, on an average, compact medium-sized animals. The bones are dense and the hoofs are strong. The formation of the horns varies considerably. The usual coat colors are brown, brown and white, and black. The skin is soft and pliable. The pigmentation of the skin is dark. The dewlap is fairly well developed. The hairy coat is short and of medium softness.

Data on certain body measurements are summarized in Table 86.

TABLE 86. — DATA ON CERTAIN BODY MEASUREMENTS OF NIOKA CATTLE MAINTAINED AT THE INEAC STATION, NIOKA, BELGIAN CONGO

	1 year	2 years	Mature
Weight, males, kg. ....	152	231	540.00
Weight, females, kg. ....	152	212	343.00
FEMALES			
Height at withers, cm. ....	—	—	116.12
Depth of chest, cm. ....	—	—	61.80
Width at hips, cm. ....	—	—	40.40
Heart girth, cm. ....	—	—	159.20

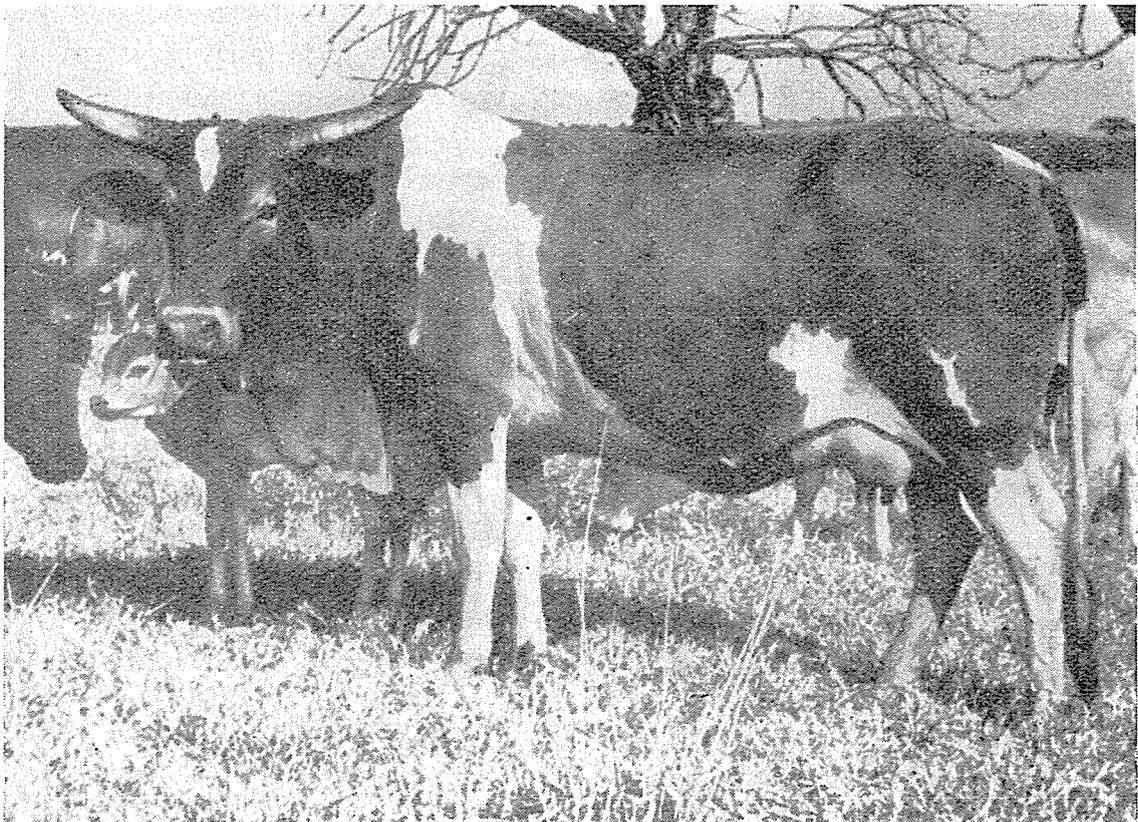
SOURCE: Veterinary Service of the Belgian Congo, *Personal Communication*.



FIGURE 66. *Nioka bull.*

FIGURE 67. *Nioka cow.*

Courtesy of R. Druet



## **Functional characteristics of the breed**

Nioka cattle are utilized for the production of milk and meat. They thrive well on the pastures available in the area and produce excellent beef. The females calve for the first time at from 41 to 48 months of age. The average calving interval is about one year. The average number of lactations during a normal lifetime is 9. The average daily milk production in a lactation period of 240 days has been 2.98 liters.

The males are put to service when they are 32 to 36 months old. They are fairly quick at service.

The Nioka cattle show good adaptability to fattening on grasslands. They are generally slaughtered at about 3 years of age when they weigh about 330 kg. The dressing percentage is about 50.

## **Sources of breeding stock and information regarding the breed**

It is estimated that there are over 45,000 Nioka cattle in the region.

Further information regarding the type may be obtained from:

The Provincial Director of Veterinary Services, Eastern Province, Stanleyville, Belgian Congo.

The Director of INEAC (Institut national pour l'étude agronomique du Congo belge), Nioka Station, Nioka, Belgian Congo.

## **NGANDA**

### **Origin**

The Nganda cattle had their origin in the crossing of the Sanga type Ankole and the Bukedi zebu of Uganda. Crossbred strains occur alongside the pure parent types in those areas where the parent types exist. The cattle type is not stabilized on account of constant intermixtures with either of the parent types, and it may, therefore, not yet be sufficiently well established to justify classification as a breed. Strains are observed in which either the Ankole or the Bukedi zebu characteristics are predominant. The crosses in which the Ankole strain predominates have a very rudimentary hump. It is reported by the Director of Veterinary Services, Uganda, that the majority of these cattle breed reasonably true to type, although exact data are not available. On account of its producing qualities, which are higher than those of other local types, it is liked by the farmers. Nganda cattle are numerous in Buganda Province and in central Uganda.

### *Location, topography and soils*

The area occupied by the Nganda cattle lies on the northern side of Lake Victoria in Uganda. It is part of the lake basin and is characterized by flat-topped hills of uniform height. The average elevation varies from 3,000 to 6,000 feet above sea level. The valley bottoms are occupied by swampy streams.

The soils on the top of the hills are gray in color and well supplied with nutrients. The soils on the slopes are red earths. These red soils grade into sandy soils around the edges of the swamps. The swamps usually have black soils of poor drainage.

### *Climate*

The area occupied by the Nganda cattle is situated on the equator. The climate is, on the whole, equable and pleasant. There are two rainfall periods, one from March to May and the other from October to December. The high plateau land and hill ranges as well as the valleys and swamps locally modify the climatic conditions.

Average climatological data for Entebbe are summarized in Table 87. Figures illustrating the degree of cloud at Entebbe in the different months of the year are given in Table 88.

TABLE 87. — CLIMATOLOGICAL DATA FOR ENTEBBE (ALTITUDE 3,878 FT.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean maximum temperature, °F.	80.9	80.3	78.7	78.6	77.4	77.3	76.3	77.2	78.4	79.4	80.1	78.9	70.3
Mean minimum temperature, °F.	63.8	64.0	63.7	64.7	64.8	63.5	61.9	62.1	62.5	63.0	63.3	62.9	63.4
Humidity at 08.30 hrs., % . . . . .	83	81	84	85	86	84	86	86	85	81	81	83	83.8
Humidity at 14.30 hrs., % . . . . .	63	64	69	71	71	70	71	71	69	67	65	67	68.2
Average monthly rainfall, in. . . . .	2.74	3.58	6.35	9.93	9.67	4.76	3.38	2.80	2.92	3.92	4.56	4.52	59.13

SOURCE: Waller, 1940.

TABLE 88. — FURTHER CLIMATOLOGICAL DATA FOR ENTEBBE

Time of day	Mean cloud (tenths of the sky covered)											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
08.30	7	8	8	9	9	8	7	7	7	8	8	7
14.30	6	7	7	7	7	7	7	7	7	7	7	7

SOURCE: Kendrew, 1953.

## Vegetation

Under the prevailing climatic and soil conditions grasses grow rapidly and luxuriantly. Elephant grass (*Pennisetum purpureum*) is the dominant species in the grazing areas. Spear grass (*Imperata cylindrica*) and *Digitaria scalarum* occur when there is overgrazing. *Hyparrhenia* spp. and *Cymbopogon afronardus* are common on dry rocky hillsides in this zone. On very swampy ground, where elephant grass does not flourish, it is replaced by *Eragrostis* spp. It has been reported that farmers in Buganda Province readily adopt improved pasture management practices. Supplementary feeding of cattle includes raw cassava, banana peelings and leaves, sweet potatoes, maize, millet, cottonseed and beans.

## Management practices

The normal farmer's herd in Buganda Province includes from 20 to 50 cattle. Nowadays cattle seldom travel long distances to pasture but utilize whatever grazing is available in the vicinity of the homestead. Biting flies (*Stomoxys* spp.) are the cause of great distress to the cattle in the grazing areas. As a protective measure, the cattle are generally kraaled during most of the day, only being allowed out to pasture for short periods in the morning and evening, so that the daily grazing time tends to be restricted below that which would be necessary for an adequate intake of nutrients by the animals. The calves, which are housed separately, receive besides grazing, chopped elephant grass and any other feeds which may be available on the farm.

The calves are not weaned from their dams, but on account of the cash value of milk, are often almost starved. This greatly retards their growth and the mortality among the calves is very high.

## Physical characteristics of the breed

The Nganda cattle (Figure 68) are medium-sized and compact, with deep bodies. The hump is rudimentary except in those animals which may have a greater proportion of zebu breeding. The coat colors usually found are reds of varying shades, red and white, black and white, and gray. Both horned and polled cattle occur in the herds. The hoofs are strong. The dewlap is fairly well developed but the umbilical fold and sheath are not strongly marked. The skin is of medium thickness and the coat is smooth.

Average weights of cattle born during the years 1948-1952 at the Livestock Experimental Station, Entebbe, where a herd of polled Nganda cattle is maintained, are given in Table 89.

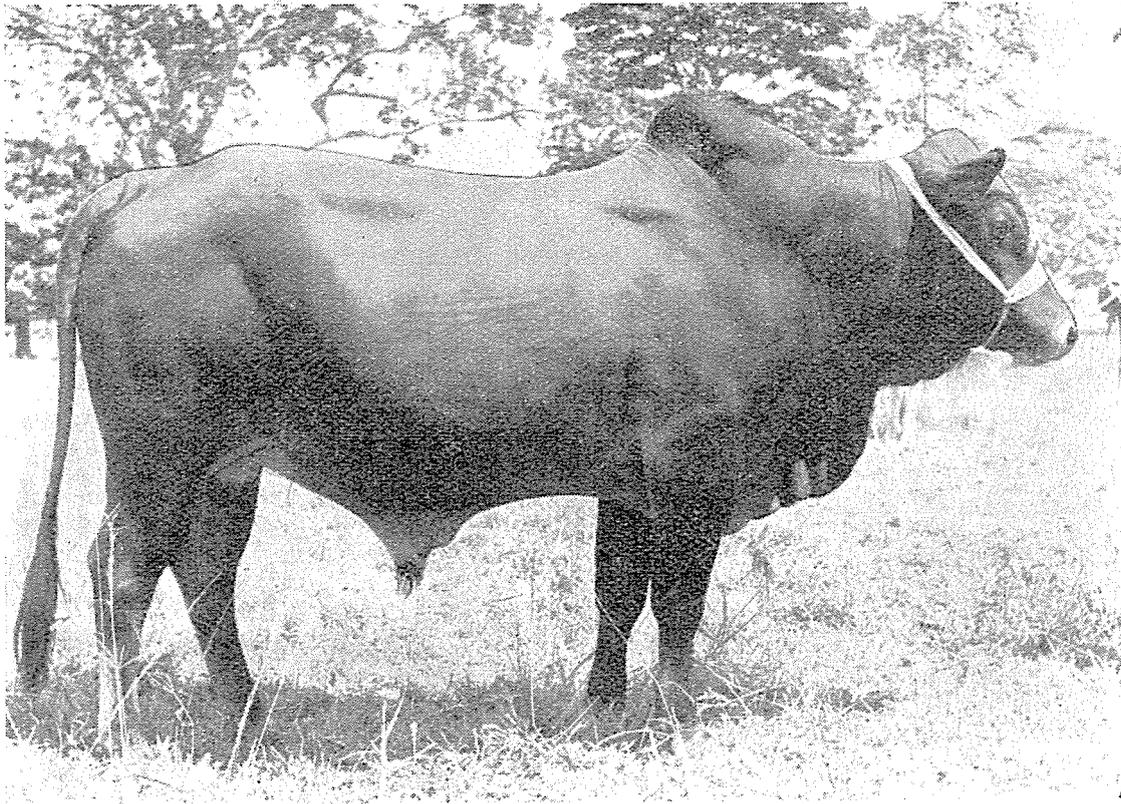


FIGURE 68. *Nganda cattle*. [above] *Bull*. Birthweight, 44 lb., liveweight at 72 months, 1,000 lb; [below] *Cow*. Average milk yield of 6 lactations, 383 gallons milk, containing 225.5 lb. butterfat.

Courtesy of R. N. Sanders

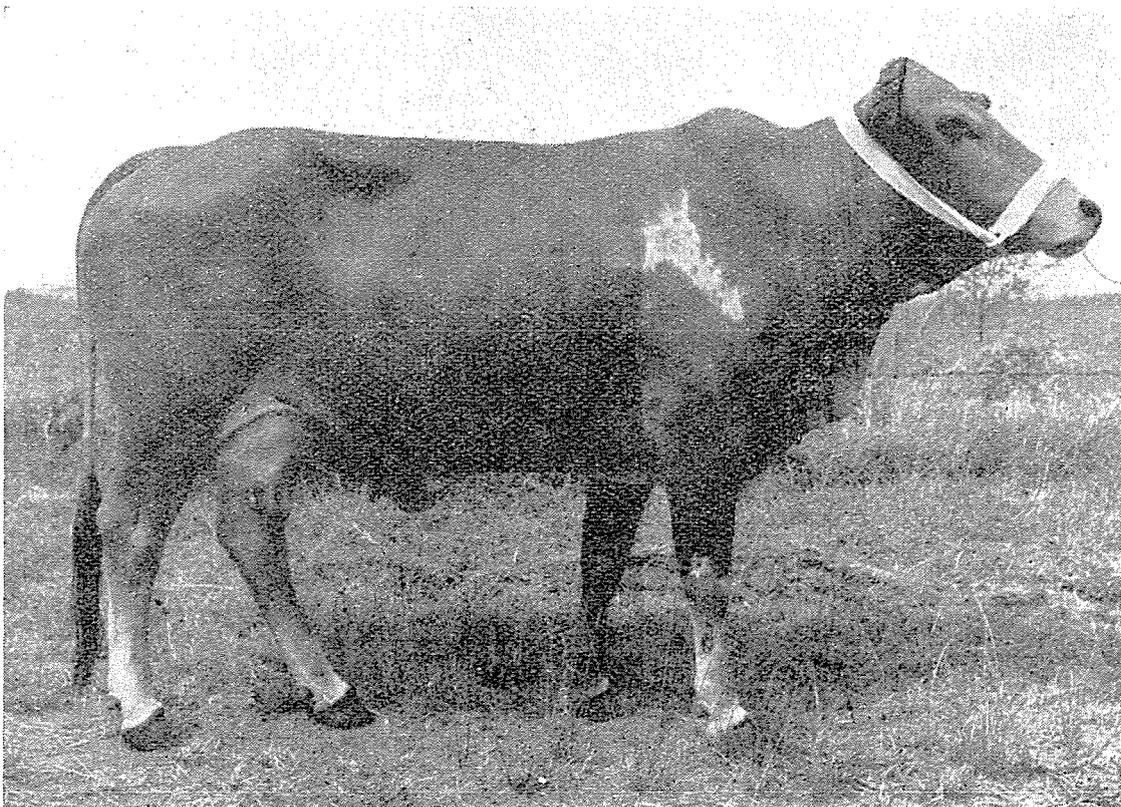


TABLE 89. - WEIGHTS OF NGANDA CATTLE IN DIFFERENT AGE GROUPS

	Average birth-weight,	6 months	12 months	18 months	24 months	30 months	36 months	42 months
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Male	42.5	172.4	278.5	319.8	385.9	492.9	558.0	623.0
Female	40.9	165.9	257.1	308.0	390.0	466.0	523.2	601.9

SOURCE: Uganda Protectorate, 1953.

### Functional characteristics of the breed

Nganda cattle are used for the production of both milk and beef. Castrated males are used for draft purposes. The Nganda is reported to show superior productivity to either the Ankole or the Bukedi zebu.

Nganda heifers calve for the first time at an average age of 45 months.

Average milk production records of Nganda cows maintained at the Livestock Experimental Station, Entebbe, are summarized in Table 90.

TABLE 90. - RECORDS OF MILK YIELDS OF NGANDA COWS AT ENTEBBE

Year	No. of cows in the herd	No. of completed lactations	Milk yield, lb.	No. of days in milk	Calving interval, days	Range in milk yield	
						min., lb.	max., lb.
1949	28 <sup>1</sup>	15	2 100	247	385	1 148	2 930
1950	31 <sup>1</sup>	24	2 345	298	377	1 457	3 727
1951	27 <sup>2</sup>	17	2 091	281	375	1 420	3 779
1951	21 <sup>3</sup>	19	2 842	272	401	1 409	3 809
1952	30 <sup>2</sup>	26	1 927	262	374	561	4 108
1953	18 <sup>3</sup>	16	2 705	272	395	1 869	3 993

<sup>1</sup> Cows milked with calves suckling and cows completely milked; 800 lb. added as the milk estimated to be taken by the calf.

<sup>2</sup> Cows entirely milked without calves.

<sup>3</sup> Cows suckling calves at milking; 900 lb. added to the yield.

SOURCE: Uganda Protectorate, 1953.

### Sources of breeding stock and information regarding the breed

Information regarding the Nganda cattle type can be obtained from the Director of Veterinary Services, Uganda Protectorate, Entebbe, Uganda.

## TONGA

### Origin

The Tonga cattle are of the Sanga type and appear to be similar to the smaller Mashona cattle of Southern Rhodesia and the Nguni of Swaziland and Zululand (Walker, C.A., *Personal Communication*). They are also known as Baila or Mashu Kulumbwe. They are smaller in size and have shorter horns than some other Sanga cattle types.

### Conditions in the native home of the breed

#### *Location, topography and soils*

Tonga cattle are found in a roughly rectangular area following the railway from Livingstone to Broken Hill, extending on the south and southwest to the Southern Rhodesian border from Nyarukanza to Kazungula, and on the northwest to a line running from Broken Hill through Namwala to Kazungula. The area is situated approximately between 25° and 30° east longitude and between 15° and 18° south latitude.

The altitude varies from 2,000 to 4,000 feet above sea level. The main soil types prevailing in the area are derived from granitic parent material with a preponderance of Kalahari sand.

TABLE 91. — CLIMATOLOGICAL DATA FOR MAZABUKA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean maximum temperature, °F.	81.8	79.4	80.7	82.4	79.1	73.0	78.5	82.0	85.5	92.8	87.1	85.6	82.3
Mean minimum temperature, °F.	76.4	66.6	62.6	64.4	57.7	55.1	51.6	57.2	62.3	77.0	70.4	68.3	63.4
Humidity, % ..	95	94	86	86	87	83	81	83	87	87	89	93	87.6
Rainfall, in. ...	3.02	12.25	2.61	0.24	0.01	—	—	—	0.01	0.17	5.25	9.54	33.1

SOURCE: Meteorological Department of Northern Rhodesia.  
Average for 10 years.

#### *Climate*

Temperature rises rapidly during the months of September and October and even the nights are sometimes warm and oppressive. The heat is occasionally relieved during the month of November by thunderstorms, which become more frequent as the rainy season

approaches. November to April are rainy months. During winter months night temperatures are apt to be low. Frosts occur quite frequently in the valley areas of the Zambesi and Kafue. The climates of Rhodesia and Nyasaland, according to the Thornthwaite classification, have been reported by Howe (1953), who may be referred to for further details.

Climatological data for Mazabuka are summarized in Table 91.

### *Vegetation*

More than half of the total land surface is covered with open woodland and savannah, important to the native inhabitants as the basis of various systems of shifting cultivation. The main agricultural crops in these areas are maize, millets, groundnuts, cowpeas, beans and cassava. By-products from these are utilized for stock feeding. In the riverine grazing areas species of *Paspalum* and *Eragrostis* are common. Other important grasses are species of *Hyparrhenia*, *Setaria* and *Urochloa* (Trapnell *et al.*, 1947).

### *Management practices*

Cattle husbandry in this area is seldom closely related to the growing of crops. The herds are semi-nomadic. During the wet season (from December to July) when the cattle are near the villages, the Batonga tribesmen keep them closely herded to prevent their trespassing on food crops. On the conclusion of the rains the cattle move away from the villages and cultivated land, following the receding flood of the Kafue river. When on the exposed flood plain they are not closely herded but are allowed to graze freely on the open range. The cattle remain on the dry season grazing from August to December.

As is usual in much of Africa, the number of cattle possessed by a man is regarded as the outward sign of his wealth and standing in society.

Calves are allowed to suckle their dams throughout the lactation, and only a few cows are milked to provide the family with its requirements of fresh milk and its products, such as fermented milk.

### **Physical characteristics of the breed**

Tonga cattle (Figures 69 and 70) are medium-sized, relatively straight-backed animals of "Sanga" conformation. The head is long and the profile straight. The slight prominence of the orbital arches lends a degree of concavity to the forehead. The neck is short and the dewlap is of only moderate development. The cervico-thoracic, muscular hump

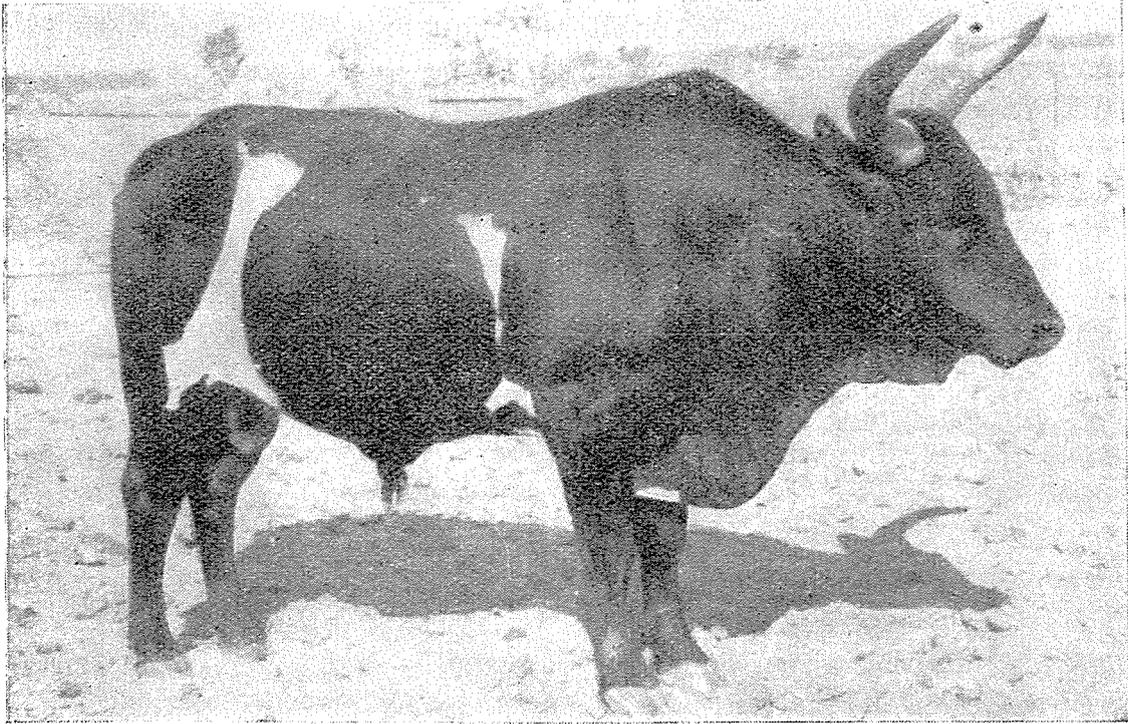
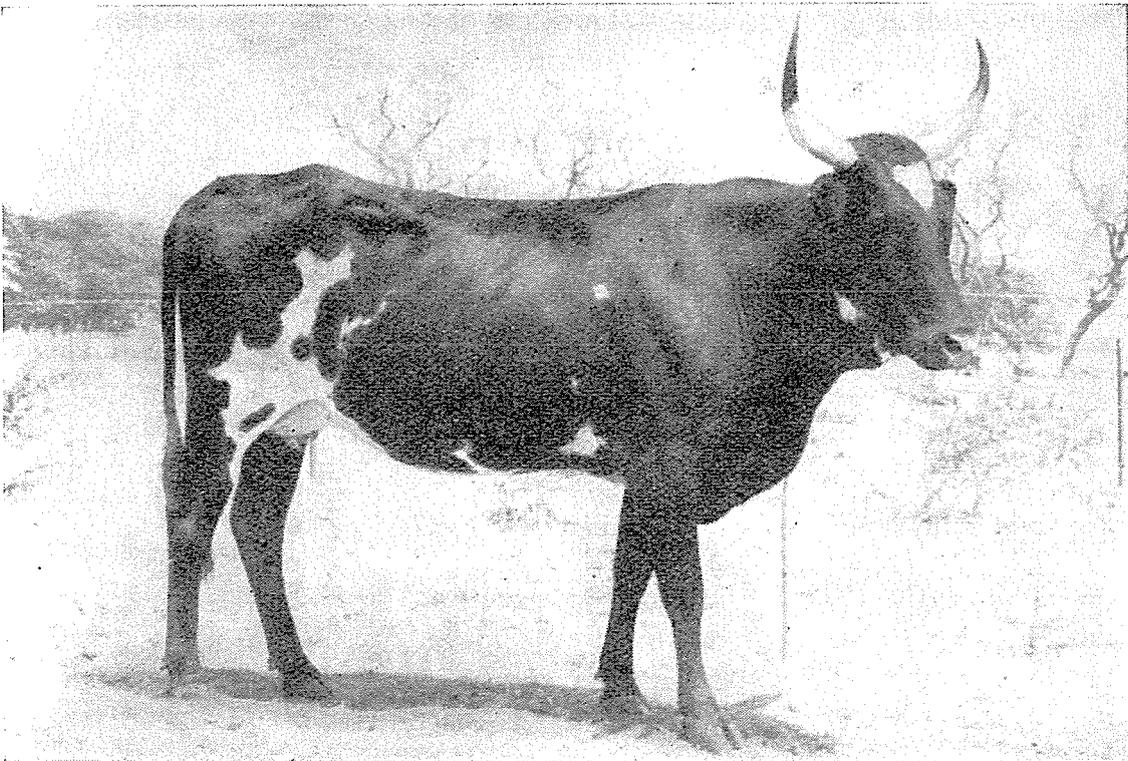


FIGURE 69. *Tonga bull.*

FIGURE 70. *Tonga cow.*

Courtesy of J. G. Black



is vestigial in the female but of medium size in the male. The topline is relatively straight from the withers to the hindquarters, which are of only moderate slope. The sacrum is slightly prominent. The body is of moderate depth and the underline tends to rise from front to rear. The lack of depth of the body together with the relatively long limbs gives the animal an appearance of legginess. The hoofs have been reported to be very durable. The most usual coat colors are red, black, and pied with red or black. Whole white is rare. The skin is darkly pigmented, loose and of medium thickness. The hair is short and close.

Average liveweights of Tonga cattle in the Mazabuka herd, the foundation animals of which had been drawn from the Namwala district, were: male and female calves at birth, 48 and 40 lb. respectively; 1-year-old males, 245 lb.; 2-year-old males, 560 lb.; mature bulls, 1,100 lb.; and mature oxen, 1,050 lb. (Walker, C. A., *Personal Communication*). Some liveweights and measurements of Tonga cattle are given in Table 92.

TABLE 92. — AVERAGE LIVeweIGHTS AND MEASUREMENTS OF TONGA CATTLE

	Male			Female		
	1 year	2 years	2 years, 9 months	1 year	2 years	2 years, 9 months
Liveweight, lb. ....	343	588	798	259	476	672
Length from shoulder point to pinbone, cm. ....	—	135	135	—	127	138
Heart girth, cm. ....	—	160	189	—	141	158

SOURCE: Black, J. G., *Personal Communication*.

### Functional characteristics of the breed

The Tonga is used as a general-purpose animal and is reported to be hardy and to have high heat tolerance. The cows are occasionally milked by the native tribesmen, although usually the calves are allowed all the milk. They are not used extensively for beef production, only the old and decrepit animals being slaughtered.

The females calve for the first time when they are a little over 3 years old. There is no fixed breeding season and calvings occur throughout the year, although the largest drop of calves is from August to March. The average calving percentage in the breeding herd at Mazabuka has been about 59. The males are allowed to serve from about 2 years of age; only males which are used for work are castrated. Tonga

cattle are slow but steady draft animals and are used for all kinds of haulage, using sleds or carts, as well as for field work. From limited data reported from the experimental herd at Mazabuka it has been observed that at 5 years of age they weigh about 1,100 lb. and are ready for slaughter. The dressing percentage has been reported to be 53.6, the proportion of bone in the carcass being 15.2 percent. The type is reported to be moderately susceptible to ticks and lice infestation and to foot-and-mouth disease (Walker, C. A., *Personal Communication*).

Records of performance of the Tonga herd at Mazabuka Government Experimental Station are summarized in Table 93.

TABLE 93. - PERFORMANCE RECORDS OF THE TONGA HERD AT MAZABUKA GOVERNMENT EXPERIMENTAL STATION

No. of cows in herd at beginning of each breeding season						Total progeny produced, 1947-52	Total progeny mortality	Corrected liveweight of beef produced - 100 cow unit			Average weight of calves, males and females, lb.				
1947	1948	1949	1950	1951	1952			in 4 years, lb.	in 5 years, lb.	in 6 years, lb.	1 year	2 years	3 years	4 years	5 years
30	29	33	23	63	65	141	26	32 602	59 160	88 611	198	490	610	975	1 165

SOURCE: Northern Rhodesia, 1952, 1953.

#### Sources of breeding stock and information regarding the breed

It is estimated that there are about 400,000 Tonga cattle in Northern Rhodesia.

Further information may be obtained from the Director, Veterinary Services, Mazabuka, Northern Rhodesia.

## Group VI

### ANGONI

#### Origin

Curson and Thornton (1936) place the Angoni cattle of Northern Rhodesia in the Shorthorned Zebu group and Mason (1951*b*) classifies them as East African Shorthorned Zebus. Faulkner (*Personal Communication*) records that, while Angoni cattle in Nyasaland may have some Sanga ancestry, those in Northern Rhodesia appear to be a more pure form of East African zebu. The name Angoni is taken from that of the tribe, the members of which are the principal breeders of this type of cattle.

#### Conditions in the native home of the breed

##### *Location, topography and soils*

The native home of the Angoni cattle is in the Eastern Province of Northern Rhodesia, roughly within the area bounded by the Luangwa river on the west, Lake Nyasa on the east and the border with Portuguese East Africa on the south. The northern border of the type area extends into the Northern Province of Northern Rhodesia. The altitude varies from 2,000 to 5,000 feet above sea level. The main soil types are sandy and sandy loams.

##### *Climate*

Temperatures vary with altitude and only the Luangwa valley area may be called truly tropical. Rainfall occurs in a single season which begins in November and continues through the middle of April. Temperatures are moderate in the early rains. The rainfall is sporadic and occurs in heavy showers. During the winter months night temperatures are low and necessitate the sheltering of livestock. The low winter night temperatures, the long dry season and the consequent lack of grazing, result in conditions for livestock being severe.

Climatological data for Fort Jameson, located in the district of that name, in which Angoni cattle are extensively bred, are summarized in Table 94.

TABLE 94. - CLIMATOLOGICAL DATA FOR FORT JAMESON,  
NORTHERN RHODESIA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °F. ....	72.6	72.7	72.4	71.9	68.5	64.5	64.8	68.1	73.8	78.1	76.3	74.1	72.40
Humidity, % ...	68	71	67	60	55	49	47	41	37	37	47	59	53.20
Rainfall, in. ....	9.92	8.22	8.30	1.83	0.29	0.02	0.02	0.01	0.02	0.53	4.59	7.94	41.69

SOURCE: Meteorological Department of Northern Rhodesia.  
Average for 10 years.

The following climatological data are reported for Mazabuka, at latitude 16° south and longitude 28° east, and with an altitude of 3,400 feet above sea level, where an experimental breeding herd of Angoni cattle is established.

The average rainfall has been 28 inches per year, the rainy season being from December to March. The mean maximum shade temperature is 80° F. and the mean minimum shade temperature is 55° F. The mean maximum and minimum shade temperatures for summer are 100° F. and 60° F. respectively. The mean maximum and minimum shade temperatures for winter are 80° F. and 30° F. respectively.

#### *Vegetation*

There are extensive grazing areas, although the availability of herbage is restricted by the length of the dry season and the lack of sufficient moisture in the soil to sustain plant growth. The following grass genera are important: *Hyparrhenia*, *Brachiaria*, *Setaria* and *Urochloa*. Characteristic tree genera are *Brachystegia* and *Isobertlinia*. Sorghum and maize are grown extensively.

#### *Management practices*

The Angoni are used as general-purpose milk and beef production cattle. As is common in African territories, the cattle serve as "bride wealth" and are slaughtered on ceremonial occasions. As crop production is not always feasible in the greater part of the area, an exten-

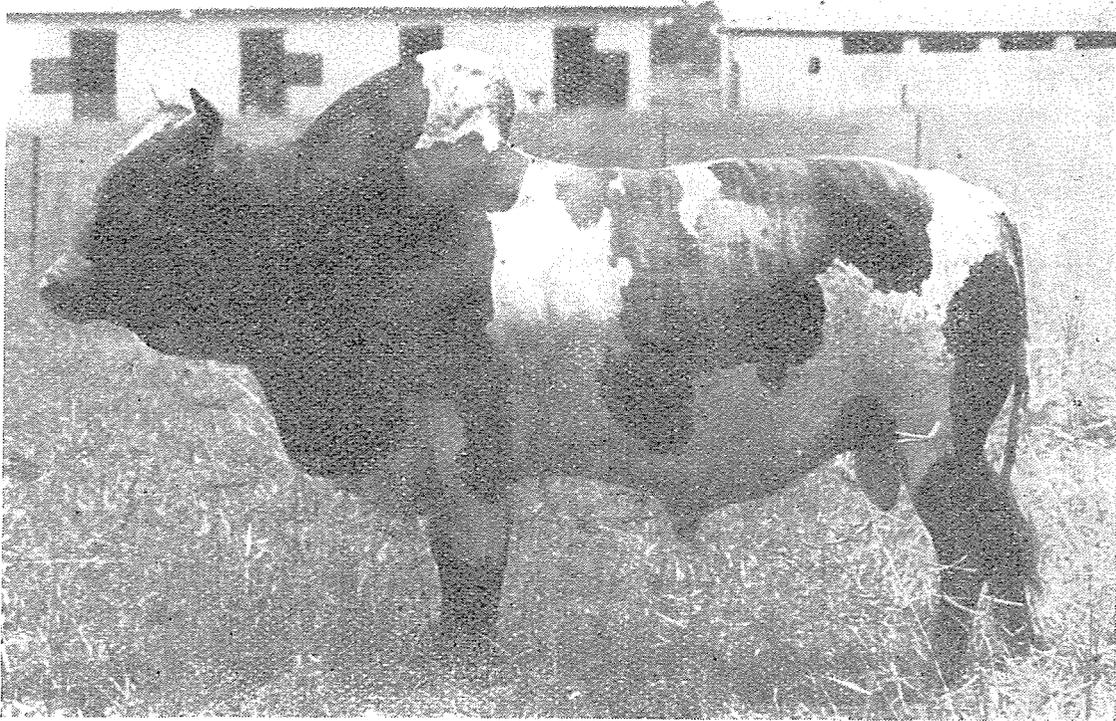
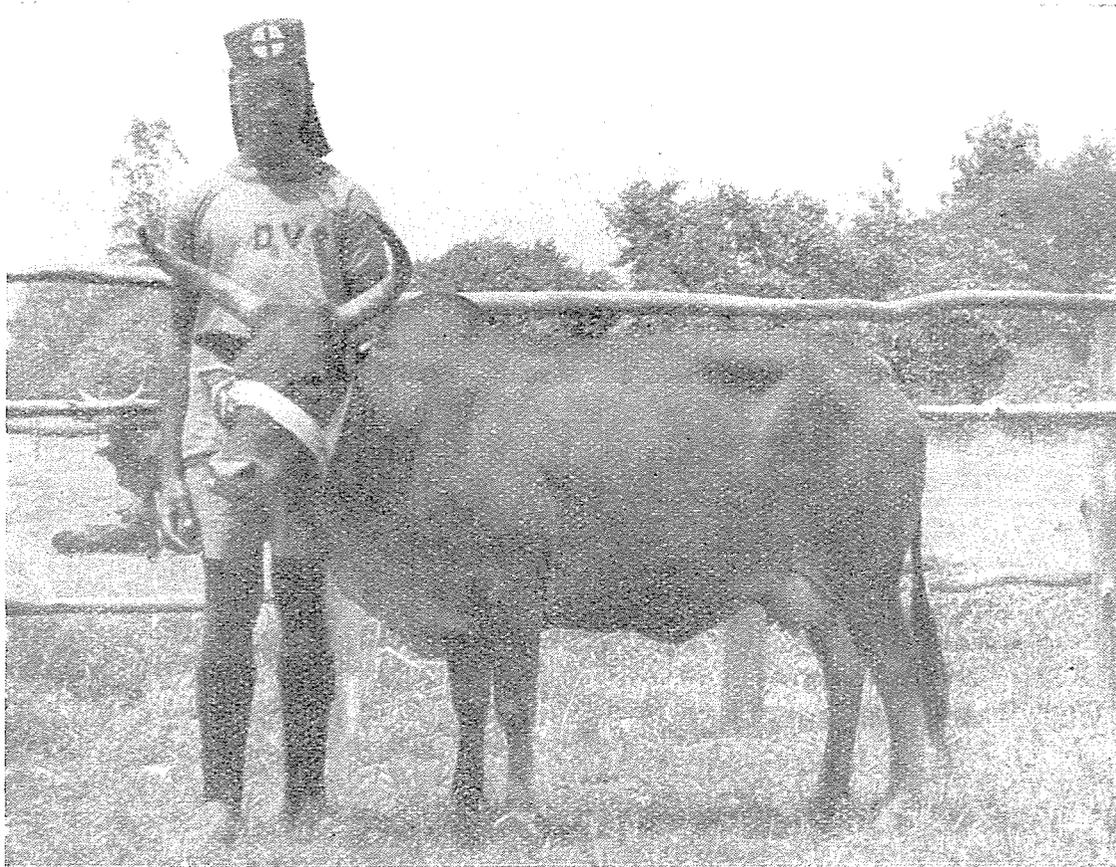


FIGURE 71. *Angoni bull. Mature liveweight, 1,480 lb.*

Courtesy of J. G. Black

FIGURE 72. *Angoni cow, Nyasaland.*

Courtesy of D. E. Faulkner



sive pastoral system of farming is practiced. Group herding is common in the area. On account of the very cold nights during the winter, the cattle are generally sheltered in corrals and taken out for grazing late in the morning.

### Physical characteristics of the breed

The Angoni cattle (Figures 71 and 72) are medium-sized, lightly-boned animals, with smooth compact frames. The hump is well developed in both sexes. The dewlap is large and deep and the skin is thin and loose and of dark pigmentation. The hair is short and of medium softness. The ears are medium-sized. The hoofs are hard and very durable. The horns are short and thick at the base. The usual coat colors are red, brown, dun, black, broken red and white, and black and white. Typical "line" brindle colors of fawn, black and brown are also commonly seen.

Average liveweights and body measurements of Angoni cattle at the Government Experimental Farm, Mazabuka, Northern Rhodesia, are summarized in Table 95. The birthweights of male and female calves at this station were 60 and 55 lb. respectively.

TABLE 95. — AVERAGE MEASUREMENTS OF ANGONI CATTLE  
AT MAZABUKA, NORTHERN RHODESIA

	Male				Female		
	1 year	2 years	ma- ture	oxen	1 year	2 years	ma- ture
Weight, lb. ....	298.0	605.0	1 250.0	—	287.0	580.0	1 050.0
Length from shoulder point to pinbone, cm. ....	107.9	125.0	130.0	—	104.3	123.0	125.0
Height at withers, cm. ....	104.0	116.5	124.4	—	103.2	112.0	119.0
Depth of chest, cm. ....	50.25	58.3	80.1	—	58.0	65.3	74.9
Width of hips, cm. ....	36.0	42.0	49.1	—	36.0	40.0	48.2
Heart girth, cm. ....	134.5	157.7	176.7	—	130.9	155.0	169.0

SOURCE: Walker, C. H., *Personal Communication*.

### Functional characteristics of the breed

In their native area Angoni cattle are used as general-purpose milk, beef, and work animals, but at the Mazabuka Experimental Station their beef qualities are being developed.

The females generally calve for the first time when they are a little over 3 years of age. No particular breeding season has been reported.

They are stated to be fairly regular breeders. The males are first used for service at 2 years of age, or slightly later, and have an active breeding life of about 12 years. They are reported to be shy breeders.

Although the Angoni herd at Mazabuka Experimental Station has not been developed for milk production, Faulkner and Brown (Colonial Office, 1953) report that the best milkers in the Angoni herd are capable of giving half a gallon of milk per day at the height of lactation, in addition to feeding a calf. It has been reported that Angoni cattle respond to a high plane of nutrition, averaging 2.6 lb. of liveweight gain per day. The average slaughter weight at 4 years is about 1,100 lb., although selected animals have attained to 1,120 lb. liveweight at about 400 days. It has also been reported that the proportion between the forequarters and hindquarters is in the ratio of 48:52 and that the average dressing percentage is 54.2, the figures for selected samples being 59 percent. The percentage of bone in the carcass has been given as 13.5 (Walker, C. H., *Personal Communication*).

Records of performance of the Angoni herd at Mazabuka Government Experimental Station (1952, 1953) are summarized in Table 96.

TABLE 96. - PERFORMANCE RECORDS OF ANGONI CATTLE AT MAZABUKA

No. of cows in herd at beginning of each breeding season						Total progeny produced, 1947-52	Total progeny mortality	Corrected liveweight of beef produced 100 cow unit			Average weight of calves, males and females, lb.				
1947	1948	1949	1950	1951	1952			in 4 years, lb.	in 5 years, lb.	in 6 years, lb.	1 year	2 years	3 years	4 years	5 years
28	28	28	40	43	48	187	11	35 704	62 396	100 034	278	480	625	944	1 128

SOURCE: Northern Rhodesia, 1952, 1953.

Angoni cattle are very little used for draft, but whenever they have been used for this purpose they have been reported to be even-tempered and active workers.

#### Sources of breeding stock and information regarding the breed

It is estimated that there are over 108,000 head of Angoni cattle in Northern Rhodesia.

Further information may be obtained from the Director of Veterinary Services, Mazabuka, Northern Rhodesia.

## BORAN

### Origin

The Boran cattle are indigenous to the Liban plateau in southern Ethiopia and the adjoining parts of Somalia and northern Kenya. In the second and third decades of this century Boran cattle were introduced into the drier parts of Kenya where they have been selected for beef qualities on the properties of European settlers until the "improved Boran" has become an animal of very different conformation to that of the tribal cattle from which it is derived. French, M. H. (*Personal Communication*) has further suggested that the "improved Boran" may often be descended from Borans which were crossed with European types, such as the Hereford, so that herds in the European ranching areas in all probability contain a small proportion of European ancestry.

### Conditions in the native home of the breed

#### *Location, topography and soils*

The original environment of these cattle was the arid country in southern Ethiopia which, in the Liban plateau, the center of social life of the Boran tribe, has an altitude of 3,000 to 4,000 feet.

In Kenya, Boran cattle are maintained very largely in the plateau area to the west of Mount Kenya with an altitude generally exceeding 5,000 feet. The soils are described by Milne (1936) as being generally red earths or black or gray clays ("cotton soils").

Faulkner (1951) refers to soil deficiencies in phosphorus and sodium as well as, to a lesser extent, chlorine and, in limited areas, cobalt.

#### *Climate*

In the original home of the breed the rainfall, which is limited to a short season in the year, is low (10 to 15 inches a year) and unreliable so that prolonged droughts extending over several years may occur.

The climate of the area in Kenya in which the majority of Boran herds are now maintained is characterized by the division of the year into four seasons. January and February are the driest and warmest months with afternoon temperatures rising above 80° F. and insufficient rainfall for plant growth. The "long rains," in which about

half the total annual rainfall occurs, fall in March, April and May. During this season the day temperatures are lower than in the first two months of the year, but the nights are warm and sultry. June to October comprises the cool winter season, with cold nights and a considerable amount of cloud, sometimes with rain, in the day. Day temperature rises in September and continues high through the "short rains" which extend from mid-October to December and give about half the precipitation of the "long rains."

Annual rainfall is generally about 20 to 25 inches but is erratic and uncertain both seasonally and from year to year and it is possible for a whole rainy season to pass with very little rain.

The mean annual temperature is in the neighborhood of 60° or 70° F. The diurnal range is considerable and at Nakuru in the east Rift valley is 24° F. in July and 35° F. in February.

The air is clear in the rainy seasons, but in the drier months visibility is reduced by dust storms and haze as well as the smoke from bush fires and the mirage induced by the afternoon heat (Kendrew, 1953).

Climatological data for Garissa, where conditions are similar to those under which the tribal herds are maintained, and for Nakuru and Rumuruti, which are representative of the country in which the European Boran ranches are situated, are given in Table 97.

TABLE 97. — CLIMATOLOGICAL DATA FOR GARISSA, NAKURU AND RUMURUTI IN KENYA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<i>Garissa</i>													
Mean temperature, °F. ....	83.9	85.5	87.1	86.4	84.3	81.3	79.8	80.4	81.8	84.1	84.7	83.7	83.6
Mean maximum temperature, °F.	92.6	97.4	98.1	96.8	94.6	91.4	89.9	90.5	92.5	94.7	94.7	93.9	94.2
Mean minimum temperature, °F.	71.6	73.5	76.1	76.0	73.9	71.2	69.7	70.3	71.1	73.4	74.8	73.6	72.9
Mean rainfall, in.	0.62	0.33	1.07	2.72	0.37	0.30	0.13	0.32	0.29	0.96	2.15	2.97	12.23
<i>Nakuru</i>													
Mean temperature, °F. ....	65.0	67.0	67.0	66.0	65.0	64.0	63.0	63.0	63.0	64.0	64.0	64.0	65.0
Mean rainfall, in.	0.7	1.5	2.6	5.0	4.5	3.3	4.4	4.1	2.7	2.2	2.5	1.2	34.6
<i>Rumuruti</i>													
Mean temperature, °F. ....	63.7	63.3	64.9	64.5	62.9	63.5	61.8	61.2	62.5	64.3	63.1	62.5	63.2
Mean rainfall, in.	0.66	0.82	1.87	3.68	2.20	1.85	3.62	3.53	1.42	1.74	2.92	1.18	25.59

SOURCE: Nakuru; Kendrew, 1953.  
Garissa, Rumuruti: Barrett, M. A., *Personal Communication*.

## *Vegetation*

In the original habitat of the Boran cattle the characteristic vegetation is desert grass and dry bush with trees (Edwards, 1951), in which the dominant tree and bush genera are *Commiphora* and *Acacia* while the most prevalent grass is *Chrysopogon audieri* var. *quinqueplumis*, which occurs throughout the area in association with other species (including *Aristida* spp., *Chloris myriostachya*, *Cenchrus* sp., and *Andropogon* sp.) which may achieve dominance in specific localities. Through the greater part of the year the bush is leafless and the grass is dry and brittle.

The vegetation of that part of Kenya in which most of the Boran herds are today has been described by Edwards (1951) as *Scattered Tree Grassland and Open Grassland (Acacia-Themedata)* and is characterized by the occurrence of widely-spaced flat-topped *Acacia* trees varying from 6 or 8 feet to 50 feet in height in open grassland in which the individual plants are 3 to 4 feet high. Among the trees, *Acacia hebecladoides*, *A. seyal* and *A. senegal* are common. The dominant grass species is *Themeda triandra* which appears in association with *Pennisetum* spp., *Eragrostis* spp., *Hyparrhenia* spp., *Setaria* spp. and others.

The association of species in the vegetation of the area is influenced by first, the occurrence of large tracts of open grassland where, owing to impeded drainage, trees are unable to grow, and secondly, by the seasonal occurrence of grass fires which appear to favor *Themeda* at the expense of other grasses.

The area is well suited to extensive cattle grazing, and only at its fringe where it borders higher rainfall areas is crop production possible (Edwards, 1951).

Faulkner (1951) refers to investigations which have indicated that the grasslands are seasonally deficient in protein.

## *Management practices*

The Boran cattle in the hands of the tribesmen of southern Ethiopia and Somalia exist under the exiguous conditions of nomadic or semi-nomadic husbandry in which the year is spent in movement in search of grazing or, more frequently, water, both of which may, in periods of drought, become insufficient to supply the needs of the herds.

In the higher rainfall areas in which they have been maintained in Kenya for the past 20 or more years, herds are commonly kept for beef production under ranching conditions on properties under European management (Figure 73) which may be as large as 80,000 acres. Nutritionally the cattle are still almost completely dependent



FIGURE 73. *Boran cattle on a European-owned ranch in Kenya.*

Courtesy of Dept. of Information, Nairobi, Kenya

on grassland and the unreliability of the rainfall can lead to grazing shortages which, while less severe than those occurring in the northern pastoral country, can be the cause of considerable deterioration in the condition of the animals.

Most of the areas in Kenya in which Boran cattle are kept are comparatively free of ticks. Some European-owned herds are never dipped in an acaricide while others are dipped fortnightly or monthly. Owing to the sparsity of the tick population, adult African-owned Boran cattle in the Northern Frontier district are fully susceptible to East African fever. All European-owned herds are inoculated against rinderpest (Faulkner, 1951; Barrett. M. A., *Personal Communication*).

### **Physical characteristics of the breed**

Boran cattle (Figures 74, 75 and 76) have been described by Faulkner (1951). They are, by comparison with many other African types, large cattle which are capable of producing, in the improved ranch strains, a beef carcass of good quality as well as having, again by African standards, a superior capacity for milk production.

The head is long and tends to be coffin-shaped, with the greatest width between the supra-orbital processes. The face is long and lean

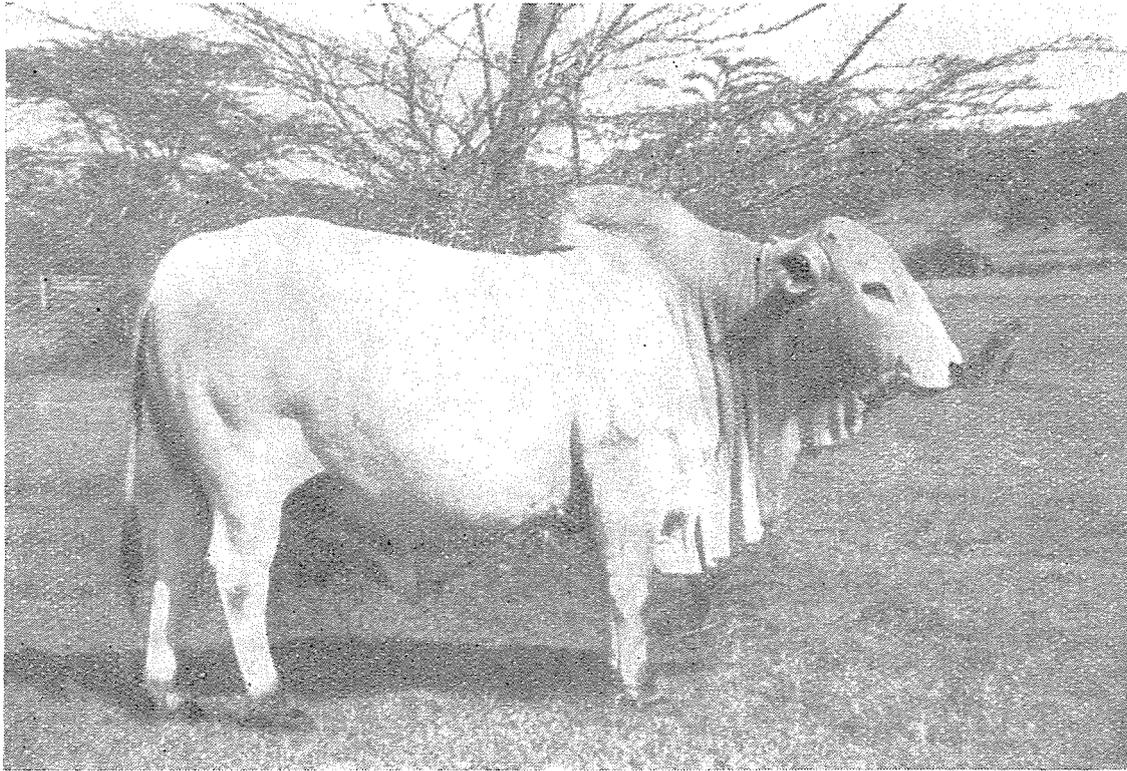


FIGURE 74. A  $4\frac{1}{2}$ -year-old Boran bull bred by Mr. Miles Fletcher at Ngobit, Kenya. This is the type of bull being selected for by the Boran Cattle Breeders Association.

Courtesy of Miles Fletcher

and the profile is generally convex. The muzzle is broad by comparison with the face. The horns are usually short and erect, but individuals with longer horns and with horns of varying direction of growth may be seen. Typically, the termination of the horn is blunt. Polled cattle are fairly common.

The neck is fairly short. The musculo-fatty hump is thoracic in position and varies considerably in size and shape between individuals. It is prominent in the bull and may tend to be pyramidal in shape or may lean over to the rear. In the female there is variation between a small, barely apparent hump, and one which compares in size with that of the bull.

The topline rises to the hindquarters and is wide and well muscled. The slope of the rump varies considerably but, possibly as a result of a small proportion of European ancestry, is generally less in the improved Boran of the European-managed ranch than in tribal cattle. The upper thigh can be thick and rounded. The tail is long and set on low.

The dewlap is well developed, as are the umbilical fold and the sheath.

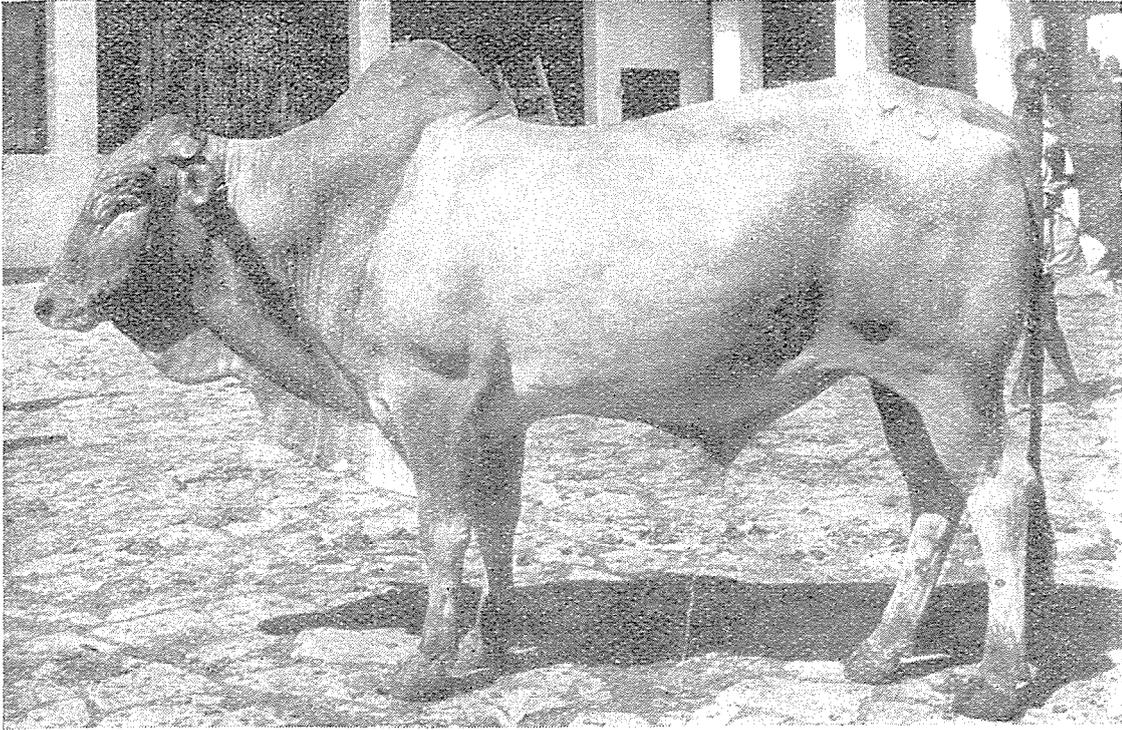
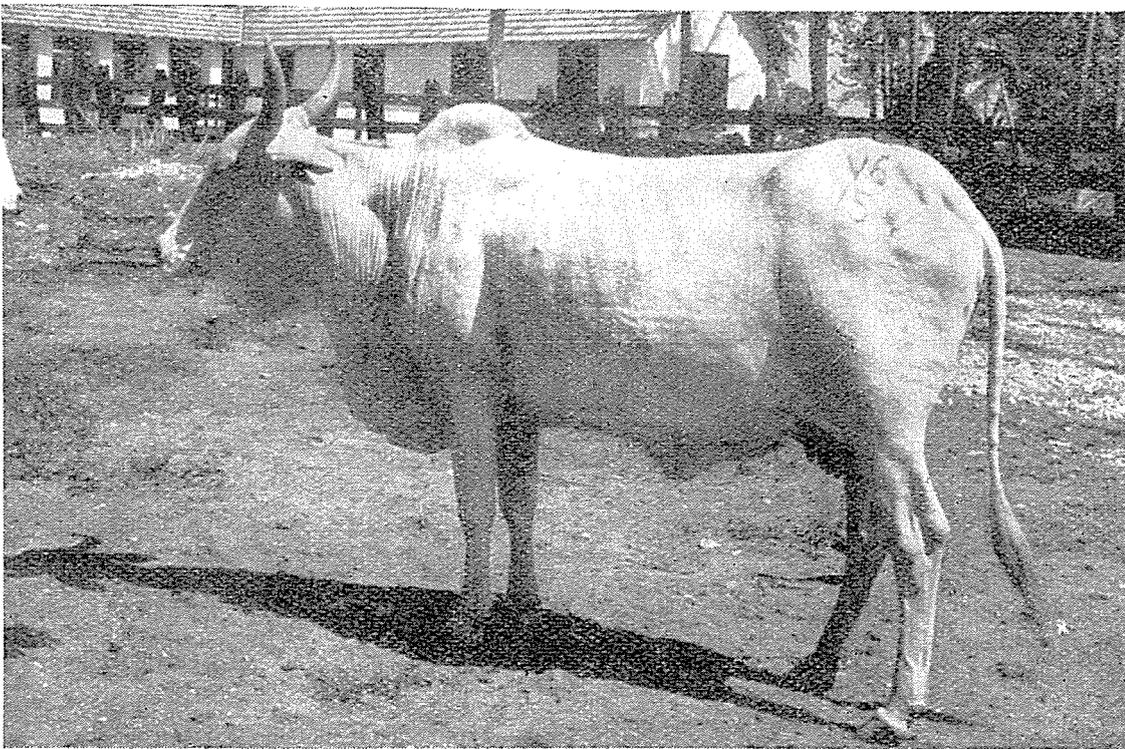


FIGURE 75. *Boran bull at Tanga Dairy, Tanganyika.*

FIGURE 76. *Boran cow at Tanga Dairy, Tanganyika.*

Courtesy of H. G. Hutchison



The most common coat coloration is white, which frequently, and especially in bulls, merges into dark gray or black or, in some cases, fawn, on the shoulders, neck and head and down the thighs. This coloration is that of the majority of the cattle in Somalia and the eastern part of the Northern Frontier Province of Kenya. In southern Ethiopia the cattle are characteristically of a coat coloration which can range from pale biscuit to medium-red, with light fawn as its most usual shade. The red coloration may be varied with patterning or spotting with white. Whole black coat color also occurs but is less frequent. The skin, especially in association with a white coat, is usually darkly pigmented but, in the Galla Boran cattle of the northern desert areas cattle are frequently seen which have white coloration but non-pigmented skins and hoofs.

Faulkner (1951) has given 1,200 to 1,500 lb. as the liveweight of the Boran bull and 850 to 1,050 lb. as that of the cow. The same author reported that the liveweight and measurements of a single Boran bull which was typical of the breed were: liveweight 1,316 lb.; length from shoulder point to pinbone 60.5 inches; height at withers 49 inches; width at hips 19.5 inches; heart girth 81.5 inches; depth of chest 28 inches. Means and range for liveweights and measurements of Boran cows and oxen are given in Table 98.

TABLE 98. - AVERAGE LIVEWIGHTS AND MEASUREMENTS OF MATURE BORAN CATTLE

	Mature cow		Mature ox	
	range	mean	range	mean
Liveweight, lb. ....	764-920	841	1 188-1 440	1 356
Length from shoulder point to pinbone, in. .	53.0-57.0	54.6	57.5-65.5	62.5
Height at withers, in. .	— -48.2	47.5	52.5-58.0	55.0
Depth of chest, in. ....	23.5-25.5	24.6	29.0-32.0	30.1
Width of hips, in. ....	14.2-18.5	16.9	20.5-22.0	21.0
Heart girth, in. ....	60.5-68.0	64.9	76.8-86.5	82.0

SOURCE: Faulkner, 1951.

### Functional characteristics of the breed

Faulkner (1951) reports ranch heifers in Kenya as calving down at 45 months and subsequently at an interval of 14 months. Young bulls have been used for service from the age of 30 to 36 months. Calving rates under range conditions in Kenya have extended from 75 per-

cent to 100 percent. On one ranch a rate of over 70 percent was maintained for 18 years.

The same author reported the milk performance of Boran cows under extensive management without supplementary feeding on a ranch in Kenya. Milking was once daily and a standard figure of 6 lb. of milk was added to each cow's daily yield as an allowance for the suckling calf. The average daily yield (including the additional 6 lb. for the calf) was 12.5 lb. over a mean lactation period of 295 days, which would give a total lactation yield of 3,688 lb. Four selected cows gave a mean yield of 4,833 lb. in 362 days. The average butterfat content of the milk was reported to be 5 percent. These means without the arbitrary addition for the suckling calf would have been 1,918 lb. in 295 days and 2,661 lb. in 362 days respectively.

Boran herds are maintained primarily for meat production. Faulkner (1951) states that Boran steers killed at 4 years, 5 years and 6 years of age can be expected to give cold deadweights of 480 lb., 600 lb., and 700 to 750 lb. respectively. He observes that on one ranch where management methods have been improved, the slaughter weight of steers killed at 5 years has increased from 583 lb. in 1943 to 672 lb. in 1950 and that a group of 50 cattle at the latter part of the period averaged 712 lb. cold deadweight. Six steers, of average liveweight off grass of 1,283 lb., and after two months supplementary feeding, 1,327 lb., killed out at 57.3 percent. It was suggested that the average dressing percentage of Boran steers slaughtered off grass could be expected to be 54 to 56 percent.

The meat is of good quality, but Boran cattle when in high condition tend to accumulate fat in the hump, the subcutaneous tissues and the abdominal cavity, while there is an absence of both the inter- and intramuscular fat which is desirable in high-quality beef.

### **Performance in other areas**

Boran cattle have been successful under a wide range of climatic conditions in Tanganyika. Herds have been established at Tanga in the hot humid coastal belt at sea level, on a hot humid flood plain in the Eastern Province at about 1,500 feet elevation, under hot conditions with moderate rainfall in Sukumaland, and in the cooler arid highlands of Northern Province at an elevation of about 4,250 feet. Climatological data for Tanga on the coast and Mpwapwa in Central Province are given in Tables 99 and 100.

Borans are usually ranched for meat production, maturing under local conditions at about 5 years of age with a liveweight of 850 to 950 lb., although individuals under superior environmental conditions

TABLE 99. - CLIMATOLOGICAL DATA FOR TANGA, TANGANYIKA  
(E. 39° 0', S. 5-2')

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean maximum temperature, °F.	87.9	89.1	90.0	87.4	84.7	83.9	82.4	82.4	83.2	85.2	86.7	88.2	85.9
Mean minimum temperature, °F.	75.3	75.3	75.4	74.4	72.8	70.7	69.4	68.5	69.0	70.4	73.0	74.4	72.4
Mean relative humidity at 08.30 hrs., %	78	79	81	83	87	82	84	85	85	83	82	79	82
Mean relative humidity at 14.30 hrs., %	71	68	66	73	74	66	66	69	67	66	68	71	69
Mean rainfall, in.	0.36	2.35	3.12	10.07	14.40	1.65	2.37	2.56	4.82	5.58	5.57	4.96	60.31

SOURCE: Hutchison, 1955.

TABLE 100. - CLIMATOLOGICAL DATA FOR MPWAPWA, CENTRAL PROVINCE,  
TANGANYIKA (E. 3° 30', S. 6° 20')

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean maximum temperature, °F.	84.0	84.5	83.2	80.6	77.8	77.3	76.1	77.7	81.4	84.2	85.7	84.4	81.4
Mean minimum temperature, °F.	61.9	61.7	62.1	62.8	61.4	59.4	57.7	56.7	56.9	57.9	60.8	61.1	60.0
Mean relative humidity at 08.30 hrs., %	86	84	86	83	78	73	75	76	70	65	69	79	77
Mean relative humidity at 14.00 hrs., %	60	55	60	65	60	52	52	50	45	41	46	59	54
Mean rainfall, in.	6.01	5.38	6.08	2.74	1.12	0.13	0.02	0.03	0.14	0.20	0.03	4.31	27.40

SOURCE: Hutchison, 1955.

often attain liveweights exceeding 1,000 lb. Hutchison (1955) has stated that unselected Boran cows have been found to be usually superior to the native Tanganyika cattle in milk production and a few intensive dairy herds are maintained. Some average liveweights and measurements for Boran cattle on stations in Tanganyika are given in Tables 101, 102 and 103.

Hutchison (1955) gives some information on the performance of Boran cows in Tanganyika. Boran heifers have calved for the first time at about 3 years of age, and have subsequently calved regularly

TABLE 101. — AVERAGE LIVeweIGHTS OF BORAN CATTLE IN TANGANYIKA  
AT DIFFERENT STAGES OF GROWTH

	Age of Cattle							
	birth		18 months		30 months		mature	
	no.	lb.	no.	lb.	no.	lb.	no.	lb.
FEMALES								
Malya (dairy farm) .	37	51.9	42	367	13	592	52	677
Tanga (dairy farm) .	38	52.7	8	474	7	577	33	777
West Kilimanjaro (ranchcd) . . . . .	91	52.6	76	454	10	557	82	739
Matamondo (ranchcd)	4	42.0	3	447	26	569	43	646
MALES								
Malya (dairy farm) .	31	53.5	23	419	17	686	7	846
Tanga (dairy farm) .	18	54.2	1	420	—	—	1	942
West Kilimanjaro (ranchcd) . . . . .	62	54.9	17	525	9	594	7	911
Matamondo (ranchcd)	7	47.6	3	453	3	580	2	1 090
OXEN								
Malya (dairy farm) .	—	—	2	313	3	695	5	845
Tanga (dairy farm) .	—	—	—	—	—	—	—	—
West Kilimanjaro (ranchcd) . . . . .	—	—	37	514	30	651	3	854
Matamondo (ranchcd)	—	—	6	450	29	570	45	666

Liveweights at Malya, Tanga and West Kilimanjaro were estimated from a monograph relating height, girth and weight, constructed from Tanganyika data.

SOURCE: Hutchison, 1955.

TABLE 102. — AVERAGE LIVeweIGHTS AND MEASUREMENTS OF BORAN  
CATTLE IN TANGANYIKA

	Male			Female		
	1 year	2 years	mature	1 year	2 years	mature
Liveweight, lb. . . . .	273 (5)	584 (5)	814 (5)	252 (5)		664 (5)
Height at withers, in. . . . .	37.3 (7)	43.8 (7)	47.1 (7)	37.0 (10)	45.0 (6)	45.4 (10)
Depth of chest, in. . . . .	20.7 (2)	30.7 (2)	35.2 (2)	21.7 (5)	25.5 (1)	29.3 (5)
Width of hips, in. . . . .	13.0 (5)	15.0 (5)	16.2 (5)	12.5 (5)	15.0 (5)	15.0 (5)
Heart girth, in. . . . .	45.6 (7)	59.5 (7)	66.6 (7)	45.0 (10)	58.6 (6)	59.2 (10)

Numbers sampled in brackets.

SOURCE: Hutchison, 1955.

TABLE 103. — AVERAGE MEASUREMENTS OF BORAN CATTLE IN TANGANYIKA

	Male			Female		
Number of cattle .....	43	38	24	36	48	89
Age, days .....	3	550	mature	2	546	mature
Height at withers, in. ....	25.6	46.3	51.8	24.3	45.6	48.7
Heart girth, in. ....	27.0	53.2	71.8	26.3	51.8	63.0

SOURCE: Hutchison, 1955.

every year. The mean of 97 lactations of an unselected sample of 24 Boran cows at Tanga was 1,879 lb. of milk in 208 days. The calving interval was 359 days. The best 5 cows in this herd had a lactation mean (14 lactations) of 3,897 lb. of milk in 303 days. These cows were completely milked and calves were pail-fed.

Another group of 7 Boran cows at Mpwapwa had a lactation mean (22 lactations) of 2,355 lb. of milk, containing 4.1 percent of butterfat, in 309 days, and the best individual gave 3,479 lb. of milk containing 5.6 percent butterfat in 379 days (3 lactations).

Calves were suckled at Mpwapwa and no corrections were made for the amount of milk taken.

Boran cattle have also been imported into parts of the Belgian Congo.

#### Sources of breeding stock and information regarding the breed

A Boran breed society has been established in Kenya which has maintained a herdbook for some five years, into which animals are admitted after inspection by a panel of judges. At present attention is being concentrated on the improvement and standardization of the beef qualities of the cattle, but it is hoped that it will be possible at a later date to open a subsection of the herdbook for the registration of animals in which the dairy qualities are well developed.

Further information on the Boran cattle can be obtained from:

The Department of Veterinary Services, Kabete, Kenya.

The Secretary, The Boran Cattle Breeders Society, P.O. Ngobit, Kenya.

## BUKEDI

### Origin

The Bukedi, or N'kedi, cattle are small East African shorthorned zebus. On account of the concentrations of these cattle in the Teso, Lango and Kyoga areas of the Eastern and Northern Provinces of Uganda, they are occasionally referred to by the names of these districts.

The Director of Veterinary Services, Uganda (*Personal Communication*), states that it is probable that the shorthorned zebus were established in Uganda before the arrival of the Ankole longhorned cattle, although other authorities (French, M. H., *Personal Communication*) maintain the contrary. It has been stated that there are as many as six varieties of these zebus in Uganda but French (*Personal Communication*) maintains that this variation is predominantly a consequence of local differences in the nutritional environment.

### Conditions in the native home of the breed

#### *Location, topography and soils*

The Bukedi cattle show their highest concentration in the Eastern and Northern Provinces of Uganda, except in the Karamoja district of Eastern Province. They are also prevalent in the Buganda Province and Western Province. The type area is situated roughly between 32° 5' and 35° east longitude and between 0° and 4° north latitude. Most of Uganda consists of undulating plateau varying from 3,000 to 6,000 feet above sea level. The whole area from the northern shore of Lake Victoria slopes towards the northwest. Bukedi cattle are found in the basins of Lake Kioga and the surround of the northern portion of Lake Victoria. The whole of the Kioga basin consists of low, shell-backed hillocks sloping gradually to intervening swamps, many of which dry up during the dry season and are used for pasturage. The Lake Victoria basin is characterized by flat-topped hills of uniform height and the valley bottoms are occupied by swampy streams choked with papyrus, grasses and sedges.

The country toward the east and north has a gently rolling character. The soils on the slopes are non-laterized red earths. When first opened up for cultivation they have good texture and fertility, but the organic reserves are soon depleted unless the land is carefully treated. These red soils grade into sandy soils around the edges of swamps which, when dried, reveal a black soil of poor drainage.

TABLE 104. - CLIMATOLOGICAL DATA FOR LIRA, ENTEBBE AND MBALE  
IN UGANDA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<i>Lira</i> (Altitude: 3 612 feet)													
Mean maximum temperature, °F.	91.7	91.7	88.8	87.0	82.9	82.5	80.1	81.8	83.6	85.4	86.9	87.0	85.8
Mean minimum temperature, °F.	60.0	62.3	63.8	64.4	63.8	62.6	62.5	62.1	62.2	62.1	61.1	59.4	62.2
Humidity at 08.30 hrs., %	54	58	72	83	80	79	84	86	80	75	72	65	74
Humidity at 14.30 hrs., %	31	32	43	49	61	60	62	61	55	50	46	40	49.2
Rainfall, in.	1.03	0.98	3.18	7.11	8.72	4.41	4.23	8.35	5.67	5.03	3.35	2.32	54.4
<i>Entebbe</i> (Altitude: 3 878 feet)													
Mean maximum temperature, °F.	80.9	80.3	78.7	78.6	77.4	77.3	76.3	77.2	78.4	79.4	80.1	78.9	78.6
Mean minimum temperature, °F.	63.8	64.0	63.7	64.7	64.8	63.5	61.9	62.1	62.5	63.0	63.3	62.9	63.4
Humidity at 08.30 hrs., %	83	81	84	85	86	84	86	86	85	81	81	83	83.8
Humidity at 14.30 hrs., %	63	64	69	71	71	70	71	71	69	67	65	67	68.2
Rainfall, in.	2.74	3.58	6.35	9.93	9.67	4.76	3.38	2.80	2.92	3.92	4.56	4.52	59.1
<i>Mbale</i> (Altitude: 3 763 feet)													
Mean maximum temperature, °F.	90.6	89.7	87.0	85.7	81.3	82.0	80.3	80.7	81.7	84.2	86.3	87.0	84.7
Mean minimum temperature, °F.	60.1	61.8	62.5	63.1	62.6	61.3	61.4	61.8	60.5	60.2	61.1	60.1	61.4
Humidity at 08.30 hrs., %	61	63	72	73	81	78	80	76	77	72	69	69	72.6
Humidity at 14.30 hrs., %	36	37	47	57	68	65	64	67	65	60	53	46	55.4
Rainfall, in.	0.99	2.32	3.40	6.36	6.33	4.77	4.31	5.68	4.42	3.33	2.51	1.55	46.0

SOURCE: Tothill, 1940.

### *Climate*

The region occupied by the Bukedi cattle is situated on and near the equator. The high plateau land and mountain ranges intersected by valleys result in varying climatic conditions as do the extensive lakes and swamps. Large diurnal temperature variations occur so that mean temperatures alone are a poor indication of the climatic conditions of the area. The peaks of the rainfall periods coincide roughly with the equinoxes. The first occurs in March to May and the second in September to October. The two dry seasons vary in

length according to geographical position and extend one or two months before and after January and June respectively.

Average climatological data as reported by the British East African Meteorological Service are summarized in Table 104.

### *Vegetation*

Except where tsetse infestation renders cattle keeping impossible, cattle densities vary from 30 to 40 head per square mile in the pastoral areas in the northeast and west, to as high as nearly 200 head per square mile in the stock-rearing districts of Eastern Province, where a highly-developed balance between stock keeping and agriculture exists. In obtaining an over-all picture of the major grassland zones in the region, the Veterinary Department (Uganda Protectorate, 1953) reports five such zones, each characterized by a series of grasses. Regions where the rainfall is more than 45 inches per annum are described as Long Grass zones. Elephant grass (*Pennisetum purpureum*) is the dominant grass in this area. Spear grass (*Imperata cylindrica*) is an early invader where overgrazing has occurred, as is the even more pernicious couch grass (*Digitaria scalarum*). Areas of less than 45 inches annual rainfall are described as Short Grass zones. *Hyparrhenia* is the dominant genus in these regions. *Brachiaria* species are common "bottom grasses." *Setaria sphacelata* and *Chloris gayana* are widely distributed, while *Panicum maximum*, *Sporobolus* spp. and *Andropogon* spp. are also seen in some localities. *Imperata cylindrica*, *Cynodon dactylon* and *Eragrostis* spp. are among the most common weed grasses of the zone.

The Eastern Province pastures occupied by zebu stock in greatest concentration are low-lying *Combretum* savannahs: *Hyparrhenia* spp. and *Panicum maximum* are the typical grasses.

### *Management practices*

Hamitic and Nilotic tribes form the bulk of the native cattle owners in the Eastern and Northern Provinces of Uganda, while Bantu tribes inhabit Buganda Province (Uganda Protectorate, 1934). Cattle play a significant role in the social customs of these tribes. Besides milk, meat and blood form the main items in their diets. It is estimated that the cattle consumption averages over a five-year period about 11 percent of the total cattle population (Uganda Protectorate, 1949). Cattle are also used for draft purposes.

The majority of the cattle owners are also cultivators. There are few areas where ranching is a major means of livelihood. The vast majority of cattle live on unimproved natural grasslands, although

conditions are changing. For instance, it is reported (Williams and Bunge, 1952) that in the Teso district of Eastern Province only about 3 acres of land per head of cattle are available in resting ley, permanent pasture and grazeable swamp. Despite this heavy stock density, there is no overstocking under existing methods of pasture control. The resting ley is extensively grazed and it is believed that this is largely responsible for the soil regeneration in the area.

The cattle are usually grazed for a short period during the day on account of worry by *Stomoxys* flies. During the noon hours they are usually kept in dark, sheltered places, a practice which tends to unduly restrict the grazing time available to the cattle. During the night they are confined in open corrals or *bomas*. Young calves are usually housed. The condition of these structures is far from being hygienic. Stock of all age groups, both male and female, are grazed together, thus making control of mating impossible.

The calves are permitted to suckle their dams before and after hand milking. The temptation to overmilk the dams is on the increase on account of the cash sale of milk, so that the calves are often underfed and their development period is prolonged.

### Physical characteristics of the breed

Bukedi cattle (Figures 77 and 78) are small in size and stocky in appearance. The horns are short, thick at the base and curve slightly outwards and inwards. The musculo-fatty hump is prominent and thoracic in position. The dewlap and umbilical fold are strongly developed. The ears are medium-sized and directed outwards. Coat coloration varies and includes gray, gray-white, light red, black, and

TABLE 105. — LIVeweIGHTS OF MALE AND FEMALE BUKEDI CATTLE AT SERERE EXPERIMENT STATION

Age in months	Liveweight in lb.	
	males	females
at birth	40	35
6	124	114
12	205	173
24	362	314
36	530	453
48	647	537
60	716	555
72	795	580
84	805	576

SOURCE: Williams and Bunge, 1952.

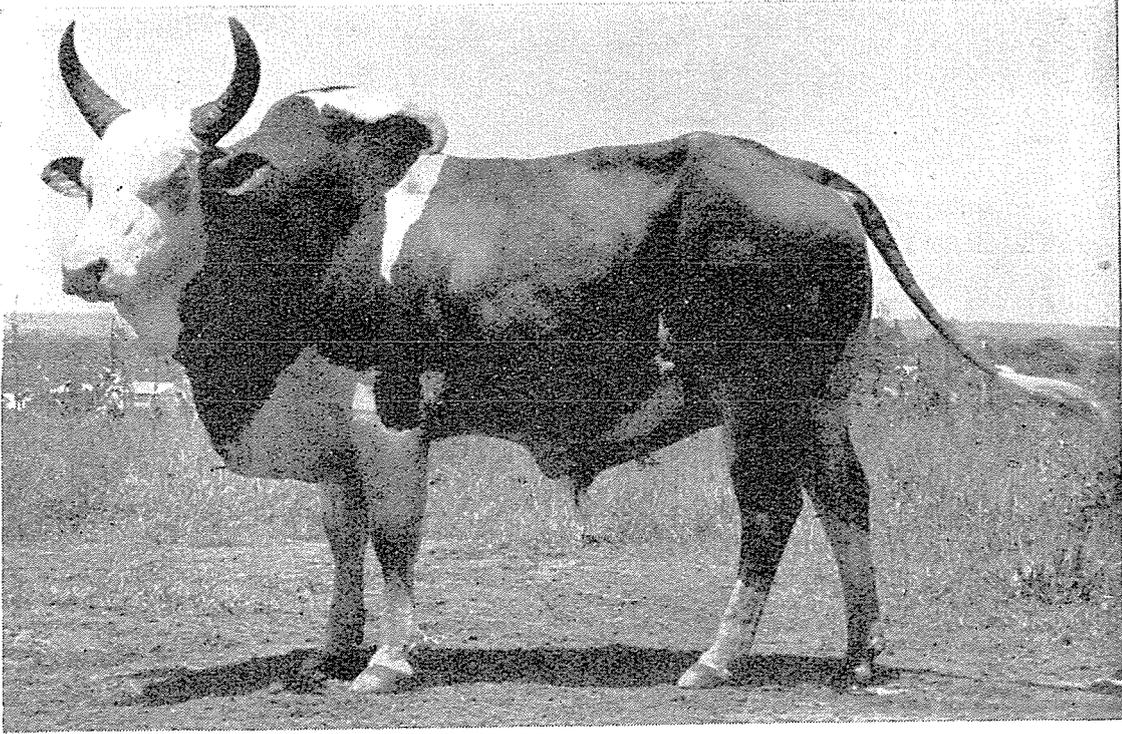
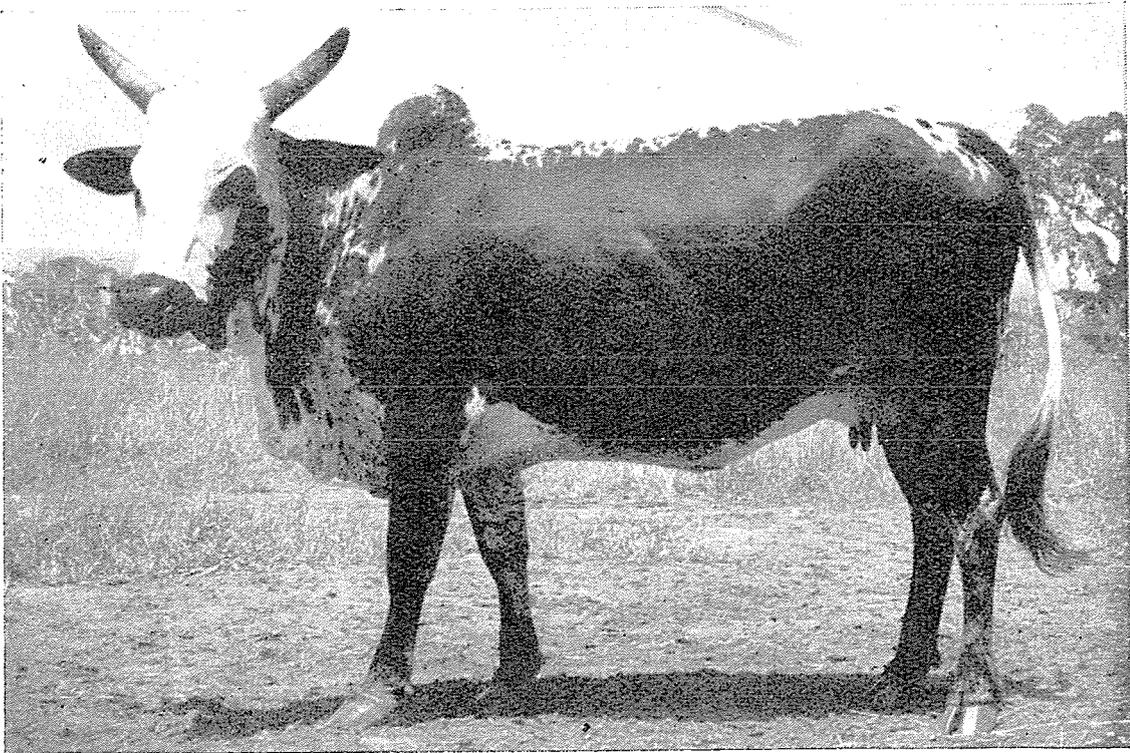


FIGURE 77. *Bukedi cattle*. [above] *Bull*; [below] *Cow*.

Courtesy of Dept. of Information, Uganda Protectorate



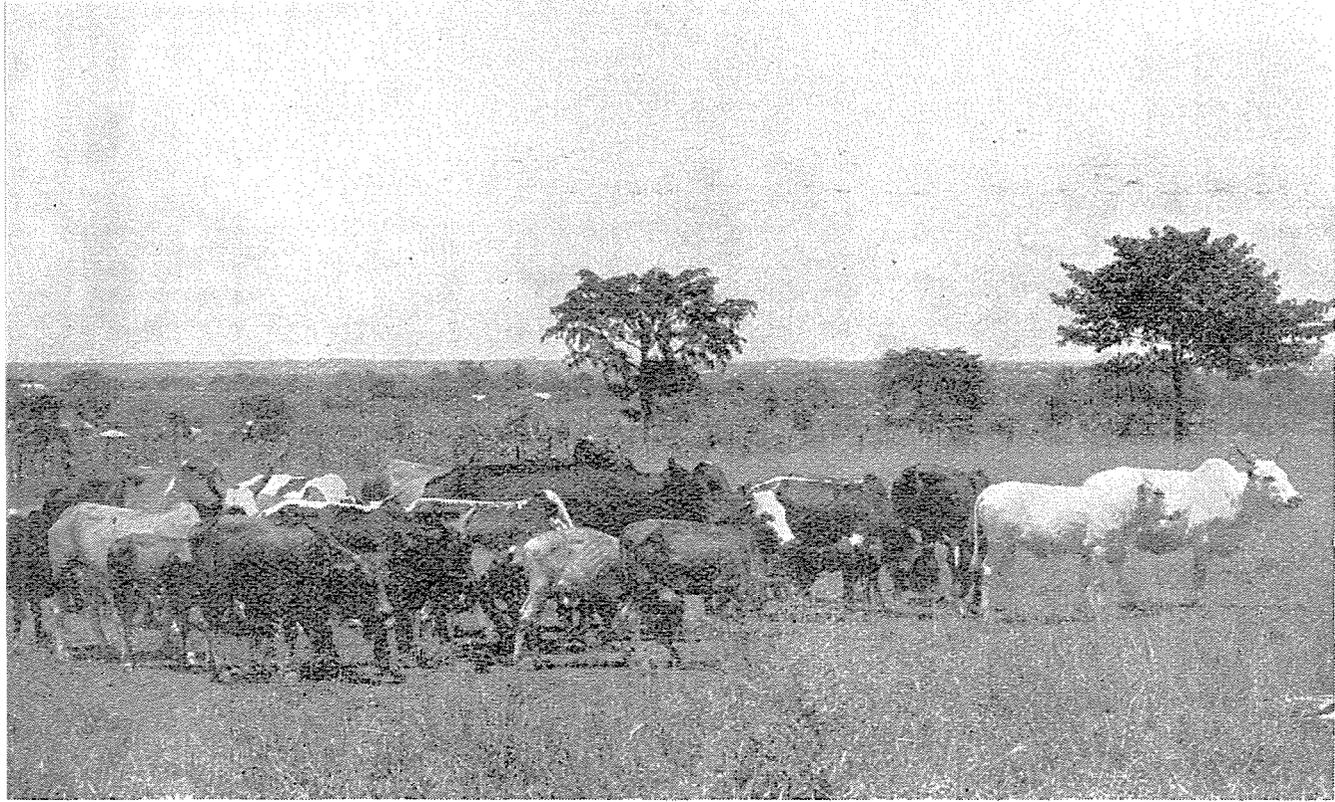


FIGURE 78. *A herd of Bukedi cattle.*

Courtesy of Dept. of Information, Uganda Protectorate

black and white. The skin is of medium thickness and the hairs are short and smooth. The hoofs are medium-sized and hard.

Liveweights of male and female cattle from the records of the Bukedi herd maintained at Serere Experiment Station by the Department of Agriculture are given in Table 105.

The average birthweight of calves at Serere Experiment Station has been 35 lb. The heaviest calf recorded weighed 61 lb. at birth.

TABLE 106. — LIVWEIGHTS OF BUKEDI ZEBU CATTLE BORN DURING THE YEARS 1948-1952 AT THE LIVESTOCK EXPERIMENT STATION, ENTEBBE

Age in months	Liveweight in lb.	
	males	females
at birth	40.5	40.1
6	177.4	167.0
12	267.3	246.9
18	314.0	314.1
24	391.4	351.5
30	463.5	439.3
36	565.5	512.8
42	616.0	560.8

SOURCE: Uganda Protectorate, 1953.

The heaviest bull in the herd in 1954 weighed 1,200 lb., and work oxen have weighed up to 1,000 lb. (Uganda Protectorate, 1955).

Liveweights of Bukedi cattle at the Veterinary Department's Livestock Experiment Station, Entebbe, are summarized in Table 106.

### Functional characteristics of the breed

Bukedi cattle are used for producing beef and for draft purposes as well as for milk production. Some of the results obtained in developing a Bukedi cattle herd at Serere in the Eastern Province of Uganda, are reported by Williams and Bunge (1952); these, and reports on the Bukedi herd established at the Veterinary Department's Livestock Experiment Station at Entebbe in Buganda Province, are summarized below.

TABLE 107. - AVERAGE MILK YIELDS OF BUKEDI COWS AT SERERE  
(COMPLETED LACTATIONS WITH CALVES AT FOOT)

Year	No. of cows	Milk yield, lb.	No. of days in milk
1942-43	5	906	300
1943-44	21	793	267
1944-45	31	1 057	263
1945-46	34	1 265	256
1946-47	34	1 063	233
1947-48	33	1 625	242
1948-49	31	1 663	233
1949-50	17	1 934	277

SOURCE: Williams and Bunge, 1952.

At Serere, heifers reaching a liveweight of 450 lb. at about 32 months of age are put in the breeding pen. Of 76 heifers which have calved, the age at first calving has varied from 25 months to 52 months, the mean being 41 months.

It is estimated that the average yield of milk of Bukedi cows in farmers' herds is about 500 lb. after feeding the calf. Milk yields of cows in the Serere herd are summarized in Tables 107 and 108.

Six cows in the group yielded over 3,000 lb. The average butterfat percentage from cows completely milked was 5.8. The highest yield obtained in 1953 (Uganda Protectorate, 1955) was that of a cow that yielded 4,280 lb. of milk in a 305-day lactation.

It was estimated that the average calving interval was 14 months.

TABLE 108. - AVERAGE MILK YIELDS OF BUKEDI COWS AT SERERE  
(COMPLETELY MILKED)

Year	No. of cows	Milk yield, lb.	No. of days in milk
1945-46	1	937	185
1946-47	6	1 527	232
1947-48	9	1 399	251
1948-49	21	1 493	245
1949-50	17	2 072	287

SOURCE: Williams and Bunge, 1952.

Average milk records of Bukedi cows maintained at the Veterinary Department's Livestock Experiment Station at Entebbe are summarized in Table 109.

TABLE 109. - RECORDS OF MILK YIELDS\* OF BUKEDI COWS AT ENTEBBE

Year	No. of cows in the herd	No. of completed lactations	Milk yields, lb.	No. of days in milk	Calving interval, days	Range in milk yield, lb.	
						min.	max.
1949	27 <sup>1</sup>	25	1 683	223	350	967	3 250
1950	36 <sup>1</sup>	29	2 066	274	388	817	3 563
1951	15 <sup>2</sup>	14	1 770	249	356	697	3 555
1951	15 <sup>3</sup>	13	2 701	260	380	2 263	3 252
1952	12 <sup>2</sup>	9	1 956	251	378	1 278	3 207
1952	17 <sup>3</sup>	16	2 505	259	390	1 657	3 100

\* NOTES: <sup>1</sup> Cows milked with calves suckling and cows completely milked. To the yield of cows suckling calves 30 gallons were added as the milk estimated to be taken by the calf.

<sup>2</sup> Cows entirely milked.

<sup>3</sup> Cows suckling calves - 90 gallons added to the yield.

SOURCE: Uganda Protectorate, 1953.

The beef-producing qualities of Bukedi cattle have been studied by Williams and Bunge (1952) at Serere Experiment Station. Aspects of this work are summarized in Tables 110 and 111.

Grazing habits of Bukedi cattle have been studied and reported on by Harker, Taylor and Rollinson (1954) at the Livestock Experiment Station at Entebbe. Under tropical conditions, Bukedi cattle spent between seven and eight hours each day grazing and between four

TABLE 110. - CARCASS PERCENTAGES BY AGE GROUPS OF BUKEDI COWS AND HEIFERS AT SERERE

Years of age	No. of cows	Average liveweight, lb.	Average dressed carcass weight, lb.	Carcass percentage
4	2	487	229	47.2
5	8	597	263	45.1
6	10	645	320	49.5
7	5	576	289	50.2
8	2	576	298	51.7
9	2	626	322	51.1
10	3	555	236	42.1

SOURCE: Williams and Bunge, 1952.

TABLE 111. - CARCASS PERCENTAGES OF BUKEDI OXEN AT SERERE

Years of age	No. of oxen	Average liveweight, lb.	Average dressed carcass weight, lb.	Carcass percentage
4	7	763	373	48.9
5	12	674	343	50.8
6	10	770	405	52.6
7	5	749	397	52.7
8	2	757	388	51.3
9	5	845	422	49.9
10	6	808	389	48.1
11	9	695	327	47.0
12	13	709	326	46.0
13	9	712	327	45.9
14	7	704	336	45.7
15	3	709	332	46.9
16	3	733	358	48.8
17	2	642	282	44.0

SOURCE: Williams and Bunge, 1952.

and one-half to six hours ruminating. The remainder of the time was spent in standing and lying without ruminating, walking when not in search of food, drinking and licking minerals. During days with 12 hours daylight, on an average 7.7 hours were spent in grazing within a 24-hour period, 93 percent of this being during the hours of daylight. Rumination occupied 5.2 hours, only 23 percent of this being during

daylight hours. Animals started grazing at daylight and stopped at sunset. The period before sunset showed greater intensity of grazing. There were seven or eight peaks of intense rumination, almost all of which were during the night. Alternate periods of grazing and resting during daylight and alternate periods of ruminating and resting were observed.

With regard to draft qualities, the animals are even-tempered and steady but slow workers. The animals are put to work when they are about 2 to 3 years of age.

### **Sources of breeding stock and information regarding the breed**

It has been estimated that there are about a million head of Bukedi cattle in Uganda. There are declared Livestock Improvement Areas in the Protectorate, where locally established Cattle Breeders Associations handle the various aspects of breed improvement.

Any further information may be obtained from:

The Director of Veterinary Services, Uganda Protectorate,  
Entebbe, Uganda.

The Director of Agriculture, Uganda Protectorate, Entebbe,  
Uganda.

## **GALLA, JIDDU AND TUNI**

### **Origin**

Jiddu cattle originated in the arid and semi-arid areas of Somalia. Faulkner (1951) mentions an unconfirmed account of European Short-horn cattle which, put ashore in Somalia after a shipwreck, may have contributed to the ancestry of the Jiddu.

The Tuni and the Galla have been regarded by some authorities (Milne, 1955; East African Specialist Committee on Animal Industry, 1954) as distinct cattle types and it has been suggested (Hutchison, H. G., *Personal Communication*; East African Specialist Committee on Animal Industry, 1954) that the Jiddu may be derived from crosses between them. Faulkner (1951) suggested that the Tuni and Galla might be considered as subtypes of the Jiddu, but more recently (*Personal Communication*) has expressed the opinion that it may be more accurate to speak of the Galla as being a variety of the Boran,

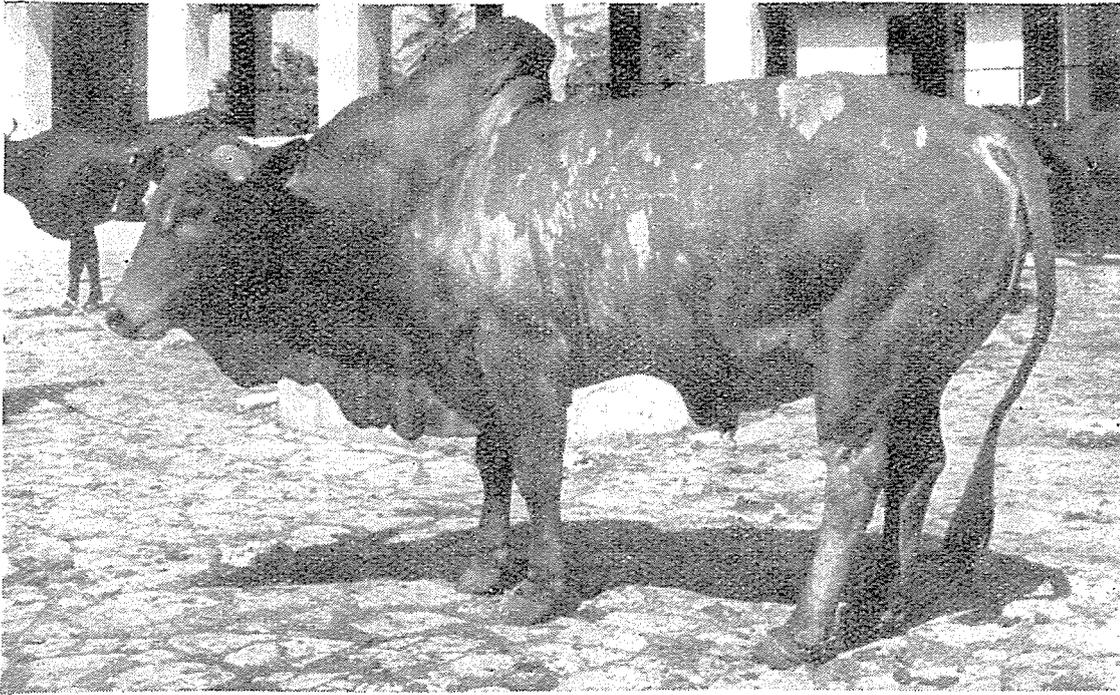
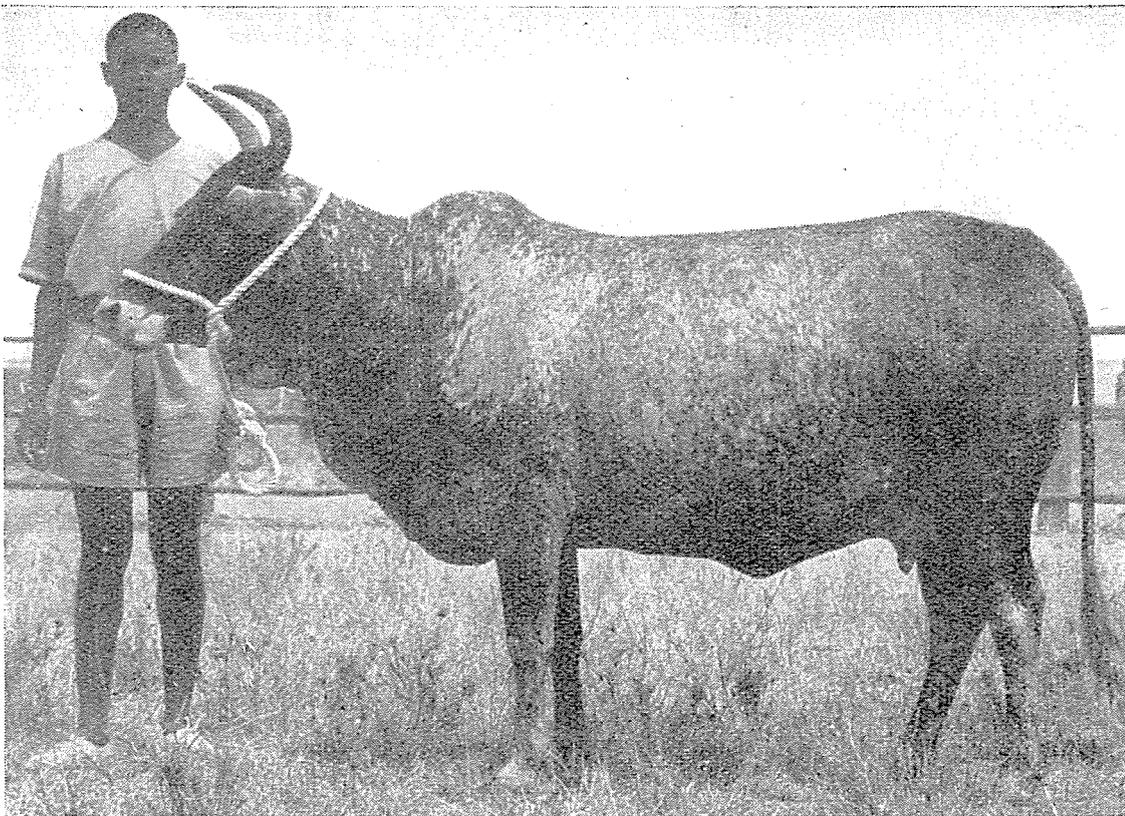


FIGURE 79. *Jiddu bull at Tanga Dairy, Tanganyika.*

Courtesy of H. G. Hutchison

FIGURE 80. *Jiddu cow.*

Courtesy of Dept. of Information, Nairobi, Kenya



a possibility that was not rejected by the East African Specialist Committee on Animal Industry (1954), while French, M. H. (*Personal Communication*) considered that, while the Tuni should not be thought of as a subtype of the Jiddu, the reverse might be true.

Jiddu cattle were introduced into Kenya during the 1939-1945 war, both as slaughter cattle and as breeding stock. Most of the cows were put to bulls of imported European breeds. Importations have also been made into Tanganyika.

The environment in the original home of these cattle types and the areas in which they are maintained in Kenya and Tanganyika are similar to those which have been described in the section on the Boran (p. 208).

### Physical characteristics of the breed

Although generally similar in conformation to the Boran, the Jiddu (Figures 79 and 80) is a rather lighter and smaller animal with a body which is longer in proportion to its height and with a hump which is, in the female, less prominent than that of specimens of the former type. The horns are fine, round in cross section, and spring from the poll in an upward and outward direction. In the cow they may be up to 12 inches in length.

TABLE 112. — AVERAGE LIVeweIGHTS AND MEASUREMENTS OF JIDDU CATTLE IN KENYA

	Male		Female		
	no. sampled	mean	no. sampled	range	mean
Liveweight, lb. ....	1	907	5	616-776	707
Length from shoulder point to pinbone, in.	1	52.0	5	51.5-55.2	53.2
Height at withers, in. .	1	45.5	5	45.2-48.2	46.4
Width of hips, in. ....	1	18.8	5	15.8-18.5	16.5
Heart girth, in. ....	1	69.0	5	62.0-69.2	66.0
Depth of chest, in. ....	1	24.2	5	23.0-24.8	24.0

SOURCE: Faulkner, 1951.

The coat coloration is a principal means of distinguishing the three types. In the Jiddu it is typically a mottled pattern in which patches of varying shades of fawns and reds are superimposed on a white or

fawn ground, with the darker areas usually on the fore and hindquarters and on the underline. It is usual for there to be a white or light-colored ring round the muzzle as well as white-flecked eyelashes and a white fringe inside the ear. The Tuni is characteristically of a whole dark-red coat coloration, while the Galla are white cattle with pigmented skins and longer horns than either the Tuni or the Jiddu (East African Specialist Committee on Animal Industry, 1954; Faulkner, 1951; Hutchison, 1955).

Hutchison, H. G. (*Personal Communication*) reported the following average body measurements made on 10 mature Jiddu cows in the Tanga herd, Tanganyika: length from shoulder point to pinbone,  $50.84 \pm 1.51$  inches; height at hooks,  $50.38 \pm 1.65$  inches; width of hips,  $15.15 \pm 0.56$  inches; heart girth,  $64.09 \pm 1.67$  inches; and depth of chest,  $23.80 \pm 0.56$  inches.

Some liveweights and measurements of Jiddu cattle in Kenya are given in Table 112.

### **Functional characteristics of the breed**

From 25 Jiddu cows and heifers in the Tanga herd, Tanganyika, which had been subjected to very light selection pressure and were completely milked without the calf suckling, 125 lactations gave an average yield of 2,246 lb. of milk in 252 days. The average dry period between lactations was 167 days. The average calving interval was 420 days, but it was suggested that it would have probably approximated to 365 days if there had not been some contagious abortion cases in the herd.

In an "elite" herd of zebus (including Boran, Jiddu and various crossbred zebus) the highest yielder was a Boran x Jiddu cow averaging 4,363 lb. of milk, and the second best was a Jiddu cow averaging 4,280 lb. The average yield of the "elite" zebu herd of 31 animals was 3,154 lb. and that of a less strongly selected zebu herd (comprising the same types) was 2,138 lb. (Hutchison, H. G., *Personal Communication*).

### **Further information regarding the breed**

Further information on the Galla, Jiddu and Tuni types of cattle can be obtained from the Department of Veterinary Services, Kabete, Kenya.

## LUGWARE

### Origin

The Lugware cattle are of the East African shorthorned zebu type. Belgian authorities report that about two centuries ago tribes (Lugware) from the Nile valley came south to the wooded plateau of Aru together with their herds of cattle. These cattle were the ancestors of the existing Lugware stock.

### Conditions in the native home of the breed

#### *Location, topography and soils*

Lugware cattle are maintained in the Eastern Province of the Belgian Congo in the Kibali-Ituri district of the Aru region, and particularly in the basin of the Rivers Aru, Ognie, Lowa and Nzoro. Small numbers are found in the Yei district in Equatoria Province in the Republic of the Sudan.

The wooded savannah of the area is intersected by gallery forest in stream valleys and infested by tsetse fly. The soils is shallow sandy clay, overlying granite.

#### *Climate*

The climate is characterized by the alternation of a rainy season, when the temperature varies from 18° to 23° C., and a dry season, when the temperature reaches 23° to 33° C.

The average annual rainfall is about 1,486 mm. (1944-1947 average), with a range between 1,143 mm. and 1,834 mm. The monthly distribution of rainfall is shown in Table 113.

TABLE 113. — MONTHLY DISTRIBUTION OF RAINFALL IN THE KABALI-ITURI DISTRICT, BELGIAN CONGO

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Maximum rainfall mm. ....	34.0	56.5	117.3	263.7	249.7	360.1	341.7	304.7	197.5	256.5	154.9	46.7	198.9
Minimum rainfall, mm. ....	—	0.6	31.5	21.1	140.2	108.3	107.8	129.9	105.5	45.3	22.9	18.4	61.0
Mean rainfall, mm.	23.0	23.2	74.8	146.3	182.2	184.0	194.4	241.6	162.6	174.0	107.2	26.2	128.4

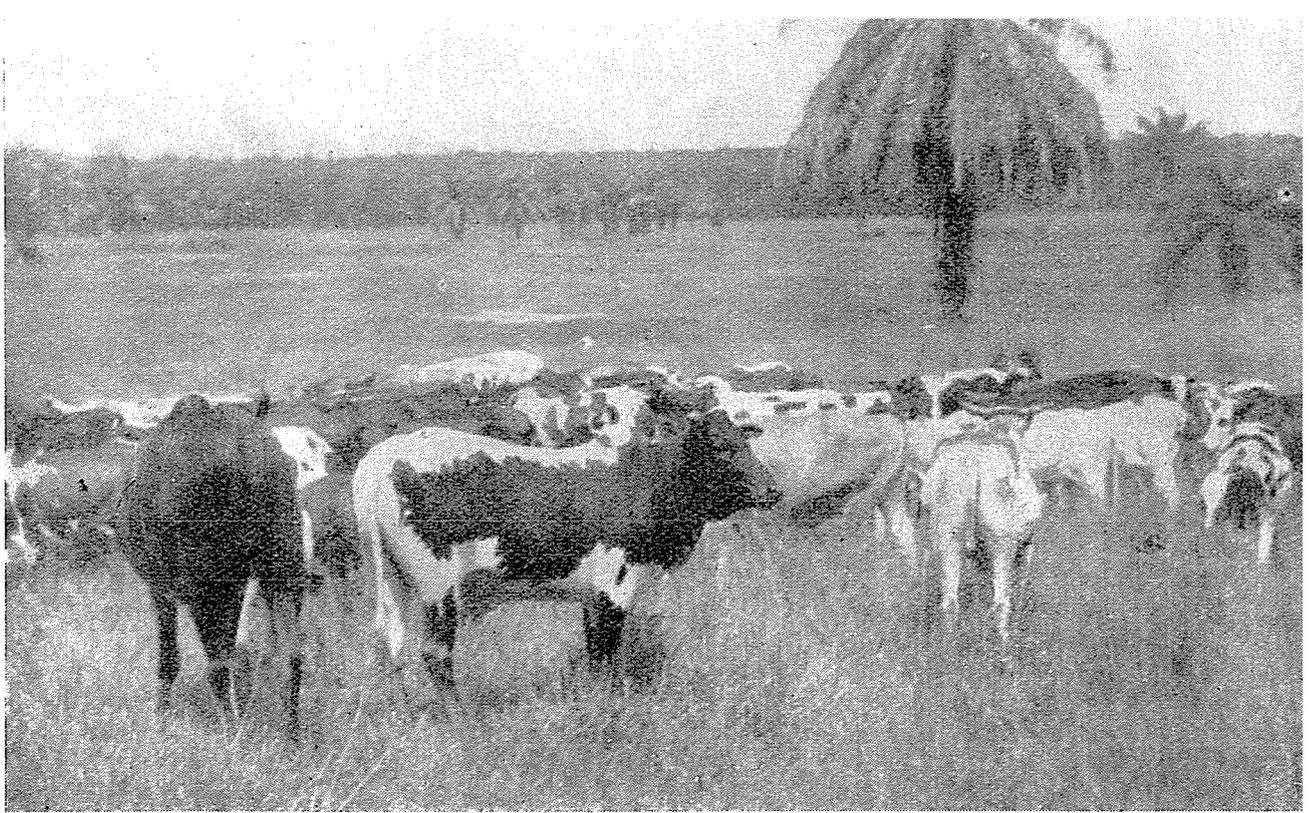


FIGURE 81. *A herd of Lugware cattle.*

Courtesy of A. Falize (INEAC photo)

### *Vegetation*

The herbage of the savannah is the only feed available to the cattle (Figure 81). The production of forage crops, and pasture improvement by planting of seed, are rarely practiced. The grasses springing up during the early rainy season are in abundant supply and of good quality, but as the season advances they soon become fibrous and woody. The tribesmen restore the herbage by burning the old vegetation in December and January. Crop production is quite independent of stockraising.

### *Management practices*

Lugware cattle are utilized for milk, meat, and draft purposes. As indicated above, they mainly depend on natural grasslands and grazing. Additional or reserve feed supplies are rarely provided. During the daytime the cattle are allowed to graze in the forest areas and at night are corralled in an uncovered enclosure for protection against wild beasts. As the chief purpose for which the cattle are kept is to serve as the bride wealth which is exchanged when a young man wishes to acquire a wife, specialized economic qualities are not emphasized by their owners.

### Physical characteristics of the breed

The Lugware (Figures 82 and 83) is a small fine-boned zebu with a well-developed hump. The head is of medium length and breadth and the profile is straight or slightly concave. The prominence of the orbital arches gives a degree of concavity to the forehead. The horns are short and spring from the level poll sideways and upwards in a crescent shape, the direction of growth of which, when viewed from the side, is often approximately a continuation of the line of the profile. The hump, although well developed in both sexes, is larger in the male than the female and often tends to hang over to the rear or to one side. The topline, the well-sprung barrel, the moderately sloping hindquarters and the upper thighs are well muscled and rounded. The dewlap is of only moderate size and the umbilical fold is not usually apparent. The limbs are lightly boned and of medium length as compared to the depth of the body. The hoofs are hard and durable. The darkly pigmented skin is of medium thickness and shows a tendency to be loose and slightly folded. Although the most usual coat

FIGURE 82. *Lugware bull.*

Courtesy of Congopress: H. Goldstein

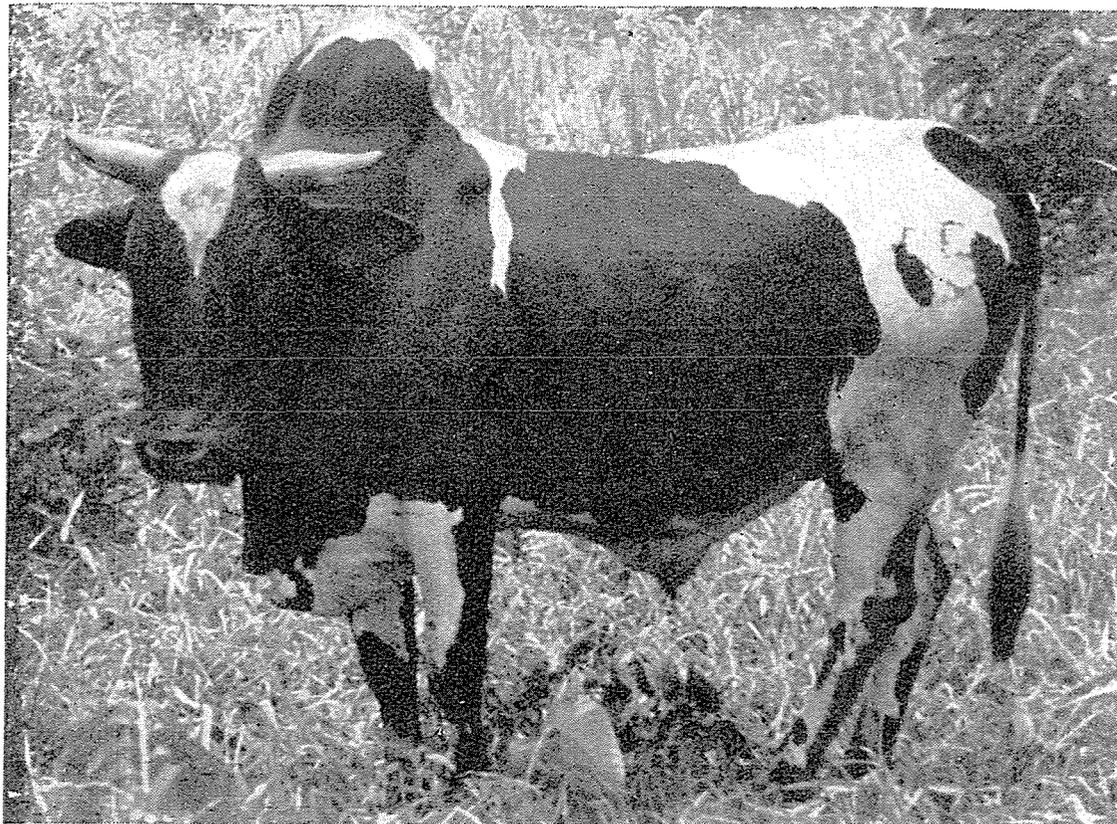




FIGURE 83. *Lugware cow.*

Courtesy of Ministère des colonies, Brussels

coloration is one of black patterning on white, brown and white, grays and duns are common.

Birthweights of Lugware calves are normally in the range of 15 to 22 kg. Some average measurements of Lugware cattle are given in Tables 114 and 115.

TABLE 114. - AVERAGE PHYSICAL MEASUREMENTS OF LUGWARE CATTLE IN THE ARU REGION

	Male			Female			Oxen
	1 year	2 years	mature	1 year	2 years	mature	
Weight, kg. ....	85-100	150-200	300-350	65-75	150-175	230-255	350-400
Length from shoulder point to pinbone, cm. ....	90	95	115	95	100	110	128
Height at withers, cm. ....	—	—	107	—	—	104	119
Width of chest, cm. ....	—	—	40.7	—	—	34	—
Width of hips, cm. ....	—	—	40	—	—	36	—
Heart girth, cm. ....	—	—	151	—	—	150	178

SOURCE: Service vétérinaire du Congo belge.

TABLE 115. — SOME PHYSICAL MEASUREMENTS OF LUGWARE CATTLE  
RECORDED AT THE INEAC STATION, NIOKA

	Male			Female		
	1 year	2 years	mature	1 year	2 years	mature
Weight, kg. ....	104	183	418	100	161	266
Height at withers, cm. ....	—	—	—	—	—	105
Depth of chest, cm. ....	—	—	—	—	—	53
Width of hips, cm. ....	—	—	—	—	—	37
Heart girth, cm. ....	—	—	—	—	—	145

### Functional characteristics of the breed

Lugware cattle are poor milk producers, but on abundant feed show quite good fattening qualities. They are reported to be fairly good draft animals.

The heifers calve for the first time when they are about 3 ½ years old. The usual calving season is from January to October. On an average they produce about 6 calves in a lifetime.

The males are first used for service when they are about 3 to 4 years old and the active breeding life of bulls is estimated to be 12 years. They are usually lazy in disposition and are said to be shy breeders.

Bullocks are put to work when they are about 3 years old and weigh about 230 to 250 kg. They are docile and are steady and willing workers. A pair of bullocks can haul a cart with a load of 700 to 800 kg. at an average speed of about 4 km. per hour over a distance of 15 km. in a four-hour working day. In the field they work for about four hours per day.

Reports of the veterinary staff in the Aru region of the Belgian Congo indicate that no systematic records are available from the native-owned herds. These herds are, however, periodically inspected and it is estimated from these observations that Lugware cows, after feeding their calves, yield about 250 to 300 liters of milk, testing about 6 to 6.5 percent butterfat in a lactation period of 7 to 8 months. McLaughlin (1952) reported that Lugware cows in the herd maintained by the Société du Haut-Uélé et du Nil at Aba produced between 2 and 3 liters a day from a once-daily milking. The average calving interval has been about 18 months.

A few specific data are available from the Nioka Station of INEAC in the Belgian Congo, where it was observed that the heifers calved

at an average age of 45.3 months. The average milk production per day was 1.6 liters of milk testing 4.7 percent butterfat in a lactation period of 260 days. The average calving interval was 12 months and the cows were observed to be fairly regular breeders. It was also observed that the average number of lactations during a lifetime was 10.

The Lugware cattle fatten easily on grassland, the carcass is well muscled and the proportion of bone is said to be small. At the age of 5 years slaughter animals attain to a liveweight of about 280 to 300 kg. The carcass yield is about 50 to 55 percent. From the data available at the Nioka Station it has been observed that the bullocks attain, at the age of 3 ½ years, to a slaughter weight of about 280 kg., the dressing percentage being 55.

At Aba, Lugware steers have been killed at between 2 and 3 years of age when they have reached a liveweight of about 300 kg. Cows of the same age have had an average liveweight of 220 to 230 kg. (McLaughlin, 1952).

This type of cattle is said to be resistant to tickborn diseases and parasites.

#### **Sources of breeding stock and information regarding the breed**

INEAC (Institut national pour l'étude agronomique du Congo belge) maintains a Lugware herd at Nioka Station and the Veterinary Department of the Belgian Congo maintains a breeding establishment at Arara near Aru for breeding bulls for distribution.

Additional information may be obtained from the Provincial Veterinary Officer of Eastern Province at Stanleyville, Belgian Congo.

## **NANDI**

### **Origin**

In 1931 cattle were selected from the herds of the Nandi tribe to provide the foundation stock for the Baraton Livestock Improvement and Animal Industry Center. These local cattle were representative of the large cattle population of generally similar type which is found in the areas surrounding Lake Victoria and Mount Kenya and which is a part of the Shorthorned East African Zebu group. The name "Nandi" has been applied to the cattle in the Baraton herd and can be given more generally to the local cattle type, but the high degree

of variation present in the tribal herds makes it impossible to speak of a Nandi «breed» as existing outside the Baraton herd (Faulkner, 1951; Colonial Office, 1953).

### Conditions in the native home of the breed

#### *Location, topography and soils*

Cattle of the Nandi and similar types are found in the country around Mount Kenya, Nyanza Province, Kenya, and in neighboring areas in Uganda and Tanganyika. The area is essentially a plateau with an altitude of about 4,000 feet above sea level. The soils are generally partially laterized red earths of local igneous origin and are often deep and fertile (Milne, 1936). The human population is among the densest in Africa south of the Sahara and a very considerable part of the land is subjected to shifting cultivation.

#### *Climate*

The rainfall, which is between 35 and 60 inches a year in most of the area, falls in two periods. Almost half the year's rain occurs in the three months of March, April and May, while there is a second minor peak in November and December. January and February are the hottest months and, together with September and October, the driest. The temperature range is small throughout the year. Climatological data for Kisumu are given in Table 116.

TABLE 116. — CLIMATOLOGICAL DATA FOR KISUMU IN THE NANDI AREA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean temperature, °F .....	75	76	75	75	73	72	71	73	73	75	75	75	74
Mean rainfall, in.	1.6	3.2	6.8	6.0	7.7	4.3	2.4	4.1	2.4	1.9	4.3	3.2	47.8

SOURCE: Kendrew, 1953.

#### *Vegetation*

The typical vegetation of the area is scattered tree grassland (low tree/high grass). The general appearance is often that of cultivated orchard land. The trees are characteristically deciduous

and broadleaved with *Combretum* as the dominant genera. The most common grasses are *Hyparrhenia* spp. and *Cymbopogon* spp. The tendency for thicket to replace the tall grass between the trees is prevented very largely by the frequency of bush fires.

The native population practice shifting cultivation which, in so densely populated an area, produces a rapid deterioration of the plant population.

The rainfall in much of the area is high enough to permit of grassland improvement by the encouragement of stoloniferous and more prostrate grasses such as *Digitaria* spp. and *Chloris gayana* (Edwards, 1951).

### *Management practices*

The majority of the indigenous cattle in the Nandi area are subject to an inadequate nutritive environment as a result of overstocking and an absence of any proper conservation of fodder.

Cattle, as elsewhere in Africa, play a very large part in the social life of the people and their ownership is commonly distributed among the various members of a family. Numbers are of predominant interest to the cattle owners and little attention is paid to the productive capability of the cattle.

Improved management can effect very striking and rapid improvements: Faulkner (1951), for instance, comments on the contrast between the carcass weights of Masai cattle (240 to 300 lb.) and those of similar cattle under European management (450 to 500 lb.).

Liquid milk is only used in the household of the cattle owner, but clarified butter is prepared for sale.

At the Baraton Livestock Improvement Station the cattle remain on pasture throughout the year. All cows receive 1 lb. a day of a concentrate mixture and those producing over three quarters of a gallon of milk daily are given 4 lb. of the ration for each gallon in excess of that amount. Calves are removed from the cows at birth and are hand-fed and great care is taken to train heifers to hand-milking.

### **Physical characteristics of the breed**

Nandi cattle (Figures 84 and 85) as described by Faulkner (1951) are small, fine-boned animals. The head is long and has a tendency to be coffin-shaped with the greatest width between the supra-orbital processes. The face in particular is long and lean. The profile is straight or slightly convex. The horns are round in cross section and are usually short and pointed at the extremities. The direction of

growth tends to be laterally from the poll with a slight curve upwards and forwards. Cattle with loose horns and polled animals occur.

The hump is cervico-thoracic in position and is usually considerably more prominent in the male than in the female, where it may be so small as to be barely apparent. Its slope is generally from front to rear with, in bulls, a marked backward fall. The topline is of moderate width and slopes slightly upwards from the withers to the hind-quarters. The rump, which is of moderate length, has a marked slope to the rear. The hind legs are upright in position and tend to be lean. The tail is long and slender. The udder tends to be small and the teats are usually close together.

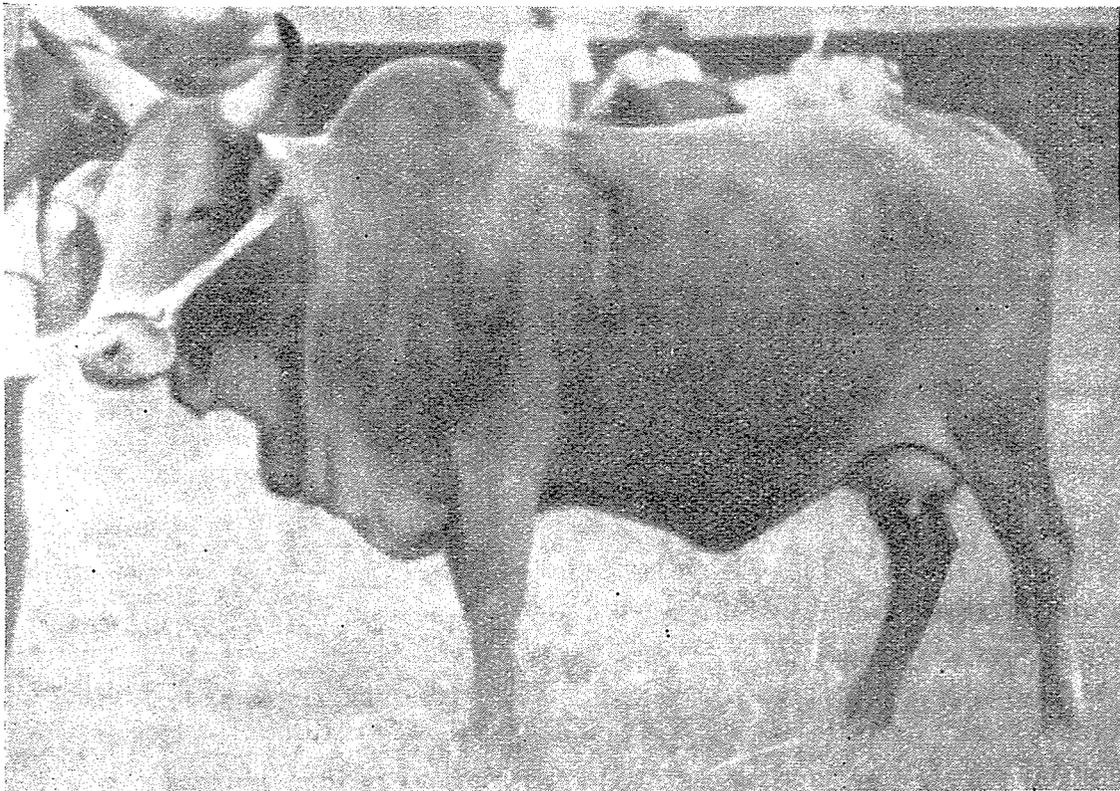
The pendulous dewlap starts under the chin and continues to the breastbone between the forelegs. The umbilical fold is only sometimes apparent.

Coat coloration varies considerably through a range including full black, red, fawn, white and gray, and combinations in which black and red predominate.

Some liveweights and measurements of typical Nandi cattle are shown in Table 117.

FIGURE 84. *Nandi cow.*

Courtesy of Ralph W. Phillips



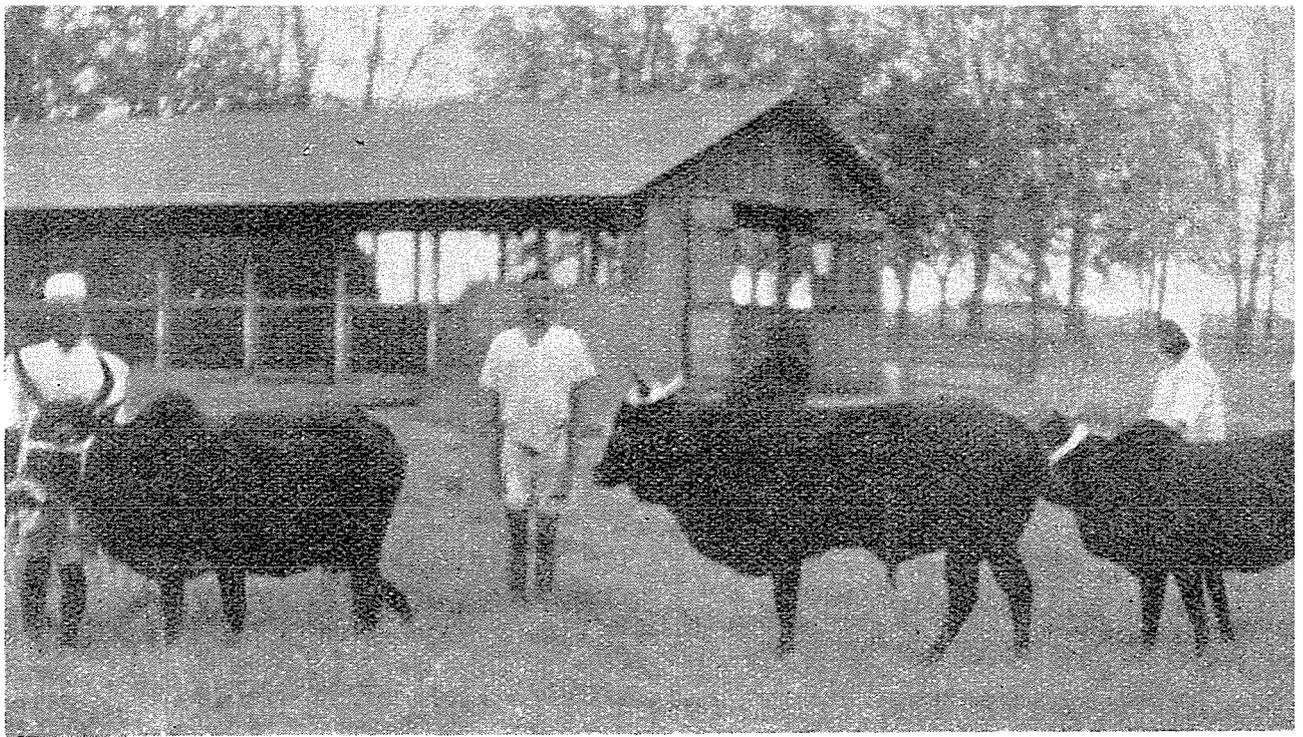


FIGURE 85. *Nandi cattle.*

Courtesy of Ralph W. Phillips

TABLE 117. — AVERAGE LIVeweIGHTS AND MEASUREMENTS OF NANDI CATTLE

	Male		Female		Ox	
	no.	mean	no.	mean	no.	mean
Liveweight, lb. ....	4	847	17	629	14	700
Length from shoulder point to pinbone in .....	4	54.0	17	47.7	14	51.0
Height at withers, in. ....	4	47.2	17	44.4	14	44.0
Depth of chest, in. ....	4	25.5	17	23.3	14	24.8
Width of hips, in. ....	4	16.9	17	15.4	14	15.8
Heart girth, in. ....	4	56.8	17	60.1	14	63.9

SOURCE: Faulkner, 1951.

### Functional characteristics of the breed

Nandi heifers at Baraton have calved for the first time at an average age of 3 years and 7 months. The average calving intervals of various groups of cows have been: foundation cows 13.0 months (311 calvings); selected progeny 11.7 months (355); unselected progeny 11.5 months. Five percent of the foundation cows and 2.6 percent of the unselected progeny were sterile.

The average gestation period of Nandi cows was 284 days with a range of 270 to 300 days.

A considerable variation of 1 to 20 hours in the duration of estrus has been observed (Faulkner, 1951).

The average of 311 lactation records of foundation cows was 1,278 lb. of milk containing 5.6 percent of butterfat in 182 days. The average production of a group of their selected progeny (100 records) was 2,282 lb. of milk containing 5.1 percent of butterfat in 275 days.

Two individual lactation yields of over 4,000 lb. of milk in 275 and 322 days were recorded at the Baraton Station, with butterfat at 5.8 percent and 6.1 percent respectively.

A number of the cows have continued breeding to an advanced age: one, after 12 lactations in which 36,479 lb. of milk and 2,054 lb. of butterfat were produced, died at the age of 19 years. Another which produced 35,621 lb. of milk and 2,048 lb. of butterfat in 14 lactations, died when 18 years old (Colonial Office, 1953).

The Nandi ox at 5 years of age is capable of producing a fair beef carcass of about 350 to 400 lb. cold deadweight (Faulkner, 1951).

While no information is available as to the working ability of Nandi cattle, it has been noted (Faulkner, 1951) that Nandi oxen have been in demand as draft animals on farms managed by European settlers.

Nandi cattle are susceptible to rinderpest and pleuro-pneumonia, as well as, to a lesser extent, to foot-and-mouth disease, which is generally only a problem in improved herds and in herds of slaughter cattle.

Tick-borne diseases are prevalent in the area and Nandi cattle, if they survive the initial calfhood infection, develop an immunity which protects them against subsequent infection.

### **Crosses with other breeds of cattle**

A Sahiwal bull was introduced at the Baraton Livestock Improvement Station shortly before the 1939-1945 war. The first generation (F<sub>1</sub>) cross females gave an average yield of 3,099 lb. of milk containing 5.1 percent butterfat in 275 days. Their calving interval was 12.4 months (Faulkner, 1951).

### **Sources of breeding stock and information regarding the breed**

Further information concerning the Nandi cattle can be obtained from the Department of Veterinary Services, Kabete, Kenya.

## SOUTHERN SUDAN HILL ZEBU

### Origin

These cattle, which have also been referred to as the Mongalla, or East African zebu, are owned by a number of tribes of mainly Nilo-Hamitic origin, which have entered their present habitat in Equatoria Province in the Republic of the Sudan from territories further to the east, and which include the Didinga, the Latuka-Lango group and the Bari on the east of the Nile as well as the Kuku and Lugware on the west.

Their similarity in physical conformation suggests a common origin for these cattle, the Lugware cattle of the Belgian Congo and the Bukedi zebus of Uganda.

There is insufficient uniformity within the cattle population of the area to justify its being referred to as a "breed."

### Conditions in the native home of the breed

#### *Location, topography and soils*

These cattle are found in the hilly and mountainous country in the Yei, Moru, Juba, Torit and Eastern districts of Equatoria Province. The Didinga have their villages on the higher slopes of the hills of that name, the Latuka-Lango group of tribes are grouped around the rocky foothills of the Lafit, Imatong, and Dongotona mountains, and the Bari live mainly to the east of the Nile in the Juba area. The Kuku inhabit the Kajo Kaji bowl on the Uganda border to the west of the Nile and the Lugware are to be found in eastern Yei district.

In the past much of the country to the west of Juba in the Moru and Yei districts supported a large cattle population, but the depredations of the Dervishes in the nineteenth century, and more recently of epizootic diseases, have resulted in its reduction to a few small surviving herds, and most of the area has become overgrown with bush and infested with tsetse fly.

The area is mountainous and much eroded and the soils show great variation. In the hills there are truncated and skeletal soils on the slopes and some deep fertile loams in the valleys; elsewhere there are mainly shallow lateritic soils or acid loams (SDIT, 1955).

*Climate*

The climate is characterized by the alternation of a dry and a rainy season consequent upon the north-south movement with the sun of the intertropical convergence. The mountainous nature of the country, however, causes some orographic rainfall even in the dry season.

There is considerable variation in the duration of the dry season from west to east. At Kajo Kaji, for instance, it occupies the months of December, January and February, while at Torit it extends from November to the end of February. The rainfall on the eastern and northern slopes of the mountains and hills to the east of the Nile is not only less than that of the more westerly Yei and Kajo Kaji districts, but is badly distributed with long, dry intervals even in the rainy season.

Temperatures can be high during the dry season with a considerable diurnal variation but during the rains generally tend to be more equable.

Climatological data for Torit in the Latuka-Lango area are given in Table 118 and the distribution of rainfall at Kajo Kaji is shown in Table 119.

TABLE 118. - CLIMATOLOGICAL DATA FOR TORIT  
(ALTITUDE 625 M.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean maximum temperature, °C.	37.7	37.4	36.5	35.5	33.5	32.3	30.5	30.8	32.9	34.1	35.6	35.6	34.4
Mean minimum temperature, °C.	18.9	20.3	21.1	20.7	20.1	19.5	19.0	18.8	18.6	18.7	18.4	18.2	19.4
Mean relative humidity, at 08.00 hrs., % .....	39	45	53	67	73	75	79	79	74	72	62	53	64
Mean rainfall, mm.	4	21	45	101	131	123	157	142	111	98	40	15	989

SOURCE: Temperature and relative humidity: Ireland, 1948.  
Rainfall: SDIT, 1955.

TABLE 119. - MONTHLY AND ANNUAL RAINFALL AVERAGES AT KAJO KAJI  
(ALTITUDE 1,030 M.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean rainfall, mm.	7	27	71	155	178	167	174	183	138	132	64	21	1 316

SOURCE: SDIT, 1955.

## Vegetation

On the slopes of the southeastern hills the vegetation ranges from broadleaved woodland, including *Combretum* sp., *Vitex* sp. and *Ficus* sp., through thorn woodland, including *Acacia* spp., *Albizia sericeophala* and *Euphorbia venenifera*, to grassland and scrub which is largely the result of overgrazing and soil deterioration. The dominant grass species are perennials — e.g. *Hyparrhenia* spp. and *Chloris gayana* — and, in old cultivation areas and where the soil is eroded, the short annuals *Aristida adscensionis* and *Eragrostis* spp.

In the Kajo Kaji area west of the Nile and near the Uganda border there is open grassland including *Hyparrhenia* spp., *Chloris gayana*, *Setaria sphacelta*, *Panicum maximum* and *Cynodon dactylon*. There are a few river pastures dominated by *Phragmites* spp. and, to a lesser extent, by *Echinochloa* spp.

A system of shifting cultivation using hand implements is followed throughout the area.

The vegetation is everywhere much modified by the effects of fires, past cultivation and, outside the tsetse areas, by grazing (SDIT, 1955).

## Management practices

The tribes maintaining this type of cattle are sedentary and do not make extensive seasonal movements in search of grazing and water. In the southeastern hills and in the Bari area the cattle graze near the villages on the hill slopes during the rains and are taken either into the lower river and stream valleys or higher up the hills in the dry season.

This movement is made very largely to bring the cattle closer to water.

In the Kajo Kaji area the cattle remain in the vicinity of the villages throughout the year.

Cattle are watered daily at midday. No fodder is preserved. The calves are kept in the villages until they are weaned on the drying-off of the dams after approximately ten months, when they join the main herd. Cows are milked once daily in the evening, and the milk is consumed in its liquid form.

Meat is eaten by the tribes. Cattle are slaughtered on festivals and meat from animals which die from disease or other causes is eaten.

The castration of male cattle, except among the Didinga, is rare (McLaughlin, E. A., *Personal Communication*).

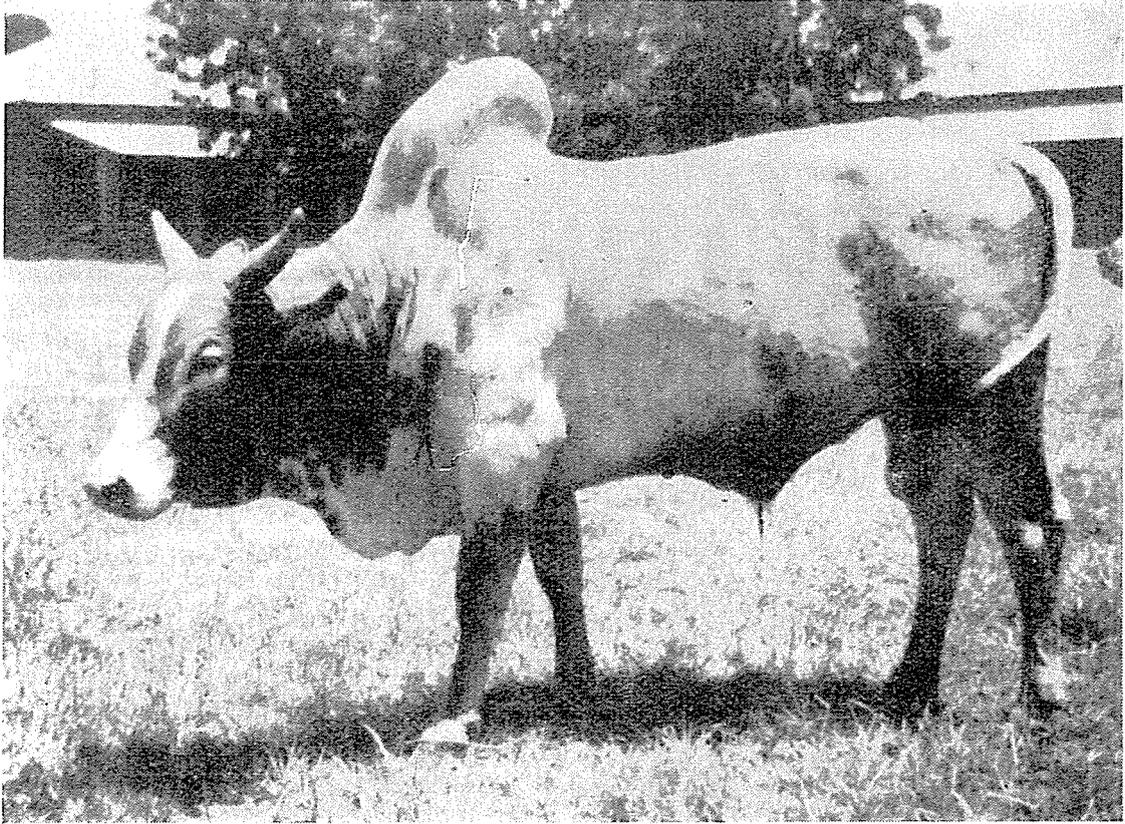
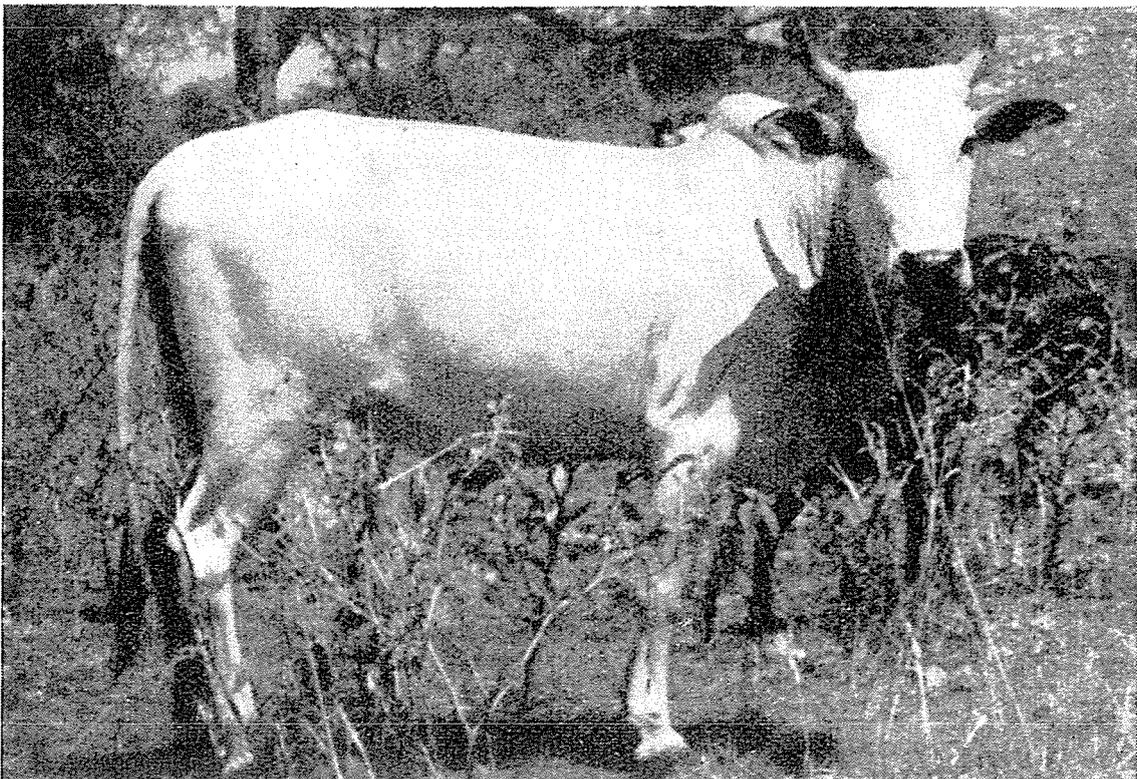


FIGURE 86. *Southern Sudan Hill zebu "Latuka" bull.*

Courtesy of J. D. M. Jack

FIGURE 87. *Southern Sudan Hill zebu "Didinga" cow.*

Courtesy of E. A. McLaughlin



## Physical characteristics of the breed

The cattle (Figures 86 and 87) are small, stocky animals, well fleshed and with good quarters. The head is short and the muzzle broad. The profile is straight or slightly concave. The orbital arches are pronounced and the forehead is concave. The horns are generally short and curved, seldom exceeding 20 to 30 cm. in length, and grow in an outward and upward direction, forward of the line of the profile. The hump is cervico-thoracic to thoracic in position and is of small or moderate size in the female, but is comparatively large in the male and may hang over to the rear or to one side. The dewlap is of medium development and the umbilical fold is small. The topline is broad and well muscled and rises gently to the hindquarters. The rump is of medium length and slope and is wide over the pinbones. The hindquarters and thighs are strong and well fleshed.

There is a wide range of coat coloration. Light colors, including grays and duns are common, but other colors and patterns on white occur. Combinations of black and white are common among the Lugware cattle in Yei district. The hair is soft and short and the skin is darkly pigmented.

There have been no observations of the liveweight of these cattle but a very tentative estimation has been of an average of 150 kg. The height at withers has been given as 100 to 105 cm. and the heart girth as 135 cm. (SDIT, 1955). The average birthweight has been estimated to be about 5 kg.

Some measurements of the cattle are given in Table 120.

TABLE 120. — AVERAGE MEASUREMENTS OF SMALL HILL ZEBUS  
IN THE SOUTHEASTERN SUDAN

	No. of cattle	1 year	2 years	Mature
FEMALES				
Height to top of hump, in. ....	10	30	35.45	40.5
Heart girth, in. ....	10	32.9	45.45	55.1
MALES				
Height to top of hump, in. ....	10	31.5	36.65	46.05
Heart girth, in. ....	10	34.95	42.6	55.25

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

### **Functional characteristics of the breed**

Heifers usually calve for the first time soon after the second permanent incisor has been cut, at between 2 and 3 years of age. Cows usually calve at yearly intervals and it is thought may have a productive life of 7 to 10 lactations. The majority of calvings occur during November to January in the dry season.

Milk yields are small; daily yields of 1.6 liters and 4 to 6 pints have been reported. An average yield of 532 liters in 300 days with calves suckling has been reported from Latuka cows (SDIT, 1955).

Meat from these cattle can be of good quality. It has been estimated that a dressed carcass may weigh from 60 to 70 kg.

These cattle are reported to be to some extent resistant to trypanosomiasis.

### **Performance in other areas**

Small cattle of a similar type to that of the small zebu of the southern Sudan are found in the possession of the pagan tribes in a small area of the Nuba mountains in the neighborhood of Dellami in Kordofan Province in the northern Sudan. This area is an isolated pocket of tsetse-infested country and the apparent tolerance of this type of cattle to trypanosomiasis has contributed to their continued survival in close proximity to the large herds of Northern Sudan shorthorned zebus which graze the plains in the vicinity of the mountains. Similar small cattle were formerly owned by the pagan Ingessena tribe who have their villages in the Ingessena hills in the southern part of Blue Nile Province, but the settled conditions which prevailed during the Condominium and which enabled the tribesmen to graze their cattle in the plains through which the nomadic Arabs graze their cattle have led to crossbreeding with the Northern Sudan zebu to such an extent that the small hill cattle have been almost entirely replaced by crossbred animals (Mills, 1953; McLaughlin, E.A., *Personal Communication*).

### **Sources of breeding stock and information regarding the breed**

It is estimated that there are approximately 111,000 cattle of this type in the southern Sudan.

Herds of these cattle have been maintained in government herds at Yei and Torit.

Further information may be obtained from the Director of Animal Production, Ministry of Animal Resources, Khartoum, Republic of the Sudan.

## TANGANYIKA SHORTHORNED ZEBU

### Origin

Cattle of this type show so much variation that there may be some doubt as to whether they can be legitimately referred to as comprising a "breed." The cattle type appears to have been present in the area for a considerable time and is thought to be derived from importations which penetrated to East Africa at the time of Islamic expansion (French, M. H., *Personal Communication*).

### Conditions in the native home of the breed

#### *Location, topography and soils*

This type of cattle occurs throughout Tanganyika, in the hot humid coastal area as well as in the dry and cool highlands. The greatest numbers are, however, found in the arid and semi-arid areas of the central plateau in a triangle between Lake Victoria, Mount Kilimanjaro, and Iringa in the Southern Highlands Province, while there are smaller concentrations in southern Tanganyika from Njombe to Abercorn, near Tabora in Western Province and between Samo and Korogwe in Tanga Province. Considerable areas in Tanganyika are infested with tsetse fly and in much of the Southern, Eastern and Western Provinces as well as the western parts of Lake and Southern Highlands Provinces there are very few cattle (Hutchison, 1955).

The central plateau is, very generally, a gently undulating peneplain, showing in some places renewed dissection and broken by occasional remnant hill ranges largely composed of gneisses. The elevation of the plateau is fairly uniform at about 4,000 feet above sea level, but there is an elevated rim on the east, west and south where it reaches, in places, 9,000 feet. Among the isolated elevations on the plateau Mount Kilimanjaro, with an elevation of 19,000 feet, is by far the most considerable. The soils are for the most part red earths (well-drained clod-structured neutral soils, free of calcium carbonate and with a low clay fraction) and plateau soils (poorly-drained, light-colored soils which are free of calcium carbonate but often have ironstone concretions in the subsoil) on the slopes of the hills with plains soils (semi-arid, hard-surfaced soils) elsewhere except in depressions where there are calcareous black or gray cracking clays (cotton soils). Catenary successions of red earths, plateau soils, plains soils, and black or gray

soils occur where the plateau shows signs of dissection. There is often advanced soil erosion where there has been prolonged cultivation (Milne, 1936; Gillman, 1949; Kendrew, 1953).

### *Climate*

The central plateau has a low and often unreliable rainfall which is concentrated in the period between October and April with the peak in January and February. The rain falls in heavy showers, often accompanied by thunder, which occur on about half the days during the rainy season. There is considerable cloud, and humidity, especially at night, is high. The wind is light and easterly during the day; at night there is calm.

TABLE 121. - CLIMATOLOGICAL DATA FOR UKIRIGURA, SUKUMALAND, LAKE PROVINCE, TANGANYIKA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean maximum temperature, °F.	83.4	83.2	84.0	83.0	81.5	83.2	83.8	84.1	86.1	87.3	83.5	81.8	83.7
Mean minimum temperature, °F.	64.3	64.4	64.5	63.9	63.5	60.6	58.4	61.0	64.0	65.9	65.6	64.1	63.5
Mean relative humidity at 08.30 hrs., %	81	82	81	84	80	73	66	66	60	57	72	79	73
Mean relative humidity at 14.30 hrs., %	49	51	51	56	55	42	37	38	37	37	51	55	47
Mean rainfall, in.	3.77	3.20	5.27	5.23	2.85	0.48	0.04	0.65	0.78	1.22	4.93	3.43	31.85

SOURCE: Hutchison, 1955.

TABLE 122. - CLIMATOLOGICAL DATA FOR DODOMA, UGOGO, CENTRAL PROVINCE, TANGANYIKA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean maximum temperature, °F.	84.7	84.2	83.2	82.9	81.7	80.5	79.2	80.4	83.9	86.6	83.3	86.6	83.5
Mean minimum temperature, °F.	65.1	64.8	64.4	63.7	61.4	57.3	55.4	56.9	59.1	61.6	64.4	65.4	61.6
Mean relative humidity at 08.30 hrs., %	80	83	84	82	76	75	74	74	71	70	71	77	76
Mean relative humidity at 14.30 hrs., %	52	52	56	54	49	45	43	42	38	36	39	48	46
Mean rainfall, in.	6.06	4.27	5.65	1.71	0.24	0.01	0.00	0.00	0.09	0.17	1.17	3.77	23.14

SOURCE: Hutchison, 1955.

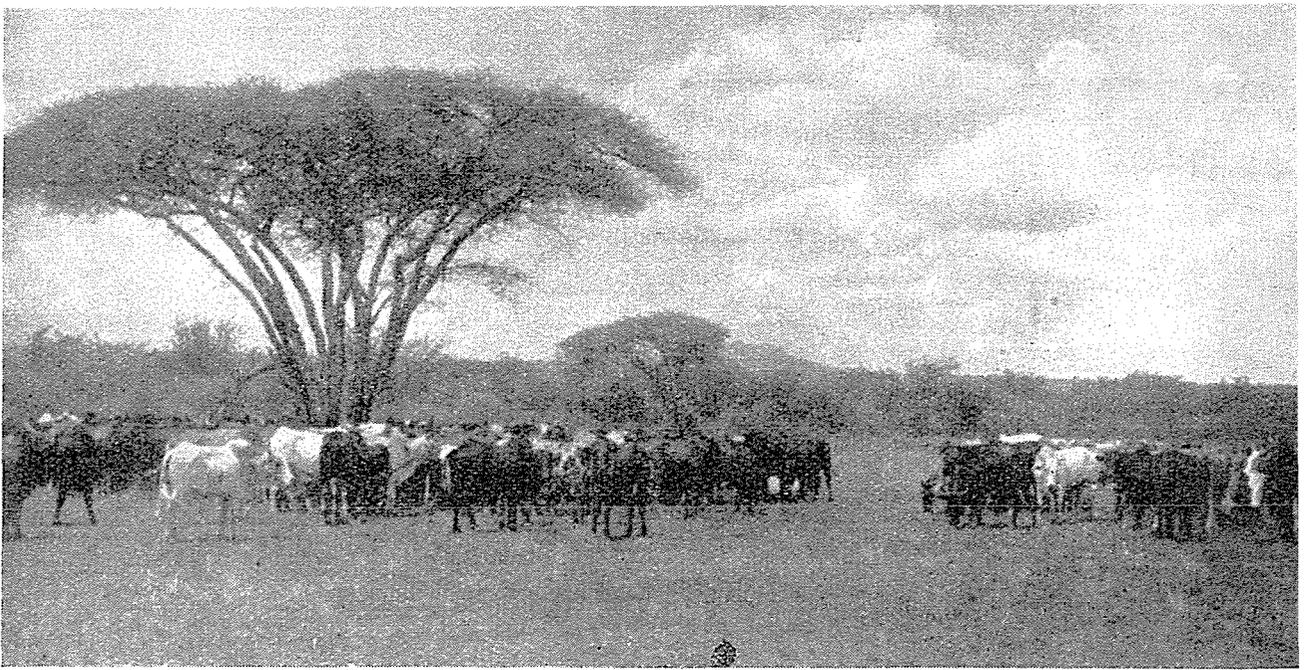


FIGURE 88. *Tanganyika shorthorned zebu yearlings at Kongwa Ranch.*

Courtesy of H. G. Hutchison

The dry season lasts from May to October. The wind is fresh from the east or southeast and there is little cloud and no rain. The air is dry and temperatures are high at midday. The diurnal range is considerable and the nights are much cooler than during the rains (Kendrew, 1953).

Climatological data for two stations in Tanganyika are given in Tables 121 and 122.

### *Vegetation*

Much of the area in which the Tanganyika shorthorned zebu is found is covered by grassland with deciduous shrubs and small trees (largely *Combretum* spp.) often covering 50 percent or more of the ground (Figure 88). Large trees in clumps or singly are often present and in places the Baobab (*Adansonia digitata*) occurs in large numbers. In areas with a sedentary population the original plant population has been modified by the effects of continued cultivation until it presents the appearance of being secondary grassland in which Baobab trees are often conspicuous remnants of the original vegetation. A combination of vegetation types which has been referred to as the "rain-pond catena" occurs in and surrounding depressions. The depression itself is covered by grassland which is surrounded on the rim by a narrow fringe of woodland which quickly gives way to the surrounding thornbush. Near Lake Victoria grassland with bushes is replaced by grassland with scattered trees which include, among other species, *Acacia* spp.

and the palms *Borassus* and *Hyphaene*. In the center of the area there are patches of *Brachystegia* woodland which are often infested by tsetse (Gillman, 1949).

#### *Management practices*

The majority of the cattle kept by the native peoples of Tanganyika, except those in small areas where "mixed farming" is practiced, are maintained wholly on grazing which tends to be seasonally limited in supply. Large areas in the more arid parts of the territory are utilized by nomadic tribes. Cattle are intimately bound up in the social organization of the people, particularly in their capacity as the currency of the bride wealth system and the quantity of the cattle composing the herds is generally given precedence over their quality by their owners.

Milking is becoming more common: when it is practiced the calf is always allowed to suckle at the same time. Meat is eaten in the area but French (1936) has observed that in the past, people during times of famine have died of starvation rather than kill their cows.

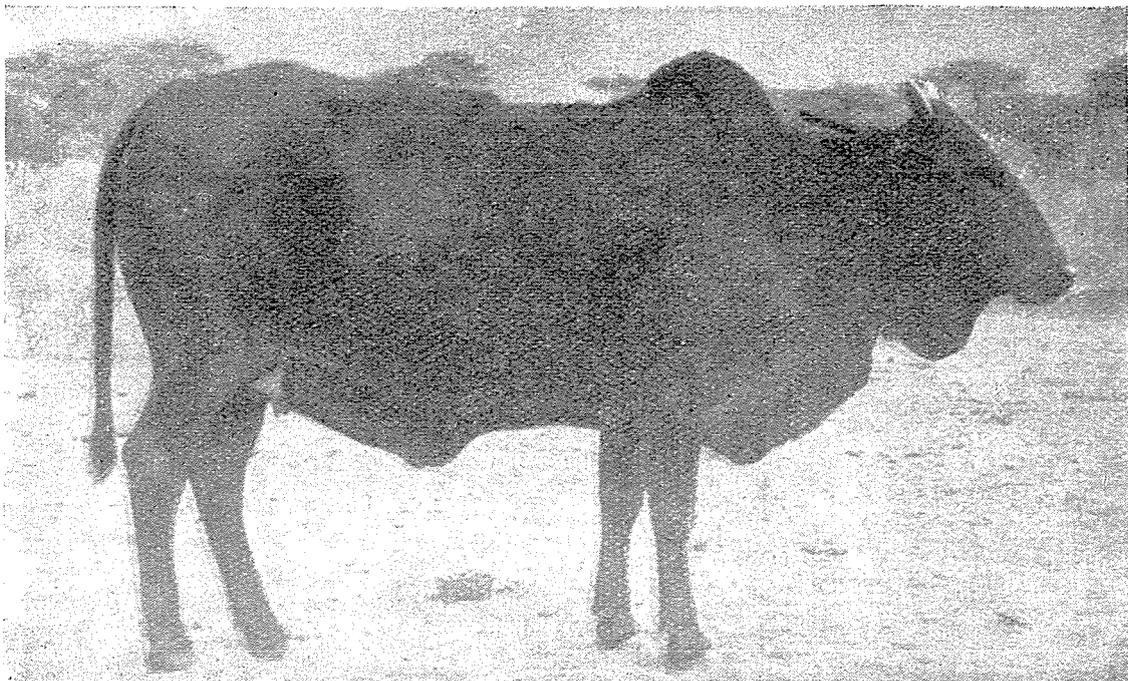
In Lake Province the Wakuria and other tribes have adopted the practice of using cattle as draft animals for tillage purposes (Hutchison, 1955).

#### **Physical characteristics of the breed**

Cattle of this type (Figures 89, 90 and 91) vary considerably in size and in conformation. The largest and best grown are reported to be those in the hands of the pastoral Masai in the Ngorongoro and

FIGURE 89. *Tanganyika shorthorned zebu (Masai) cow.*

Courtesy of H. G. Hutchison



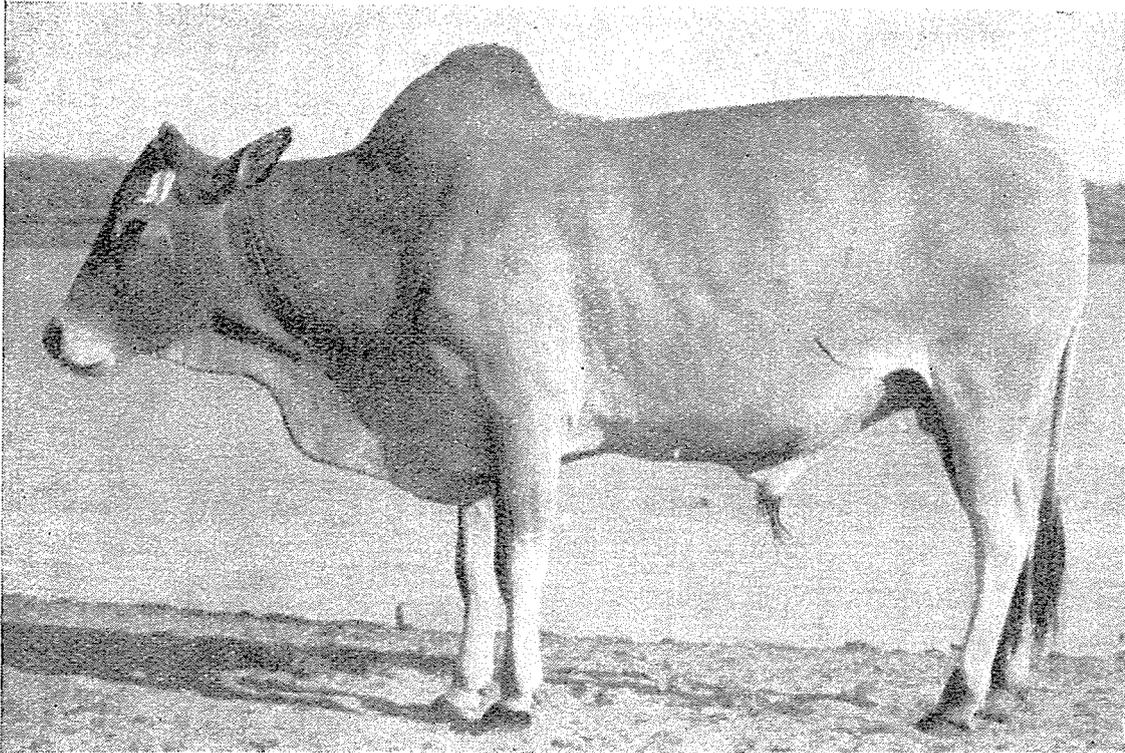
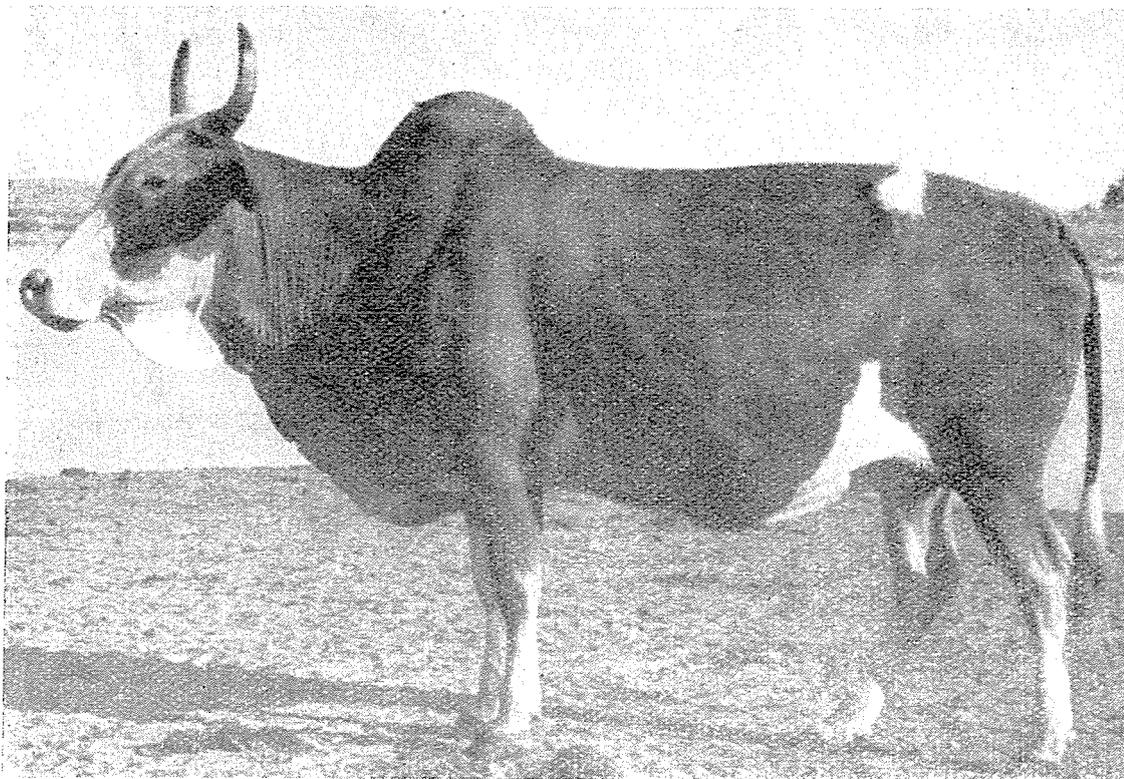


FIGURE 90. *Tanganyika shorthorned zebu (Sukumaland) steer.*

FIGURE 91. *Tanganyika shorthorned zebu (Lake Province) cow.*

Courtesy of H. G. Hutchison



Balbal areas and those in the Musoma area on the eastern shore of Lake Victoria.

The head tends to be long with a convex profile. The orbital arches are only slightly accentuated, lending a small degree of concavity to the forehead. The ears are about 6 inches long and are carried horizontally. The horns grow from the poll in a lateral and upward direction, turning upwards at the extremities and with the line of growth in line with or slightly forward of the line of the head profile. The horns are a full oval in cross section and often narrow abruptly to the tip which is continued as a short narrow projection. Exceptionally horns may bend downwards and lie along the cheeks, or horns of a narrow oval in cross section may occur which grow laterally from the poll in a slight spiral.

The hump is relatively large both in the male and the female and is thoracic in position (Milne, 1955). The slope from the front and rear may be approximately equal so that the hump has a decided pyramidal appearance (bearing a strong resemblance to that of the Toposa-Murle cattle of the southern Sudan), or the general direction of slope may be to the rear. In the male there may be some overhang to the side. Milne (1955) concluded from a series of dissections of cattle of this type that the hump was musculo-fatty in structure and that it represented an accumulation of reserve food material.

The topline rises to the hindquarters, the slope of which varies considerably from one individual to another. The sacrum is only slightly prominent in the majority of cases. The tail is of medium length. The depth of chest tends to be small and the underline rises from the front to the rear. The dewlap and umbilical fold are of moderate fullness.

The limbs are lean and lightly boned and often give the appearance of being long in relation to the depth and length of the body.

The skin is of medium thickness and the hairs of the coat are short and lie smoothly. Coat coloration shows a wide range: full colors including white, fawn, red and black occur as well as patterned color combinations and roans.

The liveweight of mature cattle in the Mbulu district in the highland area of Northern Province seldom exceeds 400 to 450 lb., but that of mature Masai cattle is sometimes over 800 lb. It has been suggested, however, that this difference is of environmental origin as, when young cattle from a number of areas, including Mbulu, have been reared together, they have been indistinguishable at maturity (Hutchison, 1955, *Personal Communication*).

This environmental effect on growth is further illustrated by a series of measurements made by Hutchison (*Personal Communication*)

in May 1956 at the Kongwa Ranch of the Tanganyika Agricultural Corporation and which are summarized in Table 123. The measurements were made on four groups of Tanganyika shorthorned zebu. Three groups were of steers brought in from tribal herds at ages represented by no-permanent-teeth to 4-to-6-permanent-teeth (estimated to include groups of cattle from 1 to 3 years of age). The fourth group was of steers which had been purchased from tribal herds as yearlings and since maintained on the ranch for three years. The cattle on the ranch were maintained on unimproved local pasture under good standards of hygiene and grazing control but were given no supplementary feedingstuffs. The samples were obtained by measuring the first ten animals of the type required, which passed through a "crush" as large herds were being dipped.

TABLE 123. - COMPARISON OF TANGANYIKA SHORTHORNED ZEBU STEERS FROM TRIBAL AREAS AND AFTER THREE YEARS OF RANCH MANAGEMENT

	Tribal cattle			Ranch cattle
	yearling	1 ½ to 2 years	2 ½ to 3 years	4 to 5 years
Length from shoulder point to pinbone, in.	35.69 ± 1.13	36.99 ± 1.22	38.69 ± 1.38	49.38 ± 1.80
Height at withers, in. . .	36.80 ± 0.60	37.29 ± 1.08	38.87 ± 0.97	46.81 ± 0.84
Height at hocks, in. . . .	39.17 ± 0.96	39.97 ± 0.84	41.77 ± 1.16	48.84 ± 0.79
Depth of chest, in. . . . .	15.91 ± 0.68	16.86 ± 0.33	17.59 ± 0.45	22.99 ± 1.59
Width of hips, in. . . . .	11.45 ± 0.56	12.13 ± 0.60	12.49 ± 0.68	16.00 ± 0.68
Heart girth, in. . . . .	46.25 ± 1.69	48.79 ± 1.58	50.37 ± 1.73	66.90 ± 2.14

All means derived from samples of 10 observations.  
SOURCE: Hutchison, H. G., *Personal Communication*.

TABLE 124. - AVERAGE MEASUREMENTS OF TANGANYIKA SHORTHORNED ZEBUS AT VARIOUS STAGES OF GROWTH

	Male			Female		
No. of cattle . . . . .	11	16	21	22	19	50
Average age, days . . . . .	24	557	mature	10	561	mature
Average height at hips, in.	22.4	42.5	45.7	21.0	39.3	44.3
Average heart girth, in. . .	25.2	49.5	61.6	23.5	46.2	56.7

SOURCE: Hutchison 1955.

In the case of the whole series of body measurements the difference between the observations recorded for the 2 ½ to 3-year-old group and the 4 to 5-year-old group is considerably greater than could be accounted for by the difference in age and can be assumed to be a

reflection of the differential effect induced by the superior nutritional status of the cattle which had been maintained on the ranch for three years.

Other measurements and liveweights of Tanganyika shorthorned zebus at various stages of growth are given in Tables 124, 125 and 126.

TABLE 125. — AVERAGE LIVeweIGHTS AND MEASUREMENTS OF TANGANYIKA SHORTHORNED ZEBUS

	Male			Female			Ox
	1 year	2 years	mature	1 year	2 years	mature	mature
Liveweight, lb. ....	237.1 (7)	503.0 (5)	685.3 (6)	201.8 (8)	386.7 (6)	473.5 (10)	580
Height at withers, in. ....	36.6 (7)	42.7 (5)	43.1 (6)	34.4 (8)	38.0 (6)	41.0 (10)	43.8
Depth of chest, in. ....	21.0 (2)	—	28.0 (1)	20.0 (3)	26.0 (1)	27.8 (5)	29.2
Width of hips, in. ....	9.8 (7)	13.2 (5)	15.0 (6)	9.6 (8)	12.6 (6)	13.6 (10)	13.8
Heart girth, in. ....	44.1 (7)	56.2 (5)	63.6 (6)	42.7 (8)	53.2 (6)	55.6 (10)	58.6

Numbers sampled in brackets.  
SOURCE: Hutchison, 1955.

TABLE 126. — AVERAGE LIVeweIGHTS OF TANGANYIKA SHORTHORNED ZEBUS FROM THREE AREAS AT DIFFERENT STAGES OF GROWTH

Area and treatment	Age of cattle							
	birth		18 months		30 months		mature	
	no.	lb.	no.	lb.	no.	lb.	no.	lb.
FEMALES								
Masailand, Ugogo (ranchd) .....	17	39.6	28	304	31	403	84	583
Sukumaland (ranchd)* .....	20	41.2	40	257	6	493	49	482
Pawaga (farmed) ...	3	52.3	8	288	15	369	24	465
MALES								
Masailand, Ugogo (ranchd) .....	29	39.8	19	327	12	505	4	768
Sukumaland (ranchd)* .....	25	41.9	23	346	14	533	5	672
Pawaga (farmed) ...	1	45.0	1	274	—	—	—	—
OXEN								
Masailand, Ugogo (ranchd) .....	—	—	47	313	43	431	8	600
Sukumaland (ranchd)* .....	—	—	2	421	2	628	3	730
Pawaga (farmed) ...	—	—	—	—	17	392	17	600

\* Liveweights were estimated from a monograph relating height, girth and weight, constructed from Tanganyika data.  
SOURCE: Hutchison, 1955.

In Table 127 are summarized liveweights and measurements of mature Tanganyika shorthorned zebus which were obtained at Mpwapwa. These figures were derived from measurements made of animals which were in poor condition at the end of a bad dry season.

TABLE 127. — AVERAGE LIVeweIGHTS AND MEASUREMENTS OF TANGANYIKA SHORTHORNED ZEBUS AT MPWAPWA, TANGANYIKA

	Mature males	Steers 3 to 4 years old	Mature females
Liveweight, lb. ....	537.20 ± 33.18	392.70 ± 22.85	468.30 ± 39.31
Length from shoulder to pin-bone, in. ....	47.35 ± 1.98	44.24 ± 1.66	45.30 ± 1.40
Height at withers, in. ....	43.16 ± 1.00	41.60 ± 0.60	41.82 ± 1.16
Depth of chest, in. ....	22.24 ± 0.68	20.32 ± 0.46	20.58 ± 0.57
Width of hips, in. ....	13.92 ± 0.85	13.29 ± 0.38	12.75 ± 0.41
Heart girth, in. ....	57.75 ± 1.46	52.90 ± 1.11	54.65 ± 1.57

SOURCE: Hutchison, H. G., *Personal Communication*.

### Functional characteristics of the breed

Heifers of this type of cattle which are maintained on government farms in Tanganyika have calved for the first time at between 36 and 42 months of age and the average calving interval between subsequent calves has been 340 to 390 days. Cows have a productive life of 8 to 10 lactations, and several cows have been recorded that have produced more than 12 calves (Hutchison, 1955).

The same author gave details of the milk yields from the 476 lactation records of 144 foundation Tanganyika shorthorned zebu cows at the Central Breeding Station, Mpwapwa, which had been obtained from a number of different localities. The yield figures were exclusive of the milk taken by a suckling calf. The average lactation yield was 1,343.3 lb. of milk containing 4.9 percent of butterfat in 235.8 days. The mean interval between calvings (data from 471 lactation records) was 373.3 days. The 113 lactation records obtained from 21 superior cows gave an average yield of 2,058.4 lb. of milk containing 4.9 percent butterfat in 273.5 days.

An earlier account stated that the cows at the Central Breeding Station, Mpwapwa, Tanganyika, gave an average yield of 70 gallons of milk in 150 days. When, in addition to grazing, hay and 1 lb. a

head of a concentrate mixture were fed, an average yield was obtained of 121 gallons of milk containing 5.3 percent of butterfat in 226 days. A group of ten cows which, when given supplementary feed during the dry season, had given an average yield of 150 gallons of milk in 200 days without losing condition, gave only an average of 97 gallons of milk in 121 days in a subsequent lactation when the extra feed was withdrawn. All the above yields were additional to the milk taken by a suckling calf (Tanganyika Territory, 1949).

French (1936) has recorded that mature Tanganyika zebus with an average liveweight of 510 lb. dressed out at 51.1 percent, giving an average carcass weight of 260.4 lb.; cattle of an average liveweight of 700 lb. dressed out at 54.4 percent, giving a mean carcass weight of 381.1 lb. In the lighter animals the hump weighed 5.9 lb. and in the heavier, 12.0 lb., or 1.7 percent of the mean liveweight.

The quality of the meat, as compared to that of specialized European beef breeds, is poor, with very little intra-muscular fat and little internal fat. The amount of fat in the carcass shows considerable variation according to the age of the animal and the season in which it is killed (French, 1936).

Tanganyika shorthorned zebus are exposed to, and are susceptible to, rinderpest, trypanosomiasis, and contagious bovine pleuro-pneumonia. Foot-and-mouth disease and bovine tuberculosis also occur but are of less relative importance than the foregoing diseases. These cattle are reported to show some resistance to epizootic abortion. As a result of the universal infection of young calves with East Coast fever in much of the area, these cattle generally show a natural immunity to this disease.

#### **Sources of breeding stock and information regarding the breed**

The Tanganyika Veterinary Department maintains a herd of these cattle at the Veterinary Research Laboratory, Mpwapwa, and a project is reported in which herds of about 150 to 200 cows of each of eight local varieties will be established at Mkata Ranch, Eastern Province.

It has been estimated that there may be nearly 6 million cattle of this type in Tanganyika territory (Hutchison, 1955).

Further information on the Tanganyika shorthorned zebu can be obtained from the Director, Department of Veterinary Science and Animal Husbandry, Tanganyika Territory.

## TOPOSA-MURLE

### Origin

These cattle bear a close resemblance to those of the Karamajong in northeastern Uganda and the Turkana in northwestern Kenya. They are owned by the Murle (sometimes called Beir) in the Pibor Post district in Upper Nile Province and by the Toposa group of tribes and the smaller Boya (Longarim) tribe in the Eastern district of Equatoria Province in the Republic of the Sudan. Of Nilo-Hamitic origin, these tribes have entered their present habitat from the southeast; the Murle, for instance, having a tradition of movement from the Maji area in southwestern Ethiopia. It seems probable that the cattle were introduced into the area with the tribal movements. Wherever there has been contact with the neighboring Nilotic and small hill zebu cattle there has been crossbreeding and a consequent blending of type characteristics. Although a recognizable type can be distinguished, there is too considerable a degree of variation between individuals to justify the description of the cattle population of the area as a "breed" (McLaughlin, E.A., *Personal Communication*).

### Conditions in the native home of the breed

#### *Location, topography and soils*

The area over which cattle of this type are distributed can be considered in two parts. First, the Murle tribal area in the country watered by the group of rivers including the Veveno, Lotilla, Pibor and Khor Geni which join near Akobo Post close to the Sudan-Ethiopia border; and secondly, the undulating country in the eastern part of Equatoria Province in the Kapoeta area which is occupied by the Toposa group of tribes. The Boya tribe have their villages on a group of hills of the same name to the west of Kapoeta. To the west of each section there are large areas which are waterless in the dry season and flooded during the rains and so are not utilized for grazing. Contact with other cattle types is made in the extreme southeast where the Turkana of northwestern Kenya are encountered, in the vicinity of the Didinga and Dongotona hills south and southwest of Kapoeta, where the small hill zebu is found, in the Pengko area east of Bor where the Murle meet the Bor Dinka in the dry season and to the south of Akobo where the Nuer and the Murle are in contact.

The type area is bounded to the east by the Abyssinian highlands and to the south by the mountains on the Sudan-Uganda border, both of which are tsetse infested.

The Murle area is a flat plain. While there may be local flooding during the rains, the area is not inundated as is much of the Nilotic area to the west. The Toposa section is made up of two components: in the southern and eastern parts the country is undulating and is not subject to flooding, while the northern part is composed of an extensive plain much of which may be inundated during the rains.

The soils of the plain are mainly crackling clays and heavy loams, while in the undulating Toposa country, a series of structureless, probably acid loams, often containing lateritic concretions, is found on the slopes, with dark alluvial alkaline loams in the valleys with a clay content of 50 to 70 percent, a well-developed surface granular structure, and vertical cracking in the dry season (SDIT, 1955; McLaughlin, E. A., *Personal Communication*).

### *Climate*

The climate of the Murle area is similar to that of the Nilotic plains to the west, with a well-defined dry season of about five months. In the Toposa district the rainfall, which is both lighter and more evenly distributed, has two distinct maxima, in May and in July to August. East of Kapoeta the rainfall diminishes until, near Lake Rudolf, semi-arid conditions prevail.

No temperature data are available for these areas but they can be taken as being generally similar to those of the neighboring Nilotic and Southern Sudan Hill Zebu areas. Rainfall, and for Kapoeta, evaporation data are given in Table 128.

TABLE 128. - CLIMATOLOGICAL DATA FOR THE TOPOSA-MURLE AREA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<i>Pibor Post</i> (Altitude: 140 m.)													
Mean rainfall, mm.	7	10	37	77	126	107	142	138	120	68	37	17	886
<i>Kapoeta</i> (Altitude: 670 m.)													
Mean rainfall, mm.	5	23	55	75	117	74	123	133	73	47	35	17	777
Mean evaporation, mm. ....	234	205	189	199	136	147	90	91	143	217	170	247	2 068

SOURCE: SDIT, 1955.

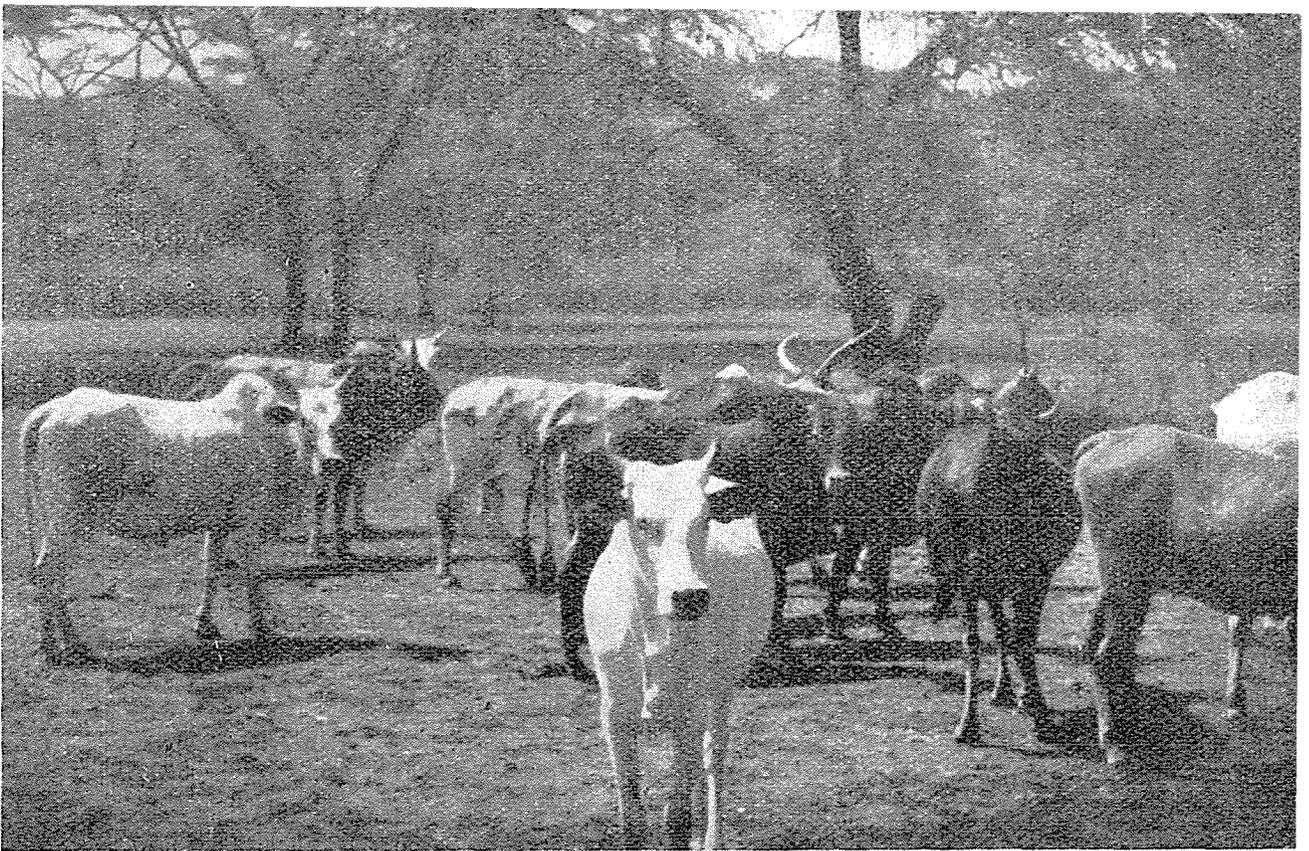


FIGURE 92. A herd of Toposa cattle in the dry season.

Courtesy of E. A. McLaughlin

### *Vegetation*

The Murle area is composed of open grass plains with scattered woodland. The dominant grass species is *Hyparrhenia rufa*, and much of the woodland is of *Combretum* spp.

The Toposa area is largely grassland with scattered trees. The principal grass species are short perennials, including *Sporobolus marginatus*, *Cymbopogon* sp. and *Bothriochloa insculpta*. The woodland and scattered scrub is mainly composed of *Acacia* spp. (Figure 92).

The Murle only engage in agriculture in a very small way, cultivating small gardens of dura (*Sorghum vulgare*) and maize (*Zea mays*). The Toposa and Boya grow considerable areas of dura around their permanent villages (SDIT, 1955).

### *Management practices*

With the exception of the Boya tribe, the owners of this type of cattle migrate over considerable distances in search of dry-season pasture. The Murle, who have their permanent villages close to the banks of the Rivers Veveno, Lotilla and Pibor, remain in them during the rains. After the rains the cattle are moved in stages over the surrounding plains and to rivercourse grazing as much as 180 km. from the permanent habitations. The plains grass is burnt and the

cattle graze the green regrowth of *Hyparrhenia rufa* as well as the *Echinochloa*-dominant pastures bordering the watercourses. It is the practice for the youths and girls of the tribe to move in December with the male cattle and a few cows to provide them with milk, to nearby pasture by rains pools. The remainder of the tribe move with the cows and calves in January and, in February, the main move to the more distant dry-season pastures is made. The return to the permanent villages is begun in April and is completed by June.

The Toposa tribes, who spend the rains near and to the north of Kapoeta, also move over long distances during the dry season. It is their practice on the completion of the rains, to take their cattle to the limit of their customary seasonal movements and then to walk them back slowly, grazing the dry but palatable perennial grasses, and arriving at their villages in time to carry out the cultivations for next year's grain crop.

The Boya make shorter seasonal movements, moving their cattle from their hillside villages to the nearby streams in the dry season and returning to their villages in the rains.

Grazing is usually sufficient for the needs of both Murle and Toposa cattle, but local shortages may occur in seasons following light rains. In both cases the amount of grazing that can be utilized is limited by the availability of dry-season water.

The Murle are accustomed to graze their cattle for long hours and frequently take them out at night. They invariably bring the cattle in to the camp between 14.00 hrs. and 16.00 hrs. for a rest after allowing them to drink. When the cattle graze at night they are taken to water in the early morning and again at sunset, unless they are grazing far from water, in which case the cattle are only watered once daily. The Toposa normally water their cattle once daily, in the evening. It has been observed that, during the dry season when water is scarce, cattle may be brought to water at a well in relays throughout the night, the men continuously scooping water from the shallow well to fill troughs made from hollowed tree trunks at which the cattle drink. In times of drought the Toposa cattle may be watered only once in two days. Neither group of tribes tether their cattle.

The Murle allow the calf to take the dam's full yield for the first fortnight of its life, after which the cow's owner begins to take his share. Calves are suckled at least three times daily, at the morning and evening milkings and at the midday rest period. During the first few months of a calf's life it is usually allowed an additional feed during the night.

Both groups of tribes consume liquid milk both alone and mixed with blood. Clarified butter is made for home consumption when milk is plentiful. Cattle are bled by piercing the jugular vein with

a miniature arrow released from a small bow which is only used for this purpose. The Murle slaughter cattle by clubbing them on the side of the neck after the head has been drawn back towards the tail. When the animal falls the skin is opened and, as a result of the rupture of the blood vessels, is found to be full of blood which is frequently drunk undiluted while still warm.

Meat is consumed in considerable quantities. Animals are slaughtered only as sacrifices on festive occasions or in times of famine, but all animals dying from natural causes are eaten unless they are excessively emaciated. Losses among the human population have resulted from eating meat from cattle which have died from anthrax.

A bull is selected for breeding on the basis of its own size and fatness and on the reputation of the dam; the Murle requiring from her a good constitution and a succession of disease-resistant calves, while the Toposa look for high milking ability. Male cattle not required for breeding are castrated with the aim of inducing fattening ability. Castration is commonly carried out by bruising the spermatic cord or by cutting out the testicles with a knife or spear. The Toposa, on finding that the first testicle to be removed from a beast is exceptionally fat, commonly leave the other in its place and use the bull for breeding.

Cattle are intimately bound up with the social organization of the tribes, particularly as the currency of the "bride wealth," and the tribesmen are very reluctant to part with them (McLaughlin, E. A., *Personal Communication*).

### **Physical characteristics of the breed**

The Toposa-Murle cattle are animals of a fairly long body of medium depth. The head is of medium length with a broad muzzle and a straight to slightly convex profile. The orbital arches are pronounced and the forehead is concave. The horns are of medium length, springing from the poll on distinct pedestals in an upward and outward direction and tending to grow inwards and forwards at the tips. This tendency is accentuated by the tribesmen who train the horns inward until they meet in a "laurel wreath" shape.

The hump is more thoracic than cervico-thoracic in position and is of a characteristic pyramidal shape. It carries a large amount of fat and when an animal is in high condition the hump may become almost rectangular in shape and of a considerable size. The topline rises slightly from the withers to the rump. The pelvis is of moderate length and slope and the sacrum is generally not greatly accentuated. The depth of the chest is usually adequate but there may tend to be some leanness of the hindquarters. The dewlap is of moderate size,

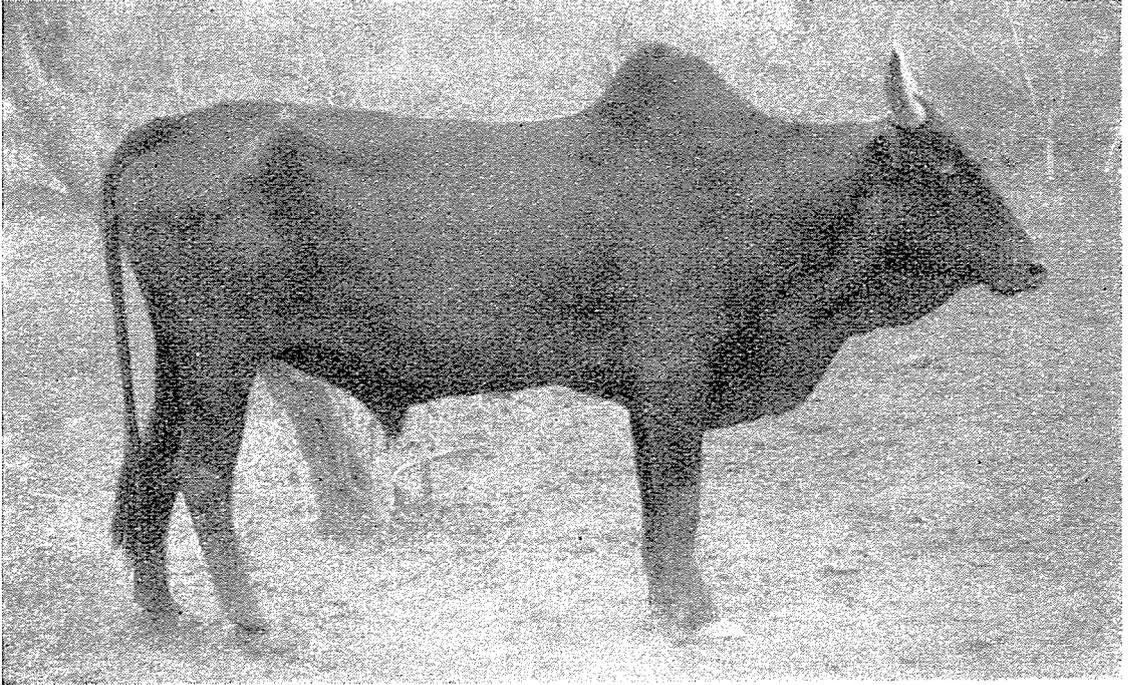
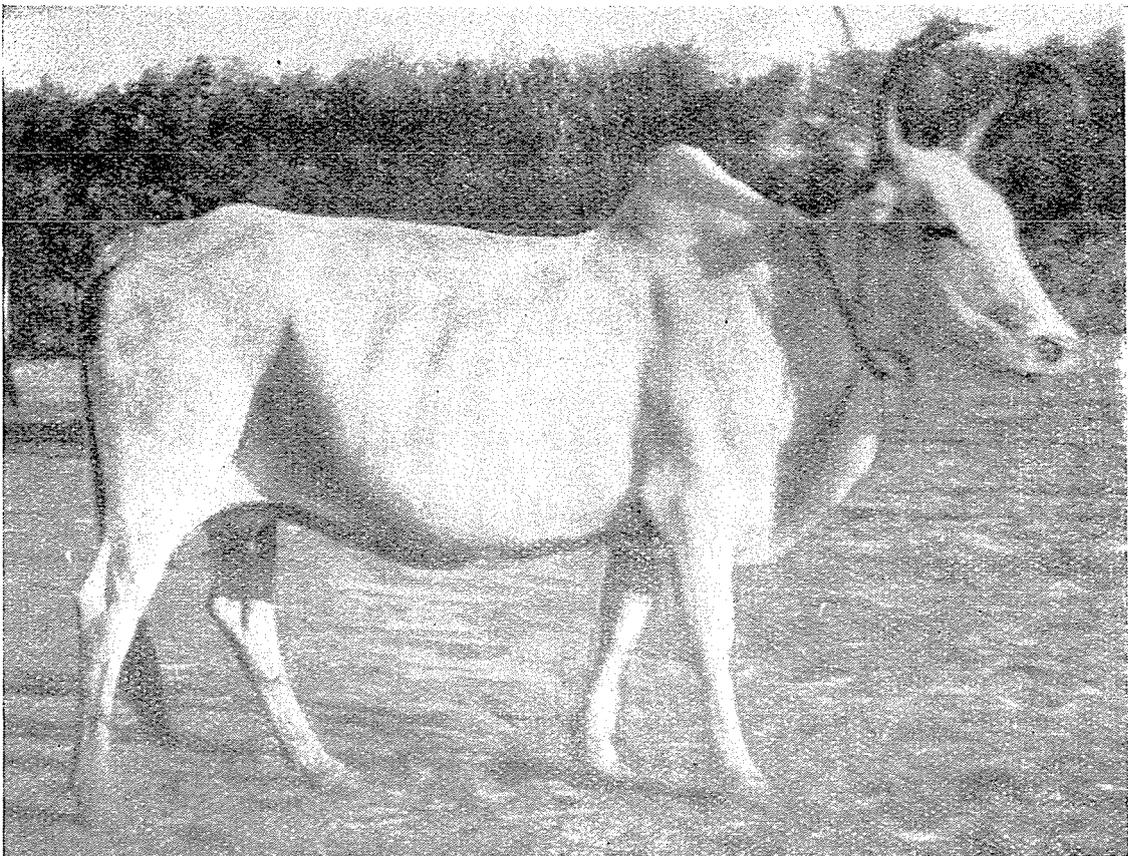


FIGURE 93. *Murle bull at the close of a severe dry season.*

FIGURE 94. *Murle cow at Malakal Government Dairy.*

Courtesy of E. A. McLaughlin



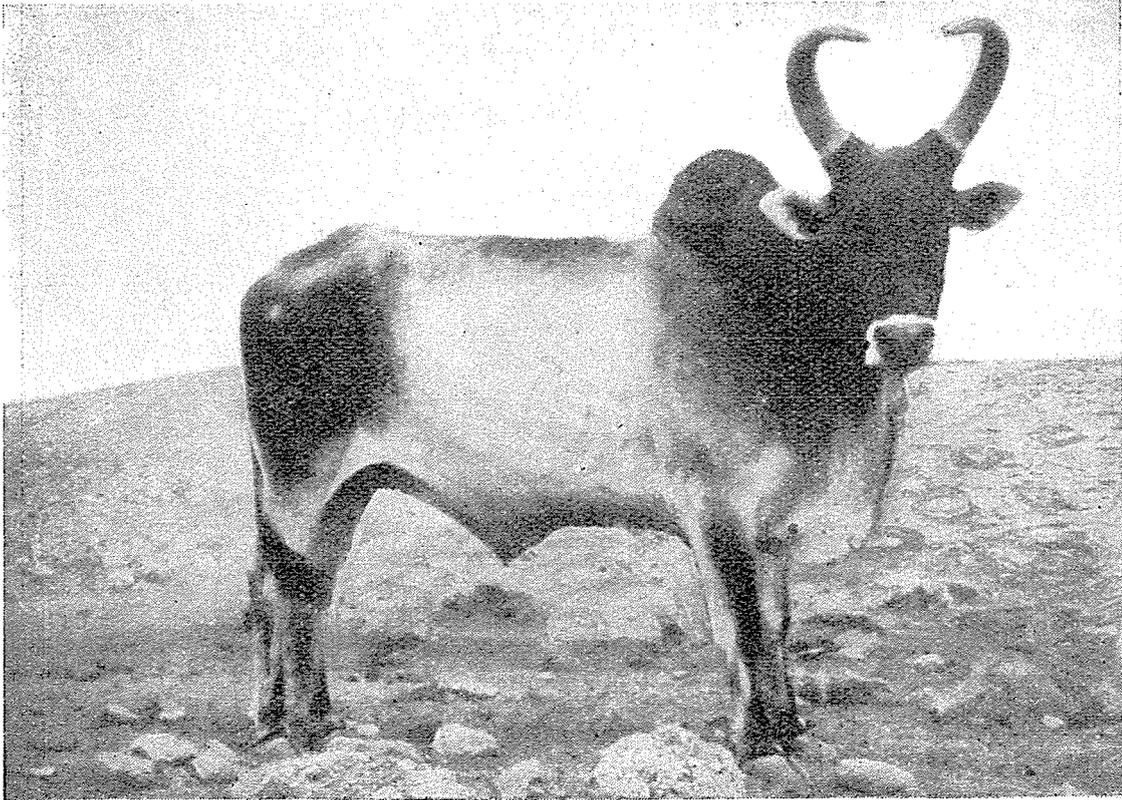
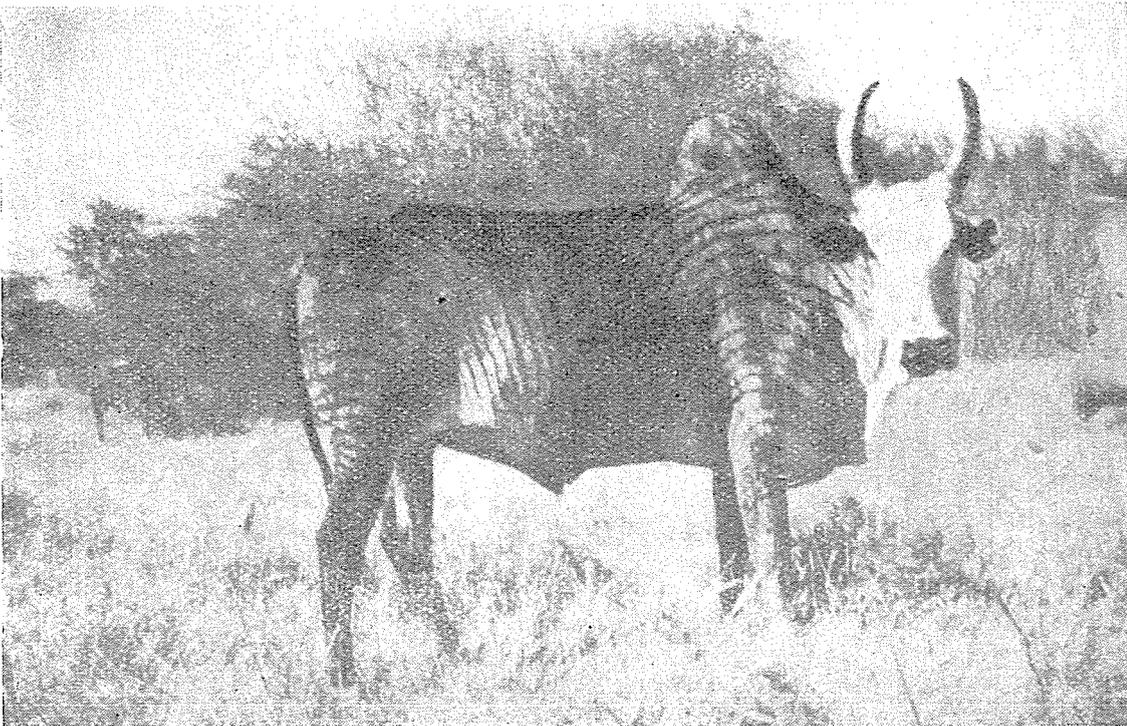


FIGURE 95. *Toposa steer.*

FIGURE 96. *Toposa bull.* (The decorative brand markings can be seen on a number of the cattle owned by this tribe.)

Courtesy of J. D. M. Jack



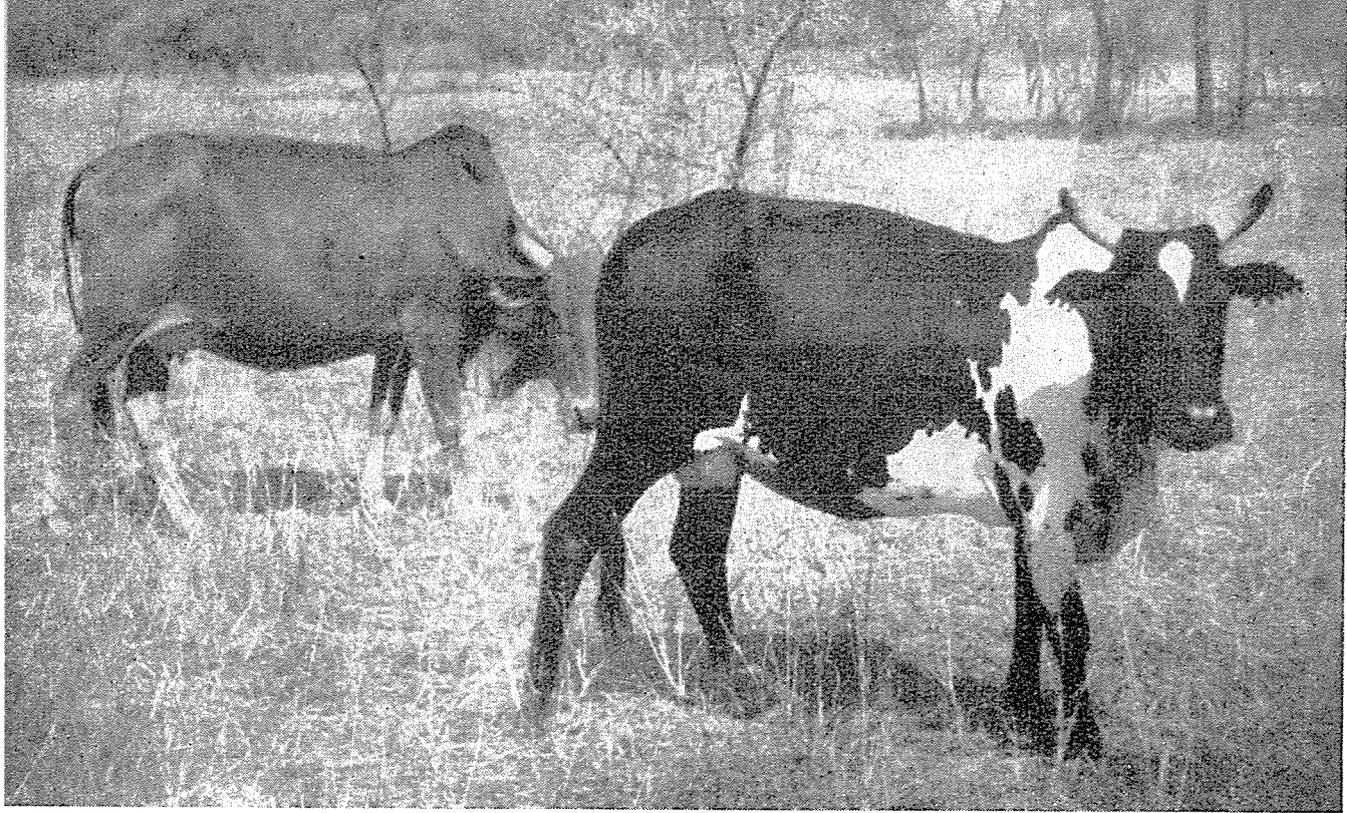


FIGURE 97. *Toposa cows at the height of the dry season.*

Courtesy of E. A. McLaughlin

but the umbilical fold has no great development. The sheath in the male is seldom pendulous.

In both Murle and Toposa herds there is a great variety of coat coloration, including full reds and blacks, whites, grays, duns, and roans, as well as patterns of red and black, together or separately, on a white ground. Among the Murle the lighter colors are predominant, while in Toposa herds there is some preponderance of reds, whites, and patterns combining these two colors. The hair is short and close and the skin loose. The hoofs are of good durability.

Murle cattle (Figures 93 and 94) are appreciably smaller than those in the Toposa area (Figures 95, 96 and 97). The average liveweight of mature Murle cows has been estimated as being between 230 and 250 kg. An estimated weight for a Toposa ox has been given as 350 to 400 kg. Reported measurements for Murle cattle are: shoulder point to pinbone, 89 cm.; height at withers, 109 cm.; width of hips, 33 cm.; heart girth, 152 cm. The average height at withers and heart girth of Murle cows at Malakal Dairy in 1954 were approximately 115 and 160 cm. respectively (SDIT, 1955).

#### **Functional characteristics of the breed**

It is thought that heifers calve for the first time at about 3 ½ years of age and that the calving interval is approximately 12 months. The average number of lactations in a lifetime has been estimated as being 8.

There are no available records of the milk yield of cows under tribal conditions, but a report suggests that the average yield of Murle cows may be about 3 pints daily and that lactation may continue for 8 to 9 months. An unconfirmed report suggests that the milk yield of Toposa cattle may be greater and that yields of 2 gallons at morning and night milkings may be obtained. The average yield of 15 Murle cows at Malakal Government Dairy in 1953-1954 was 918 liters in 255 days in addition to the amount taken by a suckling calf.

The meat from these cattle is reported to be of good quality. A mature Murle steer is reported to yield about 124 kg. of meat, while the dressed carcass of a Toposa beast weighs from 150 to 200 kg.

Toposa oxen have been trained and have proved to be suitable for draft work.

The cattle are susceptible to rinderpest and contagious bovine pleuro-pneumonia, which have been together, in the past, the principal factors limiting expansion of the herds. Bovine trypanosomiasis occurs along the south and east of the area. The local strains of foot-and-mouth disease are tolerated by the cattle. Other diseases, such as anthrax, are of sporadic importance (SDIT, 1955; Jack, J. D. M., *Personal Communication*; McLaughlin, E. A., *Personal Communication*).

#### **Sources of breeding stock and information regarding the breed**

It is estimated that there are approximately 226,000 cattle of this type in the southern Sudan (SDIT, 1955).

A number of Murle cows have been maintained at the Malakal Government Dairy and a few Toposa males have been kept at the Torit Government Dairy in Equatoria Province. In general the people are extremely reluctant to part with their cattle.

Further information regarding the cattle can be obtained from the Director, Department of Animal Production, Ministry of Animal Resources, Khartoum, Republic of the Sudan.

## Group VII

### AFRICANDER

#### Origin

The Africander breed has been developed from the native Hottentot cattle of the Cape of Good Hope. The derivation of these cattle is not known with any certainty, although a number of authors have developed theories to account for their origin. Bosman maintained that the Hottentot cattle were purebred *Bos indicus* in no way related to the Bantu cattle of southern Africa. Epstein (1933) was also of the opinion that these cattle were pure *Bos indicus* of the type with long lateral horns of oval cross section and with muscular cervico-thoracic humps. He suggested that their forebears were brought by Semitic tribes from Asia via the former land isthmus at the southern end of the Red Sea to Abyssinia and thence to the Great Lakes area where, in his opinion, interbreeding between the Semites and the Bushmen produced the progenitors of the Hottentots. As the Bushmen possessed no cattle, the lateral-horned *Bos indicus* stock is assumed to have remained pure. Curson and Thornton (1936) suggested a course for their migration from the Great Lakes westward toward the west coast of the continent and then southwards to the Cape of Good Hope. During this migration no cattle-owning tribes would have been encountered and so there would have been no adulteration of the herds. Cattle were observed in the possession of the Hottentots at the Cape of Good Hope by the Portuguese navigators in the late fifteenth century and large herds of the local cattle were acquired by the Dutch when they founded their settlement there in 1652.

Suggestions have been put forward (Baughman, 1951; Martinho, 1955) that genetic material both from European cattle imported by the Dutch and Portuguese, and Indian cattle introduced through Mozambique and the Cape, may be present in the Africander, but Bisschop, J. H. R. (*Personal Communication*), basing his objections on the difficulty of transporting anything but very small numbers of cattle in the early colonial days, has suggested that these speculations should be disregarded. He has further pointed out that cattle introduced

through Mozambique would have come in contact with the progenitors of the Nguni rather than of those of the Africander cattle. Slijper (1951) concluded, from a consideration of the position, structure and insertion of the hump, that the Africander was not a purebred zebu, but a cross between a zebu and another type of cattle.

A considerable amount of crossing undoubtedly took place between the Hottentot cattle and European cattle which were introduced into the more thickly populated parts of the Cape of Good Hope in the latter part of the eighteenth century, but it was found that oxen with a degree of European ancestry were inferior in draft qualities to the native cattle, and herds of the indigenous cattle were maintained, especially in the more remote districts, for the provision of the trek oxen which were the only means of transport throughout the greater part of southern Africa.

During the Great Trek (1836-1842) Africander cattle accompanied the "voortrekkers" northwards. There can be no doubt that crossbreeding took place whenever they came in contact with Bantu cattle but many of the "voortrekkers," preferring their own cattle, appear to have kept their herds pure.

During the rinderpest outbreaks of 1896 and 1899 and again during the Anglo-Boer war (1899-1902) the numbers of Africander cattle were much reduced, but a few herds, notably that of Mr. Josef du Plessis of Theunissen in the Orange River Colony, remained intact. After the end of the war the Africander, largely on account of its excellent draft qualities, remained popular, and numbers increased rapidly until the appearance of alternative means of transport, together with a renewal of the importation of cattle from Europe which resulted in an increase in crossbreeding for the production of beef cattle, again threatened the continued existence of this type of cattle (Opperman, 1950).

A movement for their preservation was, however, initiated and the "Africander Cattle Breeders Society" was founded in 1912. Registrations rose rapidly until, in 1936, the herdbook of the Society was closed. In 1951 almost 30 percent of the cattle owned by Europeans in the Union of South Africa were of Africander type (Joubert, 1953).

### **Conditions in the native home of the breed**

#### *Location, topography and soils*

According to Joubert (1953): "The breed is at present largely concentrated in three distinct parts of the country, viz. the northern ranching region, the Cape Midlands and eastern districts, and the western parts of the Transvaal and Orange Free State. The latter

two regions may be considered to have been the home of stud-breeding of Africander cattle and it is in these parts in particular that the development of the breed took place prior to the establishment of the Breed Society. But the area in which the Africander has its greatest role to fulfil from a commercial standpoint includes the savannah country of Bechuanaland and the northern Transvaal together with a strip of low veld bordering the Limpopo in the north." These regions are part of the inland plateaus of the Union of South Africa, which vary in altitude from approximately 500 to 4,000 feet and are characterized by their general lack of mountain ranges and their open flat to slightly undulating plains.

The soils of the "Lowveld Bushveld" are usually heavy and derived from volcanic rocks.

### *Climate*

The interior of South Africa has a subtropical climate modified by the proximity of the ocean and the altitude of the central plateau.

In winter an anticyclone associated with the subtropical high pressures is centered over the Orange Free State and the plateau has dry cold weather with clear skies, light winds and frequent frosts. The depressions of the westerlies which pass south of the Cape of Good Hope may, however, affect the interior as far north as Pretoria, producing temporarily very cold weather with heavy rain and occasional snow.

In the summer the intertropical convergence moves south over the Transvaal and pressures are low over the remainder of South Africa. Although this is the season during which the greater part of the precipitation occurs, the skies are generally clear over the plateau and day temperatures are high with mean maxima generally in excess of 80° F., while the diurnal range may be as much as 30-40° F. (Kendrew, 1953).

Climatological data for several stations representative of the Africander cattle areas in the Union of South Africa are presented in Table 129.

### *Vegetation*

Those parts of the Union of South Africa which are most suitable for the Africander cattle are included in the so-called bushveld regions, which have been described by Acocks (1953) as "tropical bush and savannah country" and subdivided by him as follows:

- a) *Lowveld Bushveld*. This is the characteristic open *Acacia nigricans-Sclerocarya-Themeda* savannah of the Lowveld, developed at altitudes of between 500 and 2,000 feet on soils which are usually heavy and derived from volcanic rocks.

TABLE 129. - CLIMATOLOGICAL DATA FOR FIVE STATIONS  
IN THE AFRICANDER AREA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<b>LOUIS TRICHARDT</b> (MARA) (North Transvaal)													
Mean maximum temperature, °F.	81	80	79	78	74	70	70	73	78	81	81	82	77.2
Mean minimum temperature, °F.	63	62	60	56	49	43	44	47	53	58	60	62	54.8
Mean temperature, °F. ....	72	71	70	67	62	57	57	60	65	69	71	72	66.1
Mean rainfall, in.	4.13	3.03	3.31	1.10	0.67	0.31	0.24	0.16	0.35	1.46	2.87	3.11	20.7
<b>ZEERUST</b> (West Transvaal)													
Mean maximum temperature, °F.	87	86	83	79	74	69	69	75	80	85	87	88	80.2
Mean minimum temperature, °F.	62	62	58	49	39	33	33	39	47	56	59	61	49.8
Mean temperature, °F. ....	75	74	70	64	57	51	51	57	64	71	73	75	65.2
Mean rainfall, in.	3.94	3.78	3.94	1.46	0.75	0.39	0.12	0.20	0.71	1.57	2.83	3.98	23.7
<b>VRIJBURG</b> (Armoedsvlakte) (N. W. Cape)													
Mean maximum temperature, °F.	90	88	83	79	73	68	68	74	79	85	87	89	80.2
Mean minimum temperature, °F.	61	60	57	49	40	33	31	36	43	52	56	60	48.2
Mean temperature, °F. ....	76	73	70	64	56	50	49	55	61	69	71	74	64.0
Mean rainfall, in.	3.15	2.99	3.66	1.89	0.71	0.24	0.12	0.24	0.31	0.98	2.01	2.72	19.0
<b>HOOPSTAD</b> (Western O.F.S.)													
Mean maximum temperature, °F.	86	84	82	76	70	66	65	71	76	82	83	86	77.2
Mean minimum temperature °F.	60	59	55	47	39	32	31	36	42	51	55	59	47.2
Mean temperature, °F. ....	73	72	68	62	55	49	48	53	59	67	69	73	62.3
Mean rainfall, in.	3.03	2.87	3.58	1.42	0.63	0.20	0.28	0.28	0.47	1.30	2.36	2.68	19.1
<b>QUEENSTOWN</b> (Eastern Cape)													
Mean maximum temperature, °F.	85	84	82	76	71	66	64	69	74	78	80	84	76.1
Mean minimum temperature, °F.	58	58	56	49	43	37	37	40	45	49	53	56	48.4
Mean temperature, °F. ....	72	71	69	63	56	51	51	55	60	64	66	70	62.3
Mean rainfall, in.	2.95	2.72	3.19	1.50	1.02	0.39	0.59	0.51	1.06	1.50	2.83	2.18	28.9

Temperatures: Louis Trichardt, 44-year means; Zeerust, 46-year means; Vrijburg, 31-year means; Hoopstad, 10-year means; Queenstown, 77-year means.

Rainfall: All stations, 30-year means.

SOURCE: Division of Meteorology, Pretoria (Bisschop, J. H. R., *Personal Communication*).

- b) *Arid Lowveld Bushveld*. This association occurs at the same altitudes and is similar to Lowveld Bushveld, except that *Themeda* is replaced as the dominant grass by *Digitaria* spp.
- c) *Springbok Flats Turf Thornveld*. This vegetation type occurs on very flat land and varies from the basic open thornveld to, with overgrazing, dense thornveld. In the more open type the dense, coarse, tufted grassland includes *Ischaemum glaucostachyum*, *Sehima galpinii*, *Setaria woodii*, *Themeda triandra*, *Elionurus argenteus*, *Digitaria* spp., *Eragrostis* spp. and *Panicum* spp. with scattered trees of *Acacia karoo*, *A. arabica*, and *Ziziphus mucronata*. The dominant tree species in the dense thornveld are *Acacia heterocantha*, *A. arabica*, *A. gerardii*, *Dichostachys glomerata*, *Ziziphus mucronata*, and *Grewia flava*, with, between them, grasses of mixed types dominated by *Themeda* spp. and *Cymbopogon plurinodis*.
- d) *Mopani Bushveld*. The chief occurrence of this vegetation type is in the Limpopo valley as well as east of the Drakensberg in the northern Transvaal towards Portuguese East Africa. Typically there is a low, fairly dense growth of scrubby *Copaifera mopani*, associated with *Acacia* spp. (including *A. heteracantha*), *Combretum apiculatum* and *Sclerocarya caffra*, and with grasses such as *Antheophora pubescens*, *Brachiaria nigropedata*, *Bothriochloa inculpta*, *Eragrostis superba* and *Schmidtia bulbosa*.
- e) *Kalahari Thornveld*. In the western Transvaal, western Orange Free State and adjoining parts of the Cape Province and Bechuanaland, this type of bushveld is found on deep, loose sandy soils overlying calcareous tufa. The trees and shrubs consist of *Acacia giraffae*, and other *Acacia* spp., *Tarchonanthus camphoratus*, *Grewia flava*, etc. and the more important grasses include *Themeda triandra*, *Eragrostis* spp., *Aristida* spp., *Cymbopogon* spp. and *Cynodon* spp.
- f) *False Bushveld*. In the midlands and eastern districts of the Cape Province the original Eastern Province Grassland has become invaded by thorn-trees. Typical trees and shrubs are *Acacia karoo*, *Scutia myrtina*, *Copparis citrifolia* and *Gymnosporia polyacantha*, and the dominant grasses are *Sporobolus fimbriatus*, *Digitaria eriantha*, *Eragrostis curvula*, *Cymbopogon plurinodis*, *Themeda triandra*, etc.

## Physical characteristics of the breed

The original Hottentot cattle from which the Africander breed is derived appear to have shown a considerable variation in type and color. Early accounts refer to these cattle as being lean and gaunt in appearance and prints dating from early colonial times show tall, long-legged cattle represented as being humpless but with heads and horns similar to those of the Africander cattle of the present day.

Since the formation of the Africander Cattle Breeders Society selection has been directed towards obtaining uniformity of conformation and coloration, and only animals meeting the type requirements have been registered by the South African Studbook Association. Selection for a powerful, free-striding type of trek-ox has been superseded by selection for beef production under the prevailing open range conditions of the natural habitat of the cattle.

The modern Africander as admitted to the herdbook (Figures 98 and 99) is a strongly built, long-bodied animal with a good spring of ribs, fair depth of chest and strong, well-placed limbs. The head is coffin-shaped when viewed from the front, with the greatest width over the eyes and with the forehead and face measuring respectively two and three-fifths of its length. The supra-orbital arches are well developed, especially in bulls, giving the eyes an appearance of smallness. The forehead is flat and diminishes in width to a fairly narrow, rounded poll. The profile of the head is convex with the highest point over the eyes and with the poll lying well back. The face diminishes only slightly in width to the strong, broad and deep muzzle. The horns, in their classical form, come from the skull direct without pedestals and grow spirally in a downwards and backwards direction, then turn upwards and forwards and finally, in mature animals, again backward. The line of growth of such classical horns is sideways and downwards below the line of the poll and behind the plane of the forehead. Horns, the direction of growth of which is more upright are, however, quite common, as are those which do not show the spiral twist. There is some indication that the horns tend to become shorter and lighter with improved feeding and management. All Africander horns are smooth and dense of fiber, oval in cross section and usually show a distinct posterior ridge. The ears are relatively small and are placed horizontally below and slightly behind the horns.

The neck is strong, of medium length and is usually carried horizontally or lower. The muscular cervico-thoracic hump is massive in the male but less so in the female. Its profile runs upwards and backwards at an angle of 30 to 35 degrees and drops on to the withers at an angle of about 45 degrees. The dewlap is well developed. It

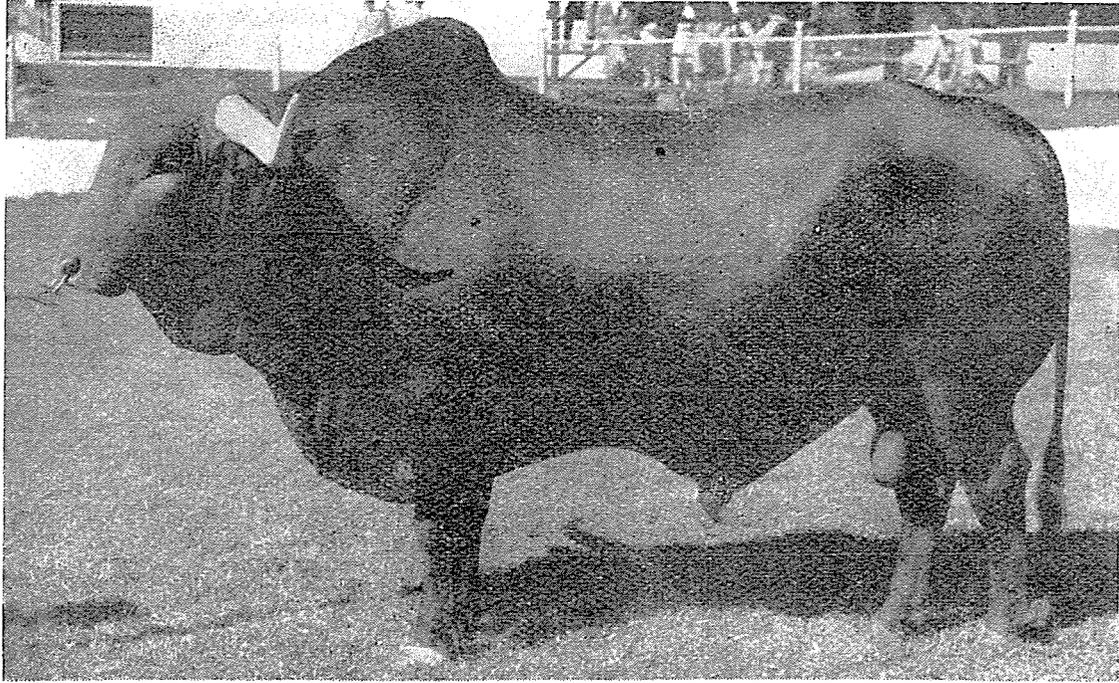
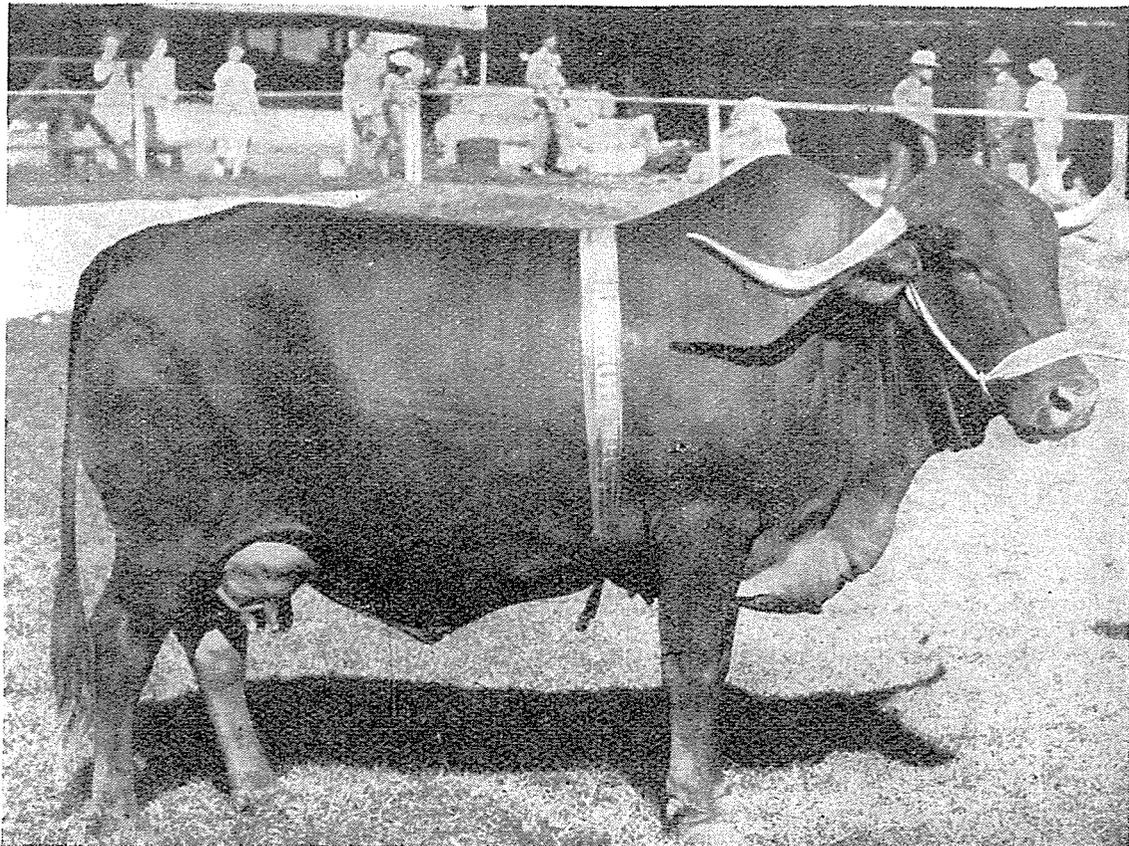


FIGURE 98. *Africander bull.*

FIGURE 99. *Africander cow.*

Courtesy of *Farmer's Weekly*



starts as a double fold just behind the chin but within a few inches becomes a single fold and then, after a slight notch in the region of the throat runs deep, but without fulness or much tendency to show folds, to terminate between the front legs without joining the umbilical fold.

The shoulders are of good length and slope, well muscled and very well attached to the neck, withers and chest. Shallow crops are not often seen. In general the body is sufficiently wide and deep but the length of the legs of many animals gives them an appearance of shallowness. There is a distinct contrast in the conformation of the body between the old draft type and the more recently developed beef type of Africander. In the former the well-developed thoracic vertebral spines produce a rather narrow roofy back, running upward and forward to the hump while the loin, which also tends to be roofy, slopes upwards to the rump, so that the topline is hollow as seen from the side and lacks development of the "eye" (*longissimus dorsi*) muscles. In the latter the thoracic vertebral spines are not prominent and the topline is straight, wide and full with well-developed "eye" muscles, particularly in the loins. The ribs, too, are well sprung so that the chest, as compared to the older type, is considerably rounder in cross section. In both types the abdomen is well developed. In bulls and steers there is a moderate development of the umbilical fold.

The hindquarters tend to be light. As a consequence of the prominence of the sacrum, the rump is roofy, rather lean of musculature, of fair length but considerable slope. In some individuals the hook-bones tend to be too wide and high set, and this, combined with the tendency of the pinbones to be excessively close together, results in the rump being triangular so that there is a cow-hocked stance and gait of the hind limbs. The buttocks are full and round but the outer thighs tend to be overlean. There is a characteristic notch in the sacrum just in front of the tail-setting which is relatively high. The tail is long and slender with the vertebrae visible down to the hocks.

The legs, which are well placed, small and clean of joints and light but dense of bone, are comparatively long in the old trek type but shorter in the modern beef animals. The feet tend to be large and are of very dense, hard horn. The gait is free and active.

The hairy coat consists of both outer (medullated) and inner (non-medullated or woolly) coats. Although the inner coat is seldom in evidence, it can be thrown up quickly when climatic conditions demand its extra protection. The coat coloration includes, in different individuals, the whole range between red, through golden-yellow and yellow, to gray. For purposes of registration, only the various shades of red are recognized, although white is permitted on the udder and scrotum and on the underline. Black in the coat or on the horns or hoofs

constitutes a disqualification. The hide is fully pigmented and is amber or brown in color. The horns are flesh-colored to creamy white, with amber tips. The hoofs are amber-colored. The muzzle varies between flesh color and light amber (Bisschop, J.H.R., *Personal Communication*).

TABLE 130. — AVERAGE MEASUREMENTS OF AFRICANDER CATTLE AT ARMOEDSVLAKTE RESEARCH STATION

	No. of animals	Age, years	Length of body, cm.	Height at withers, cm.	Height at hooks, cm.	Width between hooks cm.	Heart girth, cm.	Depth of chest, cm.
Males	12	2.0	147	131	134	44	183	68
	12	4.2	164	140	140	51	212	70
	10	6.1	169	139	139	52	216	80
	5	8.1	173	141	141	52	216	81
	3	10.1	169	141	143	51	218	80
Females	25	1.2	117	111	117	34	142	53
	25	2.1	131	121	126	42	167	61
	25	3.2	139	125	129	45	170	64
	25	4.2	144	128	133	46	179	66
	30	5.0	145	127	131	48	180	67
	25	6.2	148	128	132	48	184	68
	23	7.2	146	130	132	49	184	69
	12	8.2	149	131	132	48	184	69
Oxen	25	1.2	118	114	120	33	146	55
	25	2.2	132	124	129	38	165	61
	25	3.1	149	132	137	46	185	69
	21	4.1	157	139	142	53	202	74
	16	5.2	164	143	145	56	207	75

SOURCE: Data provided by the Director of Veterinary Services, Onderstepoort, Pretoria (Bisschop, J. H. R., *Personal Communication*).

The average hide thickness, taken behind the shoulder in line with the tuberosity of the scapular spine, of 190 cows and heifers at the Armoedsvlakte Research Station was 0.59 cm., that of 112 oxen, 0.62 cm., and that of 42 bulls, 0.67 cm. (Bisschop, J. H. R., *Personal Communication*). Bonsma (1949) reported a mean skinfold thickness of four cattle as being 1.10 cm. on the shoulder and 1.60 cm. over the thirteenth rib. Eight Africander cows of average liveweight of 1,104 lb. at an average age of 5.6 years gave wet hides of a mean surface area

of 56.67 square feet, and mean weight of 84 lb. Twenty-three steers, of average age and fasting liveweight of 3.3 years and 1,031 lb., gave hides of mean weight and surface area of 93 lb. and 57.76 square feet, while eight steers of an average age of 5.9 years and liveweight of 1,493 lb. gave hides of mean weight and surface area of 106 lb. and 66.56 square feet. A group of 12 older steers (mean age, about 13 years), with an average liveweight of 1,430 lb., gave hides, the average weight and surface area of which were 111 lb. and 66.57 square feet (Bisschop, J. H. R., *Personal Communication*).

Bonsma (1949) measured the diameters of hairs from the coats of Africanders and exotic cattle, and found that Africander hairs measured on the average 53  $\mu$  as compared with 30  $\mu$  for animals of the British beef breeds.

TABLE 131. — AVERAGE LIVeweIGHTS AND BODY MEASUREMENTS OF AFRICANDER CATTLE AT THE MARA RESEARCH STATION

	Age	Live-weight, lb.	Length of body, cm.	Height at withers, cm.	Height at hips, cm.	Chest girth, cm.	Depth of chest, cm.
Females	1 year	482	115	113	108	136	46
„	2 years	779	140	130	126	164	61
„	mature	1 190	154	134	132	187	68
Males	mature	2 000	175	142	146	224	76

SOURCE: Bonsma *et al.*, 1953.

The average birthweight of 246 male calves at Armoedsvlakte Research Station was 66.7 lb., and that of 267 female calves, 60.5 lb. (Bisschop, J. H. R. *Personal Communication*). Bonsma (1949) gave 67 pounds as the average birthweight of Africander calves at the Messina Experimental Station. The same author (1955) has given the following liveweights for Africanders at different stages of growth: at 1 year, 440 lb.; at 2 years, 815 lb.; and at 2 ½ years, 875 lb. (means of 4 observations). He gave the average weight of a mature Africander cow as being 1,188 lb., with an average height at the withers of about 130 to 140 cm.

Average measurements of Africander cattle at the Armoedsvlakte Research Station are given in Table 130, and average liveweights and measurements obtained at the Mara Research Station in Table 131.

Bonsma (1955) found that the average body temperature of Africander cattle at the Messina Research Station at about an hour before sunrise was 100.78° F.  $\pm$  0.67.

## Functional characteristics of the breed

Heifers at Armoedsvlakte Research Station calved for the first time at about 3 years of age. The average duration of 566 gestations at the same station was 291 days with a range of 283 to 299 days. At Armoedsvlakte, 92 heifer calves were born to every 100 bull calves (Bisschop, J. H. R., *Personal Communication*).

Joubert (1952) reported a twinning percentage of 0.083 from data obtained from the Africander herdbook, while at the Mara Research Station, during the period 1935-1951, 0.287 percent of 2,093 births were twin calves. At Armoedsvlakte, 0.47 percent of the Africander calves born in the period 1926-1956 were twins, as compared with 0.48, 0.82, and 0.18 for the Friesian, Red Poll and Sussex births at the station, or 0.51 percent for the exotic breeds taken together (Bisschop, J. H. R., *Personal Communication*).

Bonsma (1949) has reported that Africander bulls at the Mara Research Station had an average serviceable life of 8 years and 10 months.

Africander cows normally give sufficient milk to rear their calves well. Cows have been known to give 4 to 5 gallons of milk daily for a few weeks after freshening, but these are exceptions. As a rule production is low and lactations rarely last more than 9 months.

Bonsma (1949) gave 10.8 lb. as the average daily milk yield of Africander cows over 10 months. The same author (1955) found the mean daily milk production of 83 Africander cows to be 11.7 lb. over a 23-week period. He also reported that, at the Mara Research Station (in Northern Transvaal), 50 Africander cows weighed 1,297 lb. on the average at the beginning of lactation and 1,003 lb. at its conclusion; a weight loss of 22.7 lb. as compared with 23.8 percent for the whole experimental group which included Hereford and Africander x Hereford crossbred cows. The latter percentage would probably have been higher if the calf mortality amongst the Herefords had not been approximately 10 percent greater than among the Africander and crossbred cows, so that a number of Herefords dried up soon after calving and lost less weight than they would have done if their calves had lived to weaning age.

Butterfat percentages of 5 and 6 have been obtained.

Bonsma (1949) found that Africander cattle were able to walk at least 16 miles and, on one occasion, 40 miles in 12 hours with the maximum atmospheric temperature reaching 94° F. and that they were very much better able to do without water over periods of 24 to 48 hours than were cattle of the exotic beef breeds.

Africander cattle are today maintained primarily for beef production. Joubert (1953) considers the breed particularly suited for this

purpose in low rainfall subtropical savannah areas where their ability to withstand high air temperatures and droughts makes them more successful than imported European breeds.

At the Johannesburg Fat Stock Show in 1948, 12 Africander steers averaged 60 percent dressed weight and in 1950, 8 two-tooth steers of an average liveweight of 812 lb. dressed out at 58.1 percent. Four steers, of which three showed 4 teeth and a fourth only 2 teeth, were fattened at the Potchefstroom College of Agriculture in 1949. They averaged 1,150 lb. liveweight and dressed out at 64 percent (Opperman, 1950).

Fifteen Africander steers of approximately 3 years and 4 months of age which had been maintained on natural grazing at Armoedsvlakte were slaughtered at Onderstepoort at the end of the summer of 1956, after a 60-hour train journey. The average liveweights of the cattle at the farm and the abattoir were 1,183 lb. and 1,056 lb. respectively, representing a loss during transit of 127 lb., or 10.7 percent of the farm weight. The average warm carcass weight was 609 lb., or 57.7 percent of the liveweight on arrival at the abattoir. Seven of the carcasses were graded "Super," seven "Prime," one I, and none in the grades II or III (Bisschop, J. H. R., *Personal Communication*).

When five Africander sides of beef were analyzed into fore- and hindquarters, the following mean data were obtained: weight of side, 298 lb., weight of beef, 258 lb.; percentage of beef, 87; weight of bone, 40 lb.; percentage of bone, 13; weight of forequarter, 162 lb., or 54.5 percent of beefside; weight of beef in forequarter, 138 lb. (85 percent of forequarter weight); weight of bone in forequarter, 24 lb. (15 percent of forequarter weight); weight of hindquarter, 136 lb. (45.5 percent of weight of beefside); weight of beef in hindquarter, 120 lb. (88 percent of weight of hindquarter); weight of bone in hindquarter, 16 lb. (12 percent of weight of hindquarter) (Bisschop, J. H. R., *Personal Communication*).

Bonsma (1938) has demonstrated that whole coat colors in the Africander are inherited epistatically, the darker being dominant over the lighter. The same authority (1956) has drawn attention to the occurrence of hereditary faults in the breed including testicular hypoplasia, straight hocks, pigeon toes, wry tail, and coarse hair.

### **Crosses with other breeds of cattle**

The Africander has been used extensively in southern Africa (i.e. in the Union of South Africa, the Rhodesias and, to a lesser extent, Nyasaland) both for grading up inferior types of undifferentiated native cattle and for crossbreeding to European beef breeds. The

crossbred European x Africander cattle have shown marked hybrid vigor in the first generation, but higher grades by European bulls have failed to withstand the adverse environmental influences of the ranching areas and have tended to show negative adaptatory changes in growth, production and reproduction.

Work is in progress at the Mara Research Station on a long-term project of fixing a new breed of beef cattle, to which the tentative name of Bonsmara has been given, the individuals in which have  $\frac{5}{8}$  Africander and  $\frac{3}{8}$  Shorthorn in their ancestry. These cattle, which show the superior beefing abilities of the Shorthorn while retaining the hardiness and resistance necessary to withstand the climatic, nutritional, disease and management conditions found in the ranching areas of southern Africa, have done very well at Mara and are now being tested in other ranching areas of the Union and Southern Rhodesia. The average liveweight of yearlings in the herd at Mara has been 490 lb., and 40 percent of 8-month-old animals had liveweight of 600 lb. off natural pasture. A calving percentage of 87 was obtained from about 800 cows on open range. Cows in this herd produced, on average, appreciably more milk in an 8-month lactation period than either purebred Africanders or Herefords (Farmer's Weekly, 1956; Bonsma, 1956; Bisschop, J.H.R., *Personal Communication*).

Rhoad *et al.* (1945) reported an experiment at the Iberia Livestock Experiment Farm, Jeanerette, Louisiana, in which Africander x Aberdeen-Angus calves were compared with Aberdeen-Angus, Zebu, and Zebu x Angus. The Zebu bulls were of Kankrej breeding. The average birth and 6-month weights for the Africander x Angus calves were 70.8 lb. (46 observations) and 379.3 lb. (39 observations) as compared with 60.1 and 324.5 lb. for Aberdeen-Angus, 78.1 and 397.5 lb. for Zebu, and 72.8 and 385.0 lb. for Zebu x Angus calves. The mean birth and 6-month weights for the whole group were 72.3 and 381.2 lb. respectively.

### **Performance in other areas**

Africander cattle were exported to the United States in 1931 and to the Philippines in 1937. The results of the crossbreeding in the United States have been given above. The second world war caused the loss of the Africanders bought by the Philippine Government. A few bulls were also imported into the "White Highlands" of Kenya where their crosses with the Boran cattle proved to be no better than the purebred Borans. Four bulls and two cows are maintained for experimental crossbreeding at the National Cattle Breeding Station, Belmont, Queensland, Australia (CSIRO, 1956).

## Sources of breeding stock and information regarding the breed

In 1951, rather more than 37 percent of the 109,542 purebred cattle registered by the South African Studbook Association (about 40,550) were Afrianders, while close to 30 percent of the cattle owned by Europeans in the Union of South Africa were of Afriander type. *The Economic and Statistical Review of Southern Rhodesia* reported that, in 1952, no less than 24,272, or almost half, of the purebred cattle of Southern Rhodesia were Afrianders, while 300,571 of the 488,798 cattle were Afriander grades.

Further information on the Afriander breed can be obtained from:

The Afriander Cattle Breeders Society of South Africa, 17 Hill Street, Bloemfontein.

The Director of the Division of Animal Husbandry and Dairying, Department of Agriculture, P.O. Vallis, Pretoria, Union of South Africa.

## Group VIII

### MADAGASCAR ZEBU

#### Origin

While the absence of fossil remains indicates that cattle were introduced into Madagascar in recent times, the early navigators, from the time of Tristan d'Acunha, who discovered the island in 1506, refer to very extensive herds of cattle which were maintained, particularly in the west and southwest, by the indigenous inhabitants. It is considered that these cattle were derived from stocks introduced from India (Lalanne, A., *Personal Communication*).

#### Conditions in the native home of the breed

##### *Location, topography and soils*

Madagascar, the third largest island in the world, has a superficial area of 590,000 sq. km. It is situated in the Indian Ocean between 12° S. and 26° S. and is separated from the coast of Africa by the Mozambique channel, which has an average width of 400 km.

The island is extremely mountainous with a central plateau of an average elevation of 1,200 m. above sea level, and is much dissected by streams and river valleys. The central plateau drops to the east coast in an almost perpendicular cliff which extends down nearly the entire length of the island while, in the west, it falls more gradually to the coast and is penetrated by wide valleys.

The soils of the central and eastern part of the island are derived from granitic material and, with the exception of the alluvial soils, are of low fertility. In the west the soils are well drained and deep, while on the high plateaus lateritic clay overlies a subsoil derived from crystalline rocks. In the southern part of the island sands overlie permeable calcareous material.

Madagascar is well watered with numerous rivers and streams which assist in minimizing the very considerable climatic variations

between the different parts of the island. In the east the rivers are generally short and torrential with broad, fertile alluvial valleys. Those in the west are longer and slower, with a more irregular flow, and traverse fertile alluvial plains. In the south the flow of the torrents is often lost in the sandy soil before it reaches the sea, with the result that the low rainfall coastal arid zone receives little other surface water (Lalanne, A., *Personal Communication*).

### *Climate*

The tropical climate of Madagascar is much modified by the mountainous nature of its relief. In winter the whole island is affected by the southeast trade winds which persist south of 15° S. during the summer months, when northwesterly and variable winds influence the remainder of the island. During the day a sea breeze modifies the effect of the trade wind on both east and west coasts, but the night land wind is weaker in the east than in the west.

Precipitation varies both in amount and distribution from one part of the island to another. The rainfall on the east coast is the heaviest and most evenly distributed throughout the year. Over much of this coast there has been over 2,540 mm. a year, and Tamatave, in the northern half of the area, has had 3,124 mm. In the remainder of the island there is a distinct winter dry season, which is prolonged in the semi-arid southwest and south. The north and west of the island have the highest temperatures. Those on the east, as a consequence of the greater cloud cover, are lower, as are those of the central plateau, the altitude of which is sufficient to effect a substantial reduction.

Between December and April the island experiences violent tropical cyclones, which are capable of causing considerable damage (Kendrew, 1953).

Climatological data for seven stations in Madagascar are presented in Table 132.

### *Vegetation*

On the east of the island there is a dense forest which is, however, in spite of the abundant rainfall, slow to regenerate itself on the granitic soils. In the west the vegetation, although including numbers of tall forest trees which flourish on the deep soils, is not dense owing to the aridity of the dry season, which inhibits seed germination. Many of the great plateaus, plains and valleys carry a luxuriant grass cover composed of quick-growing species which are able to come to full development during the short hot rainy season. The vegetation cover on the lateritic soils of the center of the island is stunted and composed

TABLE 132. — CLIMATOLOGICAL DATA OF SEVEN STATIONS  
IN MADAGASCAR

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<b>DIEGO-SUAREZ</b>													
Mean maximum temperature, °C..	31.4	31.9	32.8	32.7	32.1	30.7	29.7	29.5	30.0	30.9	32.0	32.7	31.4
Mean minimum temperature, °C..	23.6	23.9	24.1	23.9	23.0	21.3	20.5	20.6	20.9	21.9	23.2	23.7	22.6
Maximum humidity, % .....	85	87	84	79	71	72	69	68	68	71	75	81	75.8
Minimum humidity, % .....	73	73	68	63	56	53	51	50	51	54	58	65	59.6
Mean rainfall, mm. ....	273	184	208	50	11	7	5	6	1	8	23	112	888
<b>MORONDAVA</b>													
Mean maximum temperature, °C. .	32.1	32.0	31.9	31.4	29.1	27.5	27.4	27.6	28.5	29.3	30.9	31.7	30.0
Mean minimum temperature, °C..	23.6	23.5	23.0	20.8	17.1	14.8	14.3	15.6	17.5	20.6	22.8	23.4	19.8
Maximum humidity, % .....	88	90	90	90	87	86	84	87	83	86	81	81	86.1
Minimum humidity, % .....	66	67	65	61	57	56	56	61	63	68	66	66	62.7
Mean rainfall, mm. ....	208	225	77	15	8	9	2	2	8	13	17	142	726
<b>TULEAR</b>													
Mean maximum temperature, °C..	32.7	32.6	31.8	30.7	28.5	26.5	26.5	27.2	28.6	29.0	30.5	31.4	29.7
Mean minimum temperature, °C..	22.5	22.4	21.3	18.9	15.8	13.7	12.7	13.6	15.2	17.5	19.9	21.5	17.9
Maximum humidity, % .....	84	88	89	89	89	90	86	88	85	86	82	82	86.5
Minimum humidity, % .....	61	62	61	58	55	54	50	56	56	62	65	63	58.6
Mean rainfall, mm. ....	193	82	37	8	18	11	3	6	9	19	35	44	464
<b>FORT-DAUPHIN</b>													
Mean maximum temperature, °C...	29.3	29.4	28.4	27.6	25.5	24.2	23.6	24.0	24.8	26.2	28.1	28.9	26.7
Mean minimum temperature, °C..	21.6	22.1	21.5	20.5	18.3	16.7	15.9	16.4	16.9	18.4	20.1	21.1	19.1
Maximum humidity, % .....	87	88	89	88	87	85	84	86	84	85	85	85	86.1
Minimum humidity, % .....	72	71	73	71	70	70	68	68	69	68	68	70	69.8
Mean rainfall, mm. ....	193	215	219	116	103	153	93	88	50	64	83	150	1 527

TABLE 132. — CLIMATOLOGICAL DATA FOR SEVEN STATIONS  
IN MADAGASCAR (continued)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
FIANARANTSOA													
Mean maximum temperature, °C..	26.2	26.0	25.6	24.5	22.1	20.6	19.4	21.1	22.7	25.5	27.5	26.7	26.3
Mean minimum temperature, °C..	16.5	16.3	16.0	14.4	11.9	9.8	9.3	9.8	10.7	12.4	14.7	15.9	19.4
Maximum humidity, % .....	94	96	97	97	97	97	97	97	96	92	92	92	95.3
Minimum humidity, % .....	65	65	64	61	56	55	58	53	48	43	49	57	65.7
Mean rainfall, mm. ....	302	247	155	50	27	23	19	17	23	35	127	226	1 251
BETROKA													
Mean maximum temperature, °C..	30.5	30.2	29.7	28.8	25.6	24.3	23.8	25.4	28.1	32.2	31.7	30.2	28.4
Mean minimum temperature, °C..	18.9	19.1	18.4	16.3	12.2	10.1	10.0	11.4	13.5	15.6	17.9	18.7	15.2
Maximum humidity, % .....	81	82	84	83	86	87	84	77	77	73	75	79	80.7
Minimum humidity, % .....	51	52	49	45	39	40	37	37	41	28	33	47	41.6
Mean rainfall, mm. ....	227	143	90	27	12	16	9	6	14	42	94	211	891
TANANARIVE													
Mean maximum temperature, °C..	26.5	26.6	26.6	25.7	23.4	21.2	20.2	21.7	24.3	27.1	28.1	27.3	24.9
Mean minimum temperature, °C..	15.4	15.6	15.2	13.8	11.7	9.8	8.7	8.9	10.2	11.8	13.8	15.0	12.5
Maximum humidity, % .....	93	94	93	94	93	94	94	94	89	87	87	90	91.8
Minimum humidity, % .....	68	70	68	65	63	62	61	58	52	48	53	63	60.9
Mean rainfall, mm. ....	303	273	179	66	17	10	8	8	14	54	40	307	1 379

SOURCE: Lalanne, A., *Personal Communication*.

of species which become woody and of reduced feeding value as soon as they reach full development. The more arid south supports only an ephemeral grass cover, together with xerophytic trees and shrubs, including spiny species.

Among the more important pasture grasses are *Andropogon rufus*, *Heteropogon contortus*, *Aristida adscensionis*, *Imperata arundinacea*, and *Andropogon intermedius*. *Cynodon dactylon*, which appears in asso-

ciation with species of *Panicum*, *Digitaria* and *Setaria*, is pre-eminent among the grasses giving dry-season grazing in depressions, valley bottoms and river banks. Legumes are rare in Madagascan pastures (Lalanne, A., *Personal Communication*).

### *Management practices*

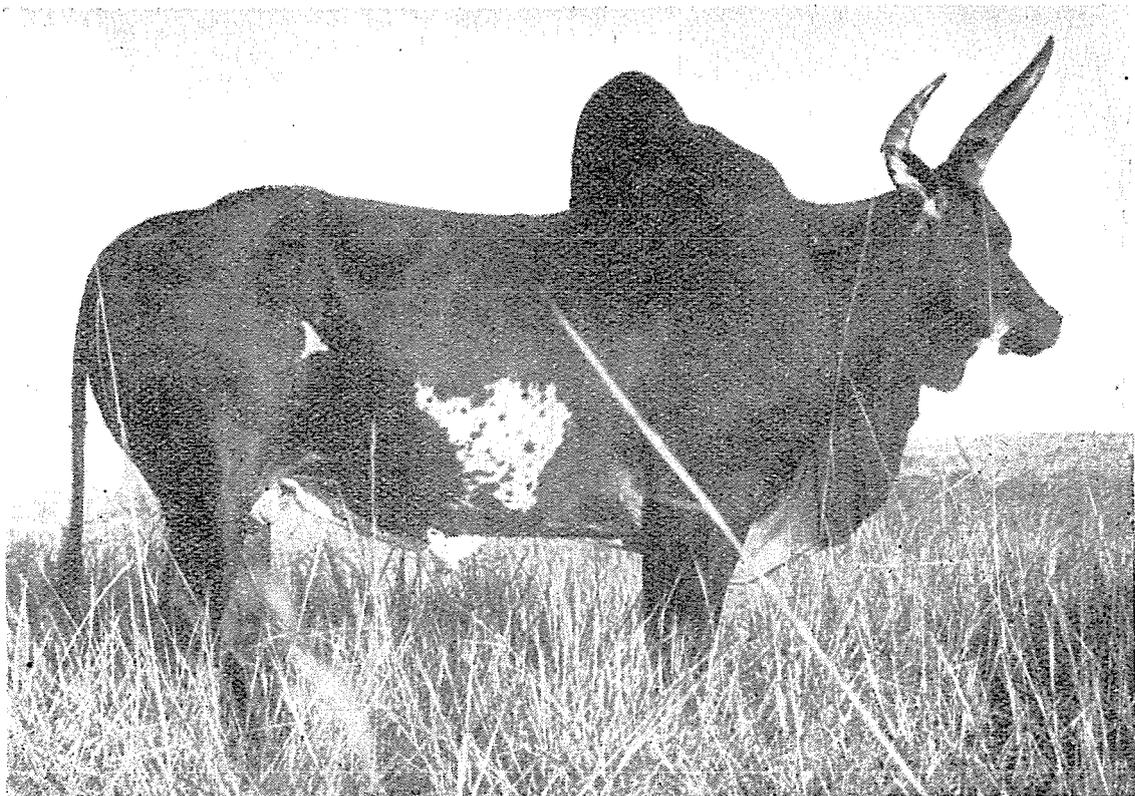
With few exceptions, the cattle subsist entirely on natural pastures. During the rains the herds are maintained on upland and other grazing away from the rivers. During the dry season they are moved down to depressions, valley bottoms and river banks where the higher soil/water status permits of a more prolonged season of plant growth. In general, the cattle remain on the dry season pastures from June or July to November or December, and on the rain season grazing grounds from November or December until the following May or June.

In the neighborhood of the larger population centers where there is a market for milk, cows are milked once daily after the calves have suckled, the quantity of milk allowed to the calf being usually insufficient for its full requirements.

Elsewhere there is little opportunity for the commercial disposal of milk or milk products and it is only where tribes, such as the Bara and the Antandroy in the south of the island, include milk in their

FIGURE 100. *Madagascar zebu bull.*

Courtesy of A. Lalanne



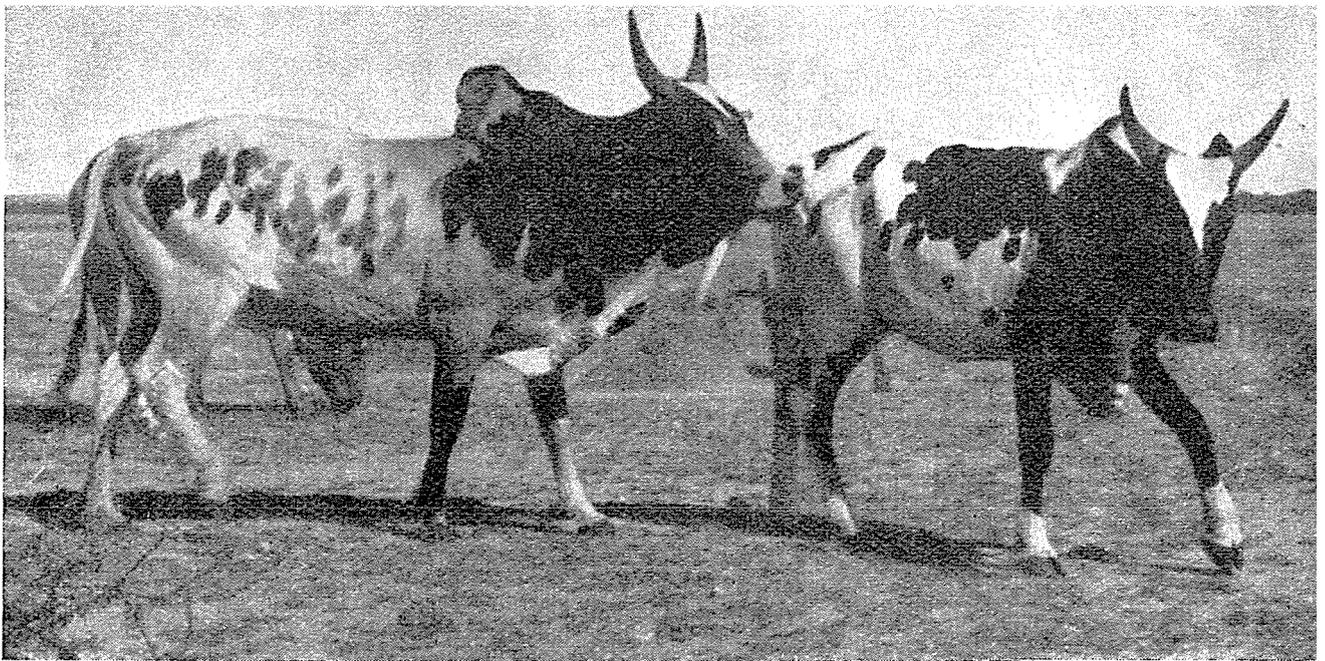


FIGURE 101. *Madagascar zebu bull and cow, southwest Madagascar.*

Courtesy of A. Lalanne

diet that milk sufficient for the small needs of the people is taken from the better yielding cows at the peak of the lactation while the remainder of the cows remain un milked. In other areas, where milk finds no place in the diet of the people, milking is not regularly practiced (Lalanne, A., *Personal Communication*).

#### **Physical characteristics of the breed**

The Madagascar zebu (Figures 100 and 101) is a thickset animal of less than medium height. The head is short and the profile straight. The horns are lyre-, or more often, crescent-shaped and are of circular cross section. Individuals occur which are polled or the horns of which are loose and unattached to the bones of the skull. The neck is light and the dewlap, although smaller than that of many Indian zebus, is strongly developed. The hump carries a considerable amount of fatty tissue when the animal is in high condition, is cervico-thoracic in position and is placed vertically. The body is short and the hind-quarters are poorly developed. The limbs are coarse and the hoofs are of adequate durability on soft ground. The udder and teats are small.

The hairy coat is soft and short and the skin is supple and fine and of light pigmentation. There is a wide range of coat coloration; black, red, fawn, yellow and white, pied with black or red on white, and gray with black points occur. Muzzle, tongue and the surround of the eyes, etc. may be black (usually with black or red coat coloration) or light-colored (with lighter coat coloration) (Lalanne, A., *Personal Communication*).

The birthweight of calves is in the range of 12 to 20 kg. Average liveweights and measurements of Madagascar zebus at different stages of growth which were obtained at the Centre de recherches zootechniques at Kianjasoa, Madagascar, are given in Table 133.

TABLE 133. — AVERAGE LIVEWEIGHTS AND MEASUREMENTS OF MADAGASCAR ZEBUS

	Male			Female			Ox
	1 year	2 years	mature	1 year	2 years	mature	mature
Liveweight, kg. ....	175	260	450	160	240	320	440
Height at withers, cm. ....	110	117	125	108	111	119	135
Depth of chest, cm. ....	73	85	90	70	81	95	105
Width of hips, cm. ....	31	35	40	33	36	43	46
Heart girth, cm. ....	128	150	170	130	138	163	182

SOURCE: Lalanne, A., *Personal Communication*.

#### Functional characteristics of the breed

The Madagascar zebu is kept primarily for meat production.

Heifers calve down for the first time at about 3 or 4 years of age. The calving interval of cows under extensive management is normally 2 years. Most cows are served by the bull in the period November to March. The average productive life of a cow extends over 4 lactations.

Bulls are first used for service at between 1 and 1.5 years of age. They are quick to service and have an active breeding life of 10 to 12 years.

Milk production is small. The average amount produced is 150 to 250 liters in a lactation extending over 6 months. The butterfat content of the milk has been given as 4.5 percent.

Superior cows have produced 2 to 3 liters of milk a day in addition to feeding a calf, and exceptional individuals, under improved management and feeding, have given up to 5 liters a day.

Madagascar zebus fatten well at pasture, which is the usual method followed in the island, but in the province of Tananarive stall fattening is also practiced.

Animals are slaughtered at 6 to 12 years of age, with a liveweight of about 350 kg. The dressing percentage is usually in the range 48 to 56. It has been reported that a typical dressed carcass contains 72 percent muscle, 5 percent fat, 20 percent bone, and 3 percent nerves

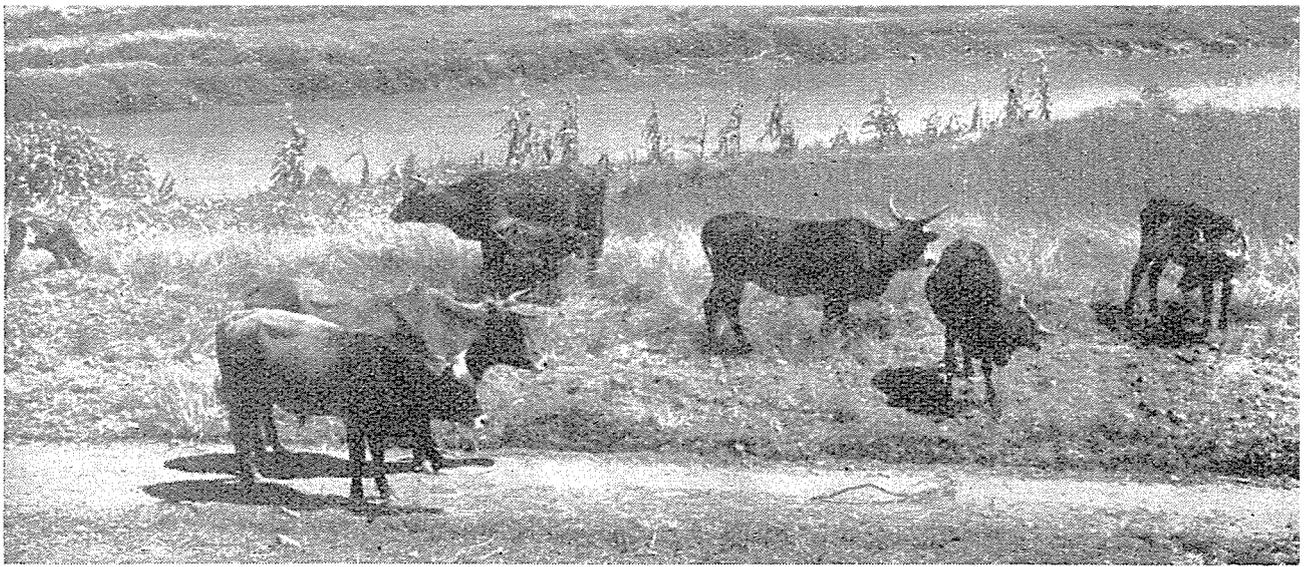


FIGURE 102. *A Rana herd to the southwest of Tananarive, Madagascar.*

Courtesy of A. Lalanne

and aponeuroses, and that the meat consists of 40 percent first-, 25 percent second-, and 35 percent third-quality cuts.

Cattle are employed widely for the preparation of land for the rice crop by trampling before the rice plants are set out. The use of oxen-drawn plows and other tillage implements is increasing rapidly. As the road system of the island improves there is a wider use of oxen as draft animals for transportation work.

The oxen are trained for work at 4 years of age, when they have achieved a liveweight of about 300 kg. They are docile and can be trained for haulage work in a few days. Two oxen harnessed to a cart are able to draw a load of 350 to 500 kg. at 4 km. an hour. The distance covered in the course of a working day is about 30 km. Haulage oxen normally work 150 or more days a year.

Employed in tillage work a team of six oxen can plow a half-hectare in a five-hour working day. It is unusual for tillage oxen to work more than 50 or 60 days in a year.

Cattle in Madagascar are not exposed to rinderpest, foot-and-mouth disease, or contagious abortion. Madagascar zebus have shown a moderate susceptibility to haemorrhagic septicaemia and streptothricosis. Herds which have not previously been exposed to tuberculosis have been found to be 80 percent susceptible, while in those which have been subjected to prolonged exposure the susceptibility has been reduced to 10 or 20 percent. This type of cattle is reported to be resistant to babesiosis, anaplasmosis, heartwater, and mastitis. They are subject to lumpy-skin disease.

While there is some susceptibility to tick attack, there is resistance to that of lice and biting flies. Among internal parasites, *Ascaridia lombricoides* and, to a lesser extent, strongyles, have been troublesome, particularly in young cattle, among which they cause a consider-

able number of losses. Cysticercosis has been occasionally observed. Fluke infestation has not been observed in the livers of Madagascan cattle but flukes have frequently been found in the pancreatic ducts of cattle slaughtered in abattoirs on the east coast (Lalanne, A., *Personal Communication*).

#### **Crosses with other breeds of cattle**

A humpless breed, the Rana (Figure 102), has been developed from the offspring of Madagascar zebu cows and bulls of the Bordelais, Gascon, Breton and Normand breeds. These cattle are maintained for milk production within a radius of 100 km. of Tananarive. The cattle spend the day at pasture but are housed or kept in an unroofed enclosure during the night.

The Rana is a finer, less blocky, type of cattle than the Madagascar zebu. The head is long and lean and the forehead is flat or slightly concave. The neck and shoulders are fine, as are the hindquarters. The hooks are prominent and the thighs are lean and straight. The coat coloration varies; speckled fawns, yellows, black patterning on white, and gray with dark points are among the colors which may be seen in the herds.

Milk production is usually about 5 to 8 liters a day during a lactation period extending over 6 months. The highest reported individual yield has been 2,800 liters of milk in 300 days, with a maximum daily yield of 14 liters.

As a result of extensive crossing with Normand cattle the Rana is rapidly disappearing as a clearly differentiated type. In the neighborhood of the larger population centers it is at present difficult to find individuals which do not show signs of the presence of Normand cattle in their near ancestry, and it seems probable that the type will have been completely absorbed in the crossbred population in the comparatively near future.

#### **Sources of breeding stock and information regarding the breed**

There were 6,152,000 head of Madagascar zebus in the island in 1954.

Further information on the breed can be obtained from the Inspection générale de l'élevage et des industries animales, B.P. 291, Tananarive, Madagascar.

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