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 *Isoberlinia*. 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-

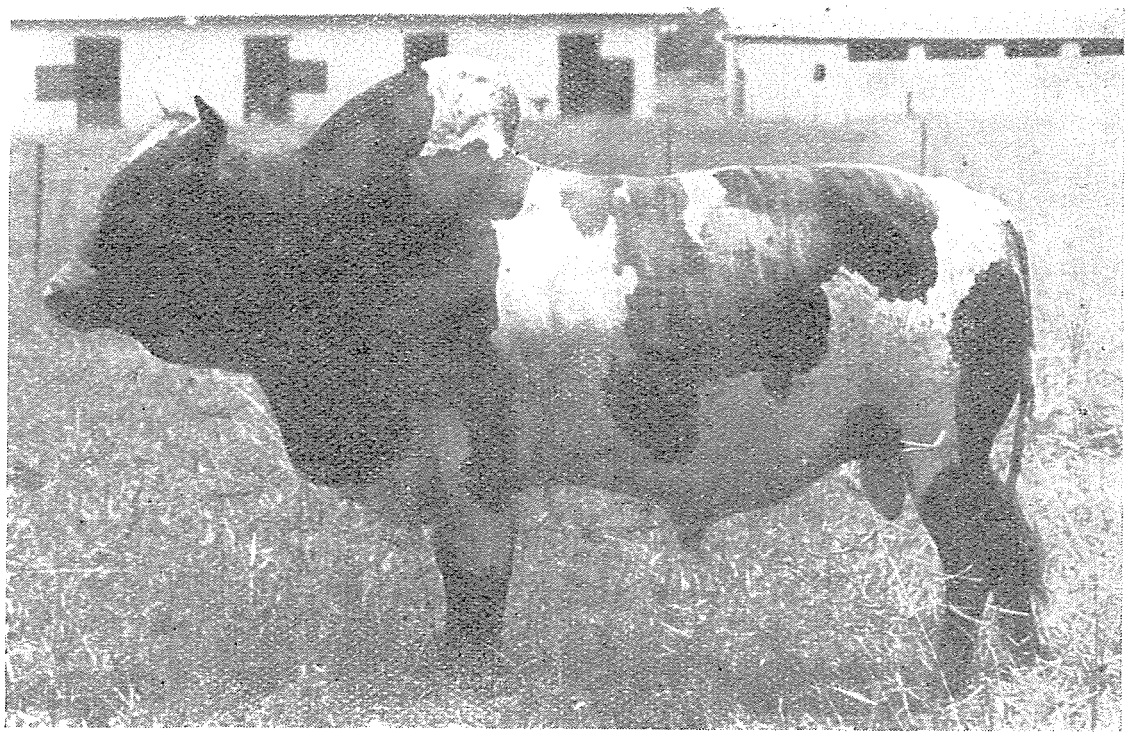
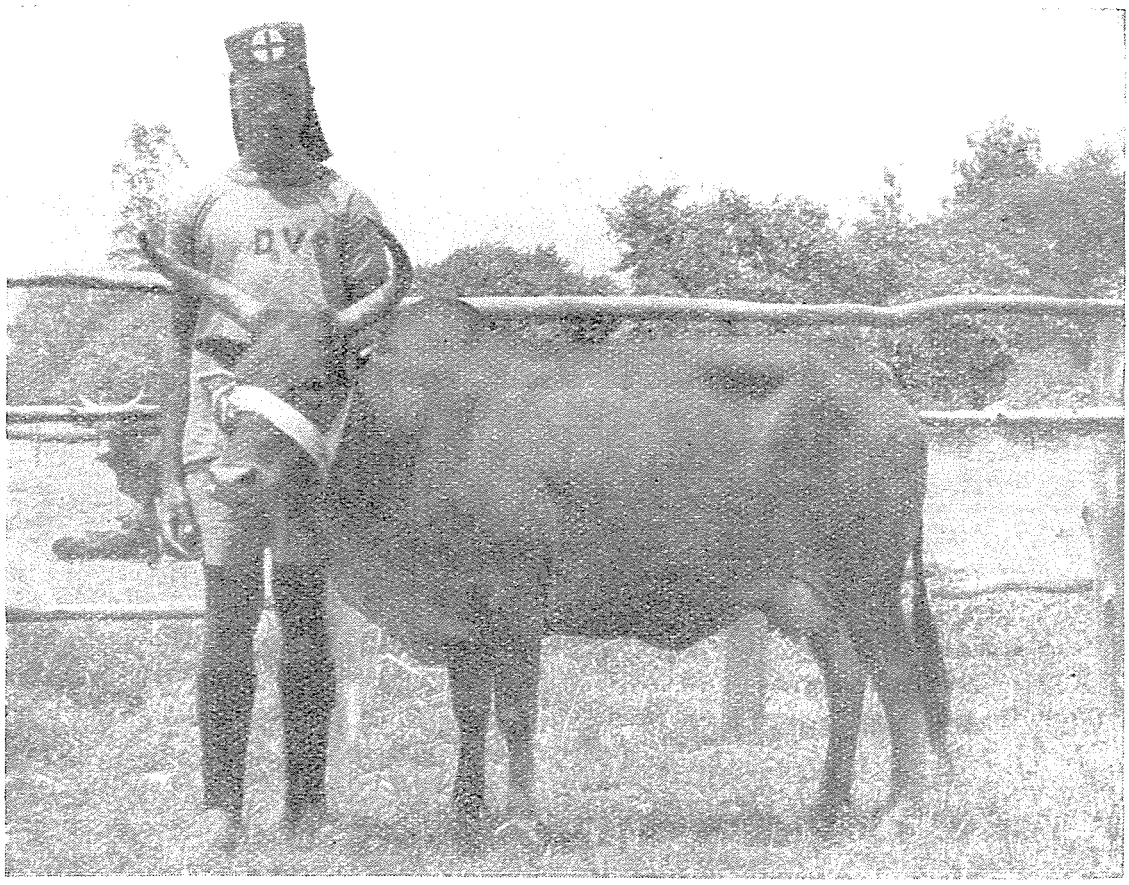


FIGURE 71. *Angoni bull. Mature liveweight, 1,480 lb.*

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	mature	oxen	1 year	2 years	mature
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.

Agoni 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
Garissa													
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
Nakuru													
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
Rumuruti													
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. *quinque plumis*, 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-Themeda*) 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

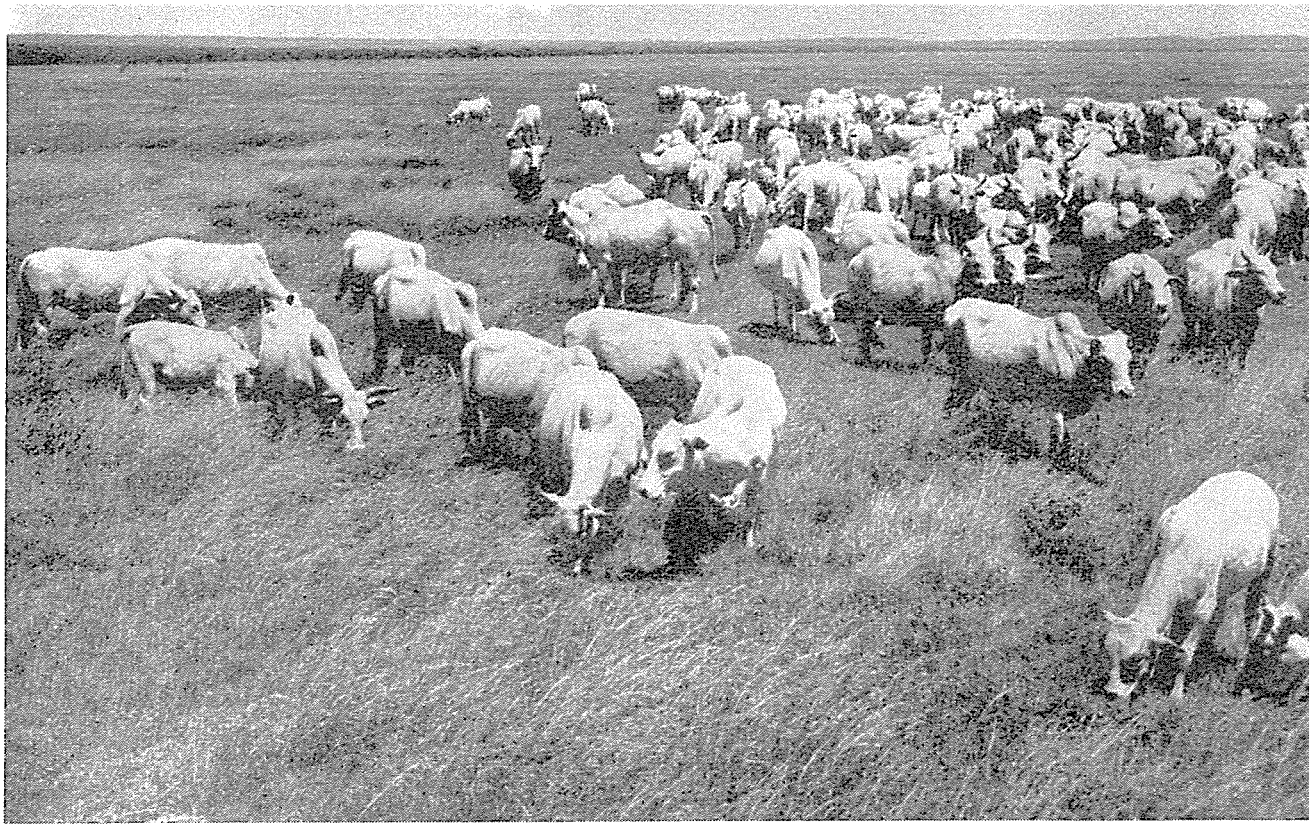


FIGURE 73. *Boran cattle on a European-owned ranch in Kenya.*

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

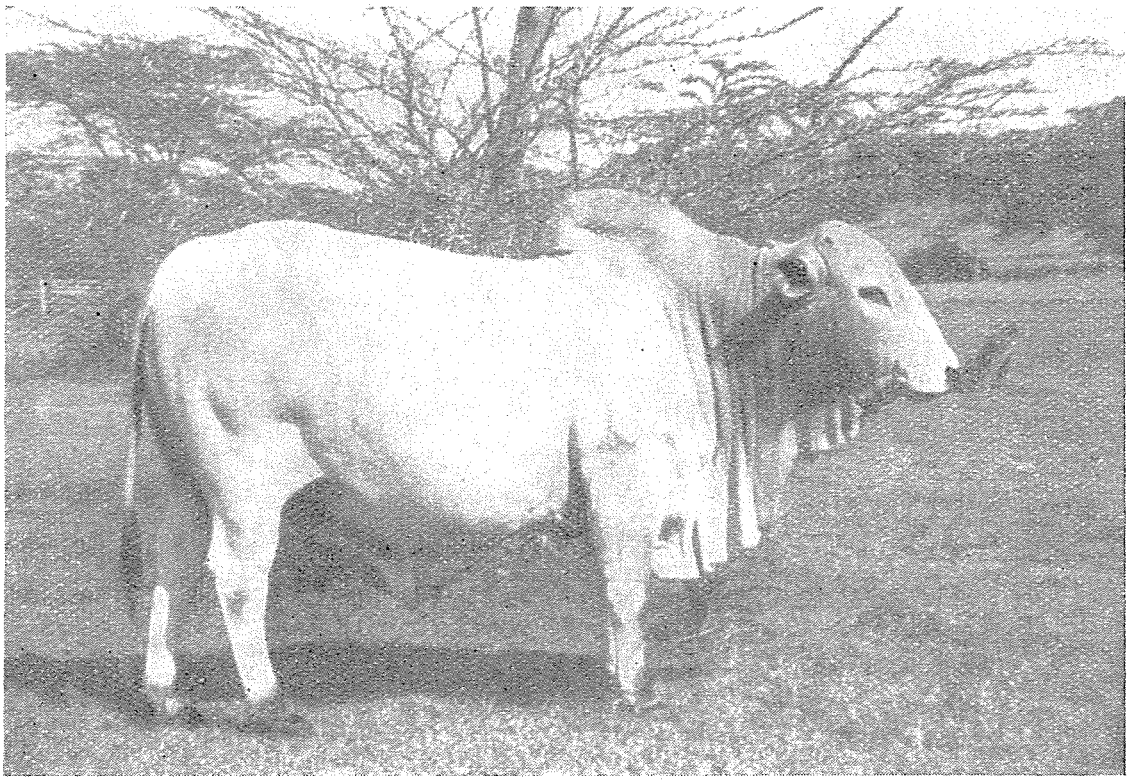


FIGURE 74. *A 4 1/2-year-old Boran bull bred by Mr. Miles Fletcher at Ngobit, Kenya. This is the type of bull being selected for by the Boran Cattle Breeders Association.*

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 unbilical fold and the sheath.

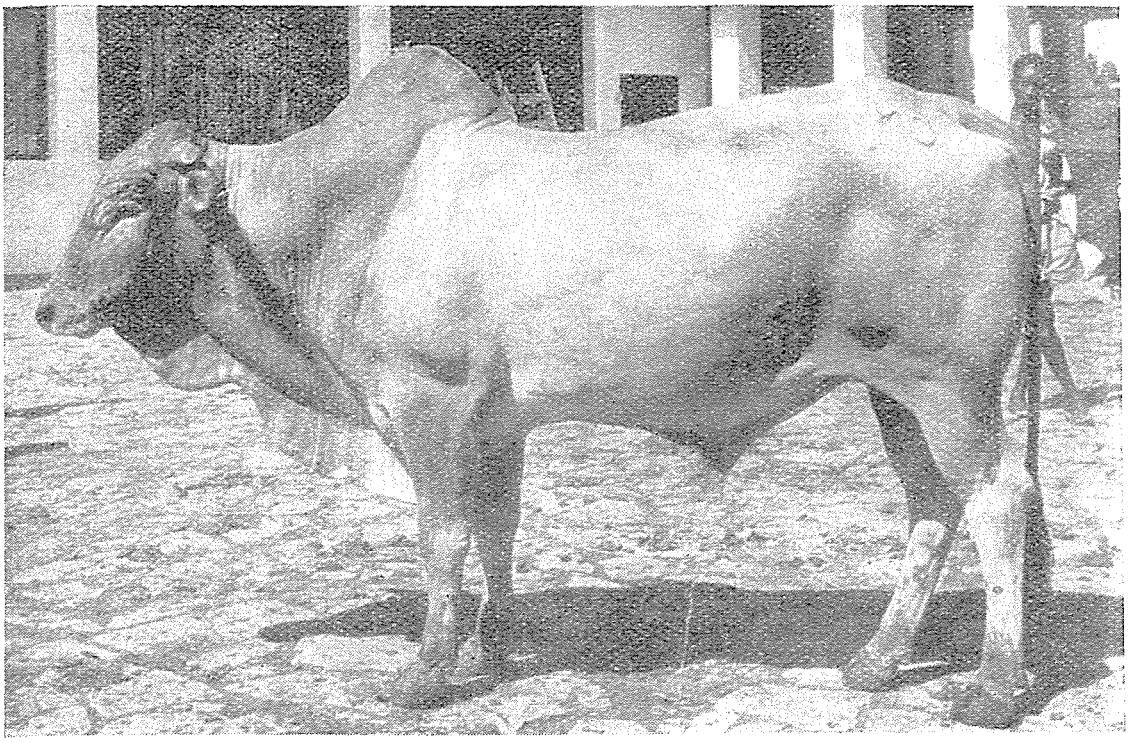
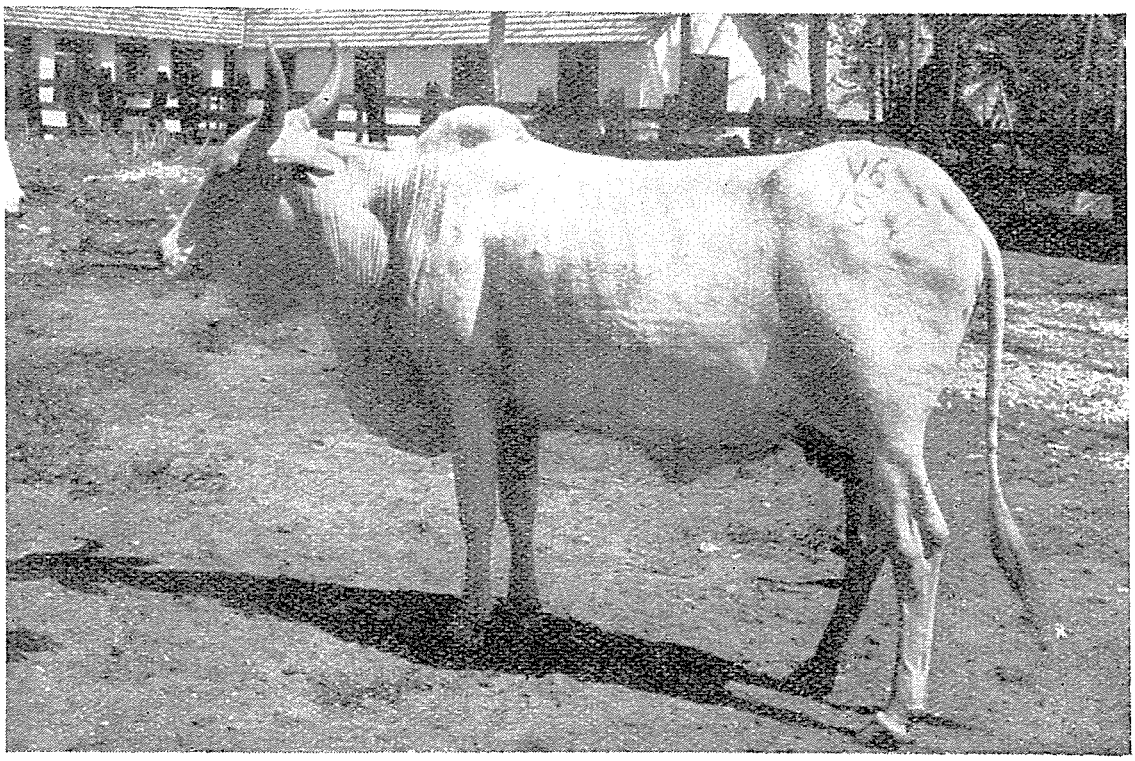


FIGURE 75. *Boran bull at Tanga Dairy, Tanganyika.*

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 LIVEWEIGHTS 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. (	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 (ranched)	91	52.6	76	454	10	557	82	739
Matamondo (ranched)	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 (ranched)	62	54.9	17	525	9	594	7	911
Matamondo (ranched)	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 (ranched)	—	—	37	514	30	651	3	854
Matamondo (ranched)	—	—	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
Lira (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
Entebbe (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
Mbale (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.

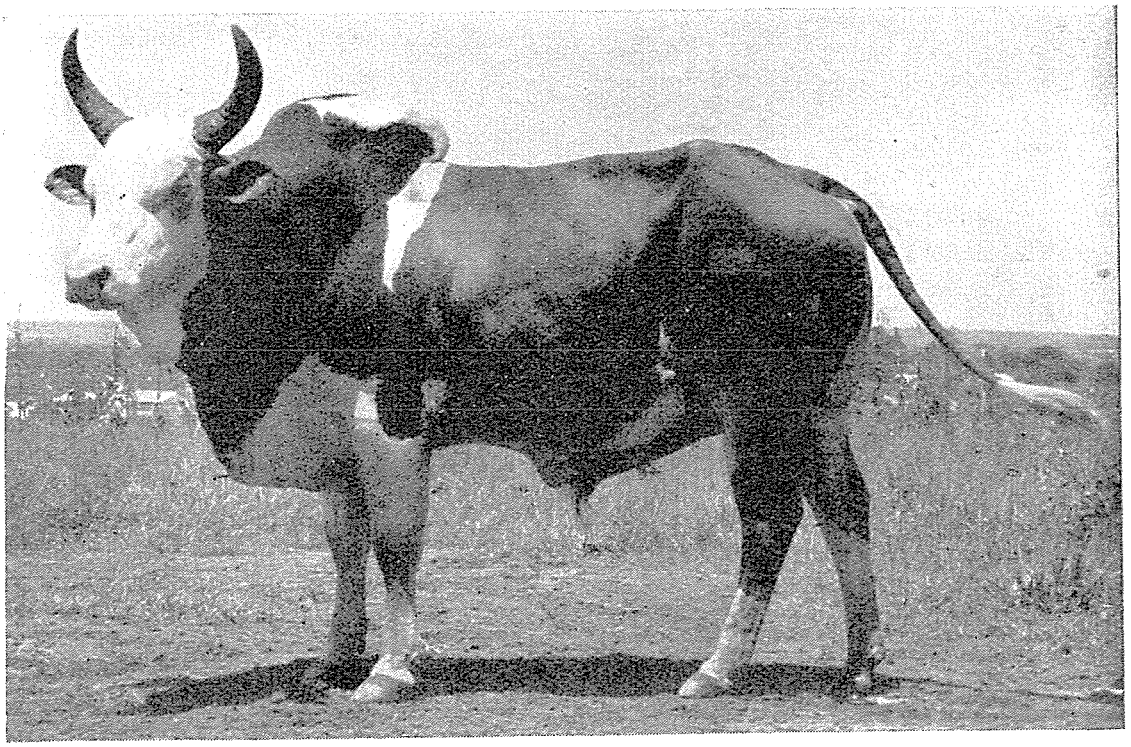
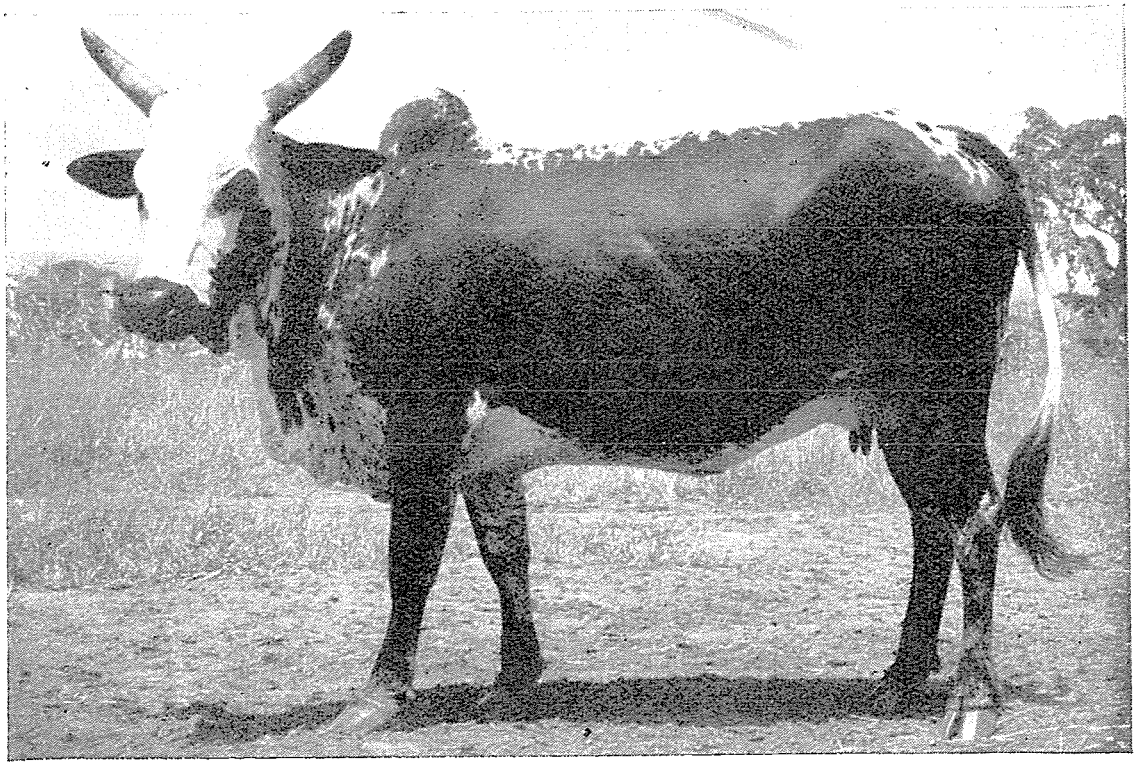


FIGURE 77. *Bukedi cattle.* [above] *Bull*; [below] *Cow.*

Courtesy of Dept. of Information, Uganda Protectorate



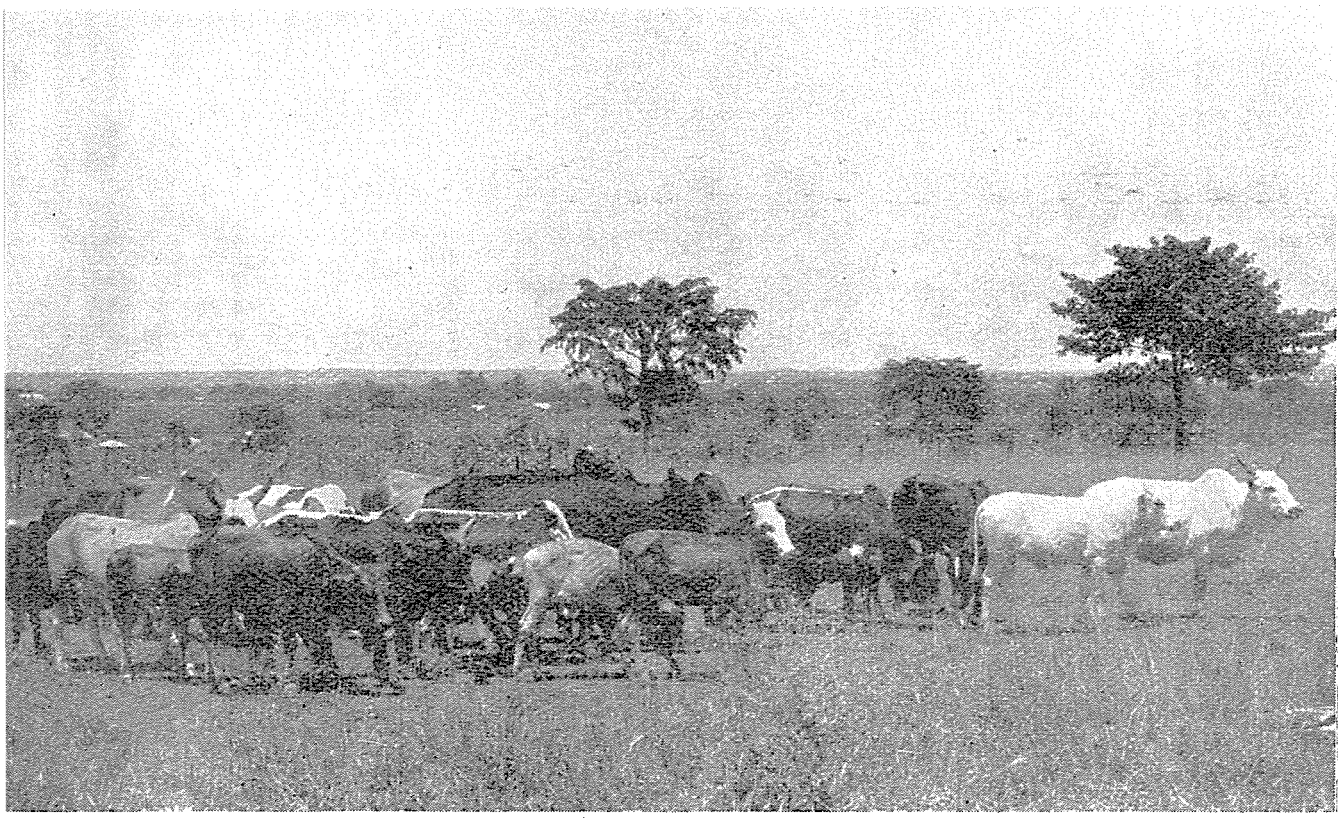


FIGURE 78. *A herd of Bukedi cattle.*

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. – LIVEWEIGHTS 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 [1]	25	1 683	223	350	967	3 250
1950	36 [1]	29	2 066	274	388	817	3 563
1951	15 [2]	14	1 770	249	356	697	3 555
1951	15 [3]	13	2 701	260	380	2 263	3 252
1952	12 [2]	9	1 956	251	378	1 278	3 207
1952	17 [3]	16	2 505	259	390	1 657	3 100

* NOTES: [1] Cows milked with calves suckling and cows completely milked. To the yield of cows suckling calves 80 gallons were added as the milk estimated to be taken by the calf.
[2] Cows entirely milked.
[3] 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 Shorthorn 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,

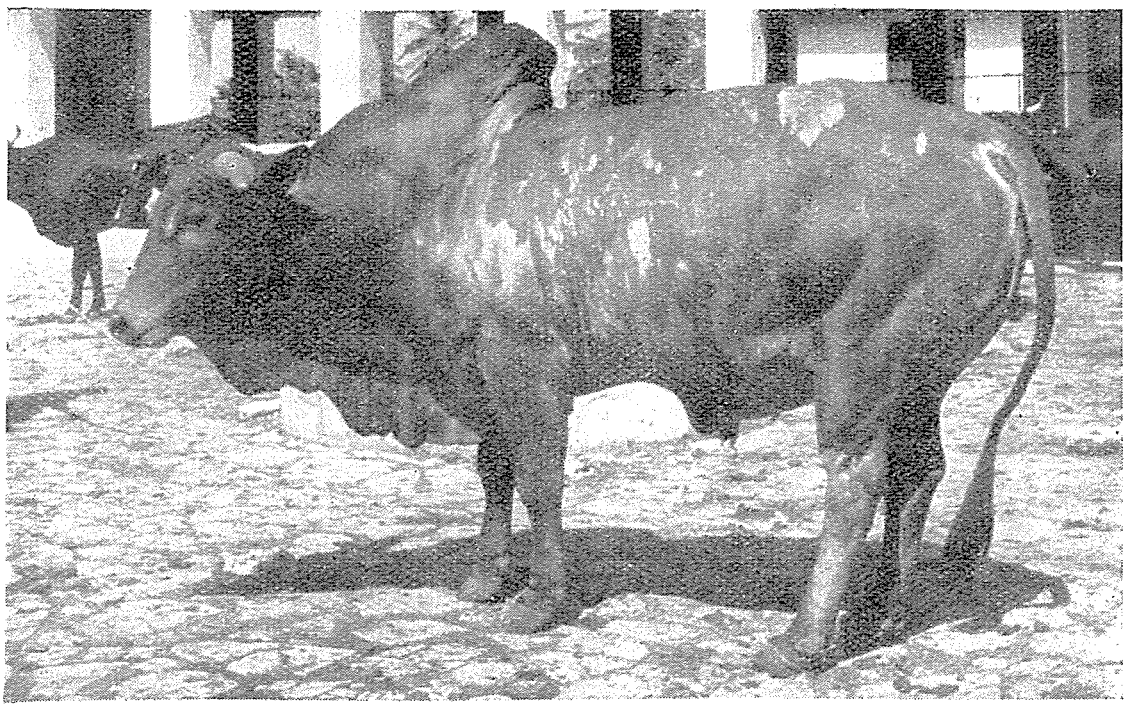
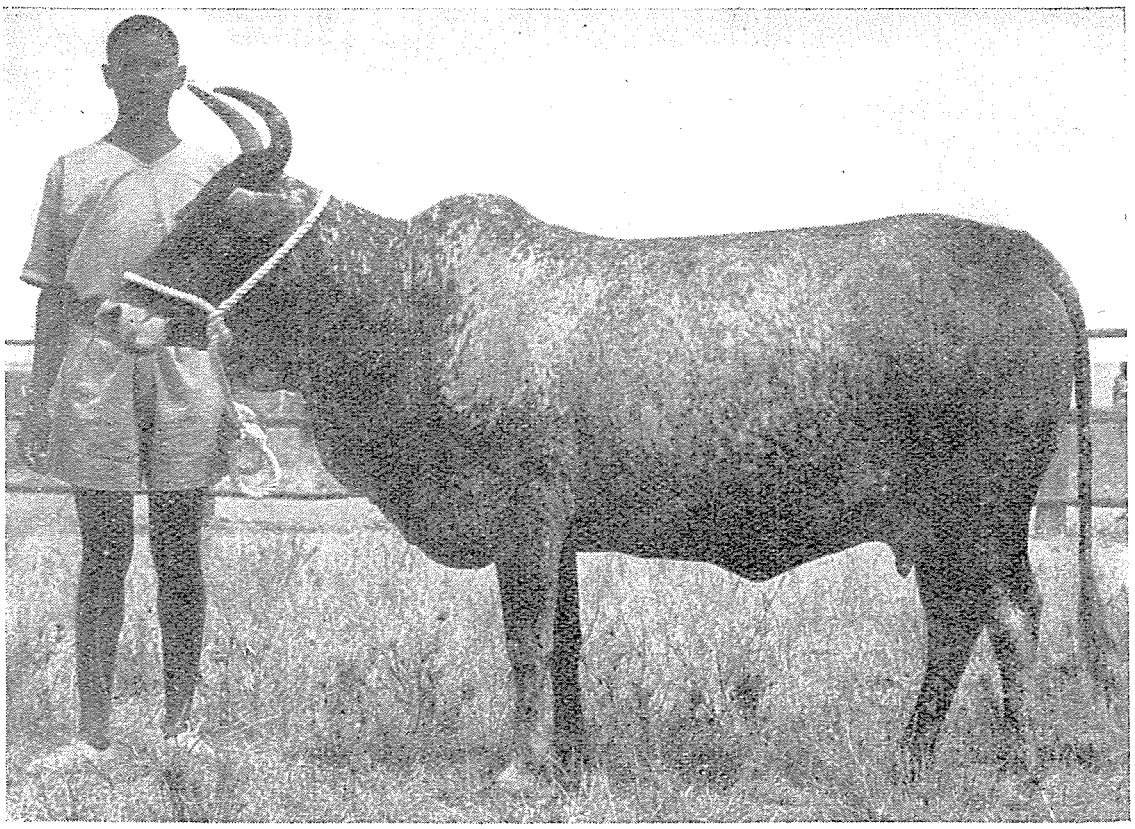


FIGURE 79. *Jiddu bull at Tanga Dairy, Tanganyika.*

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

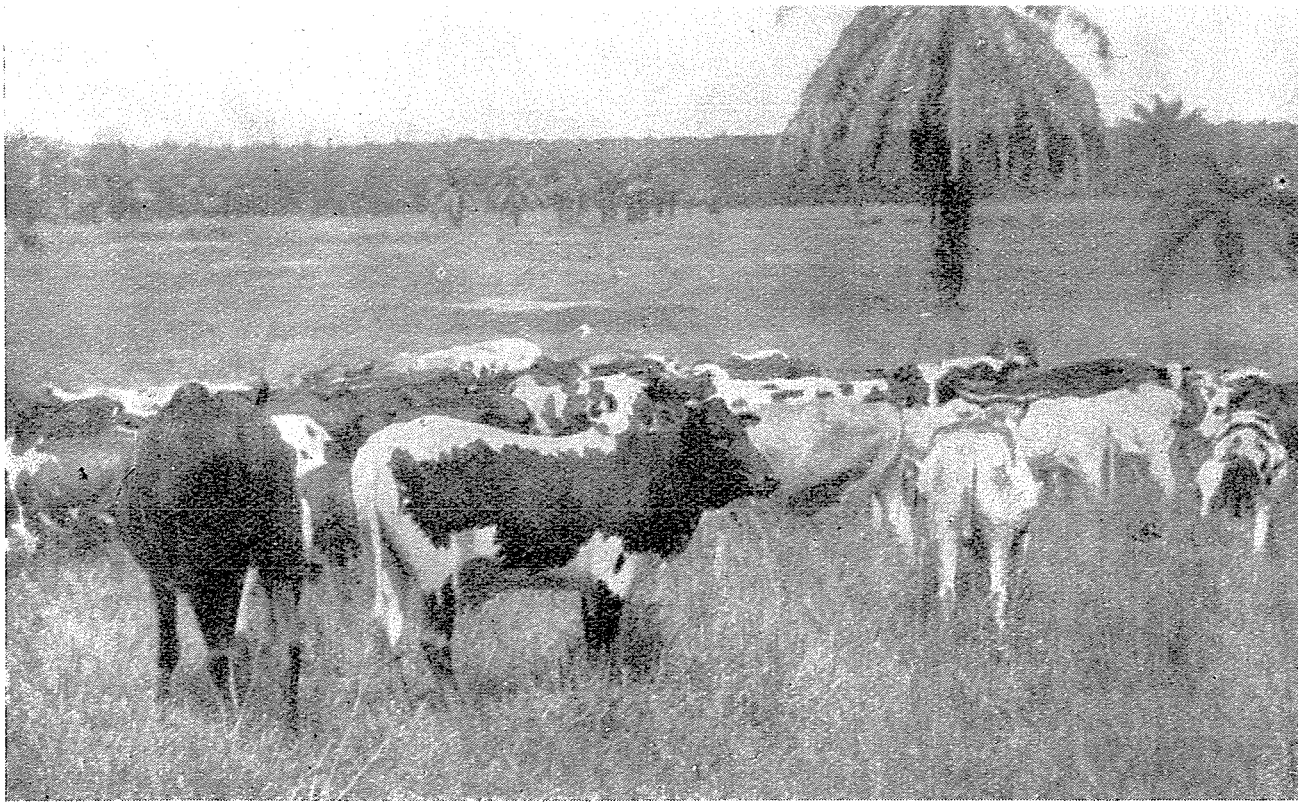


FIGURE 81. *A herd of Lugware cattle.*

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

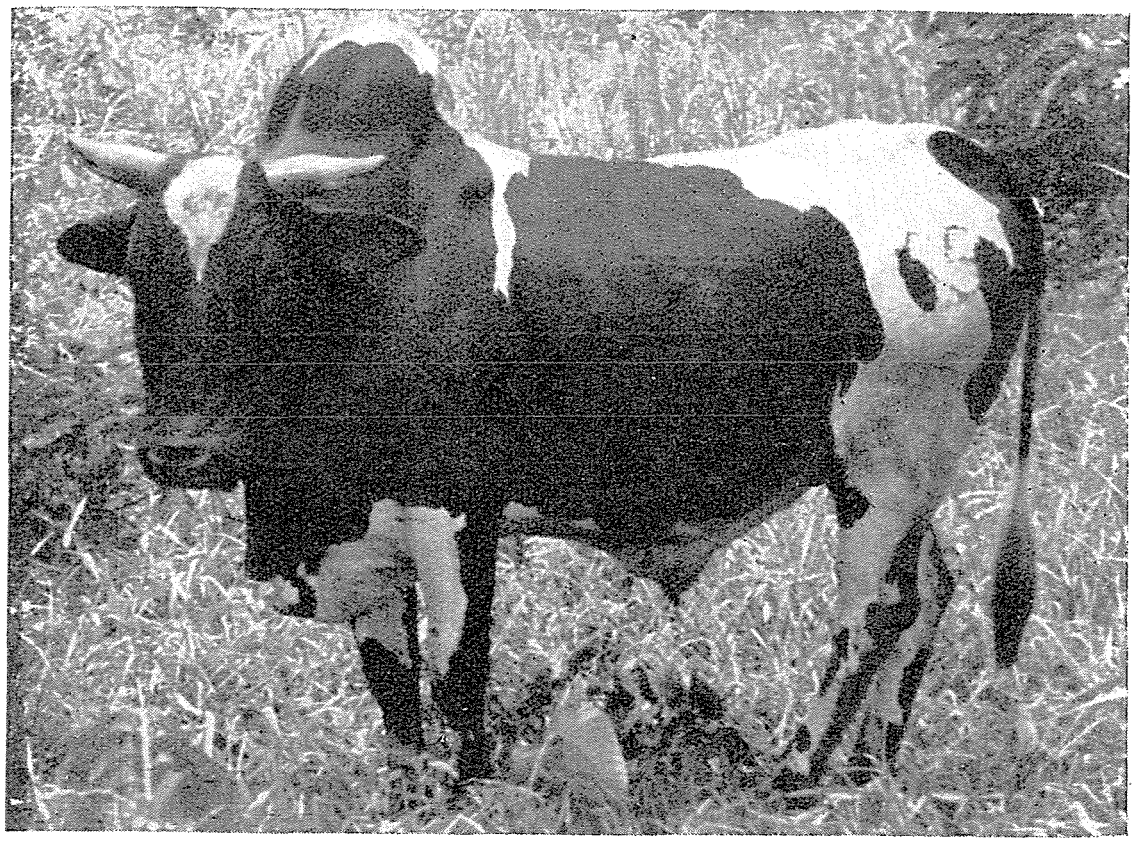


FIGURE 83. *Lugware cow.*

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 hindquarters. 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.

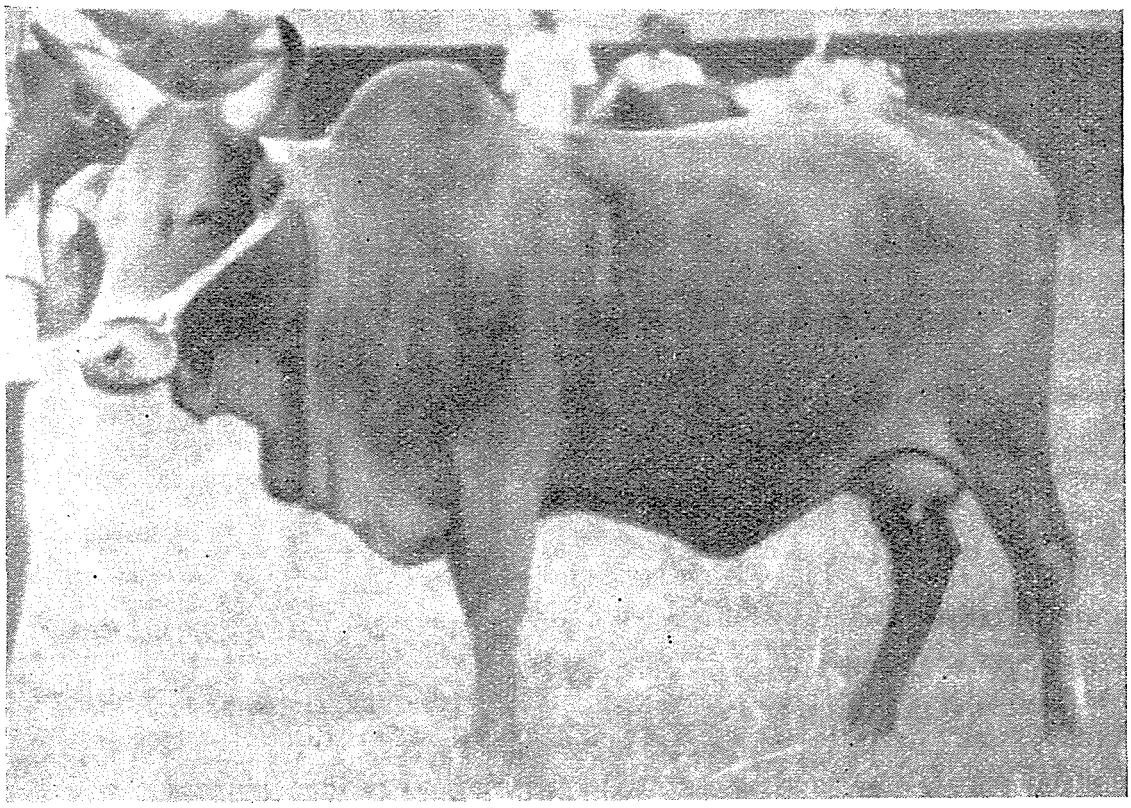
The pendulous dewlap starts under the chin and continues to the breastbone between the forelegs. The umbilical fold is only sometimes apparent.

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



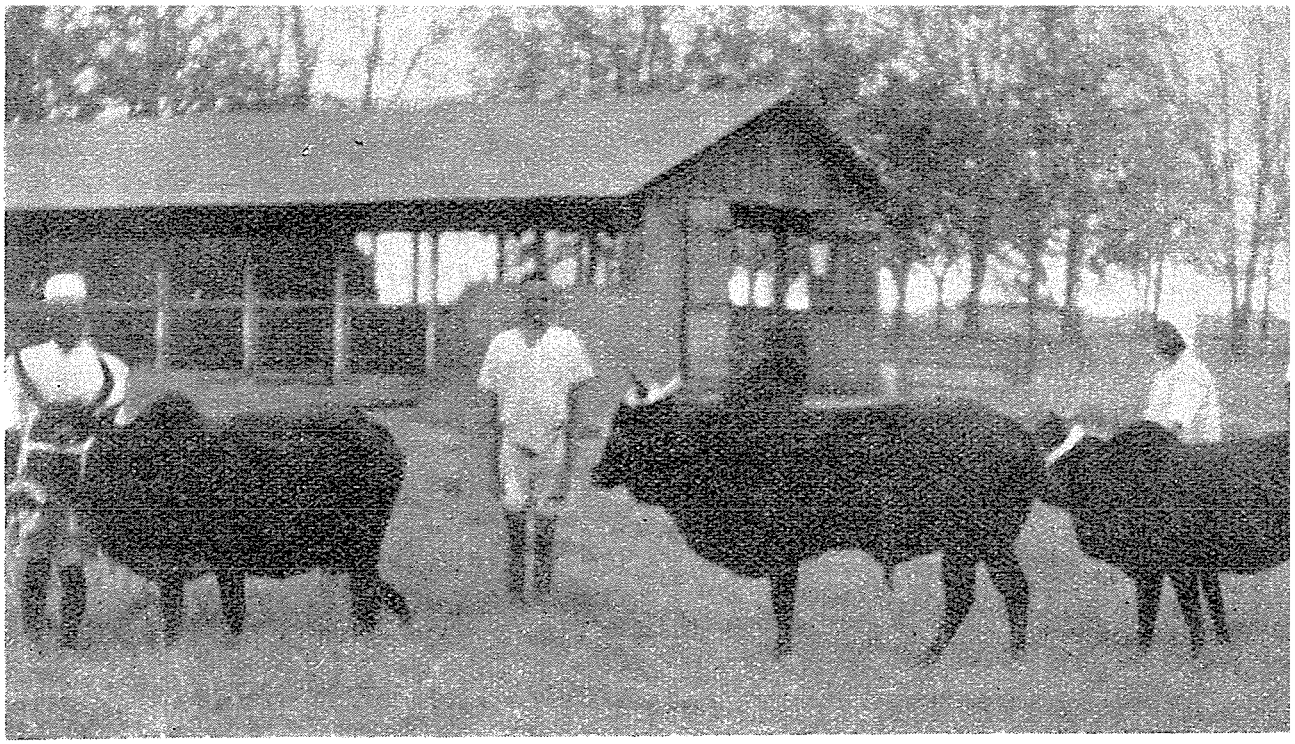


FIGURE 85. *Nandi cattle.*

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_1) 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., *Albizzia seriocephala* and *Euphorbia venenifica*, 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*).

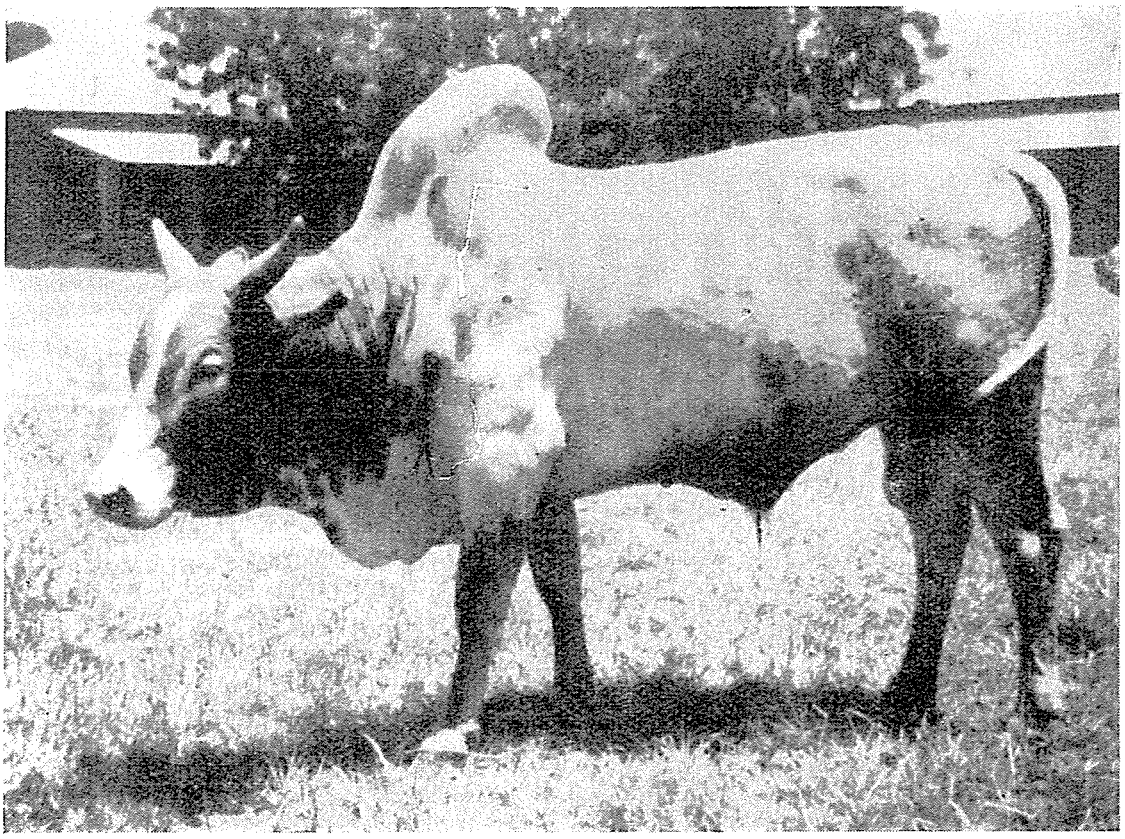
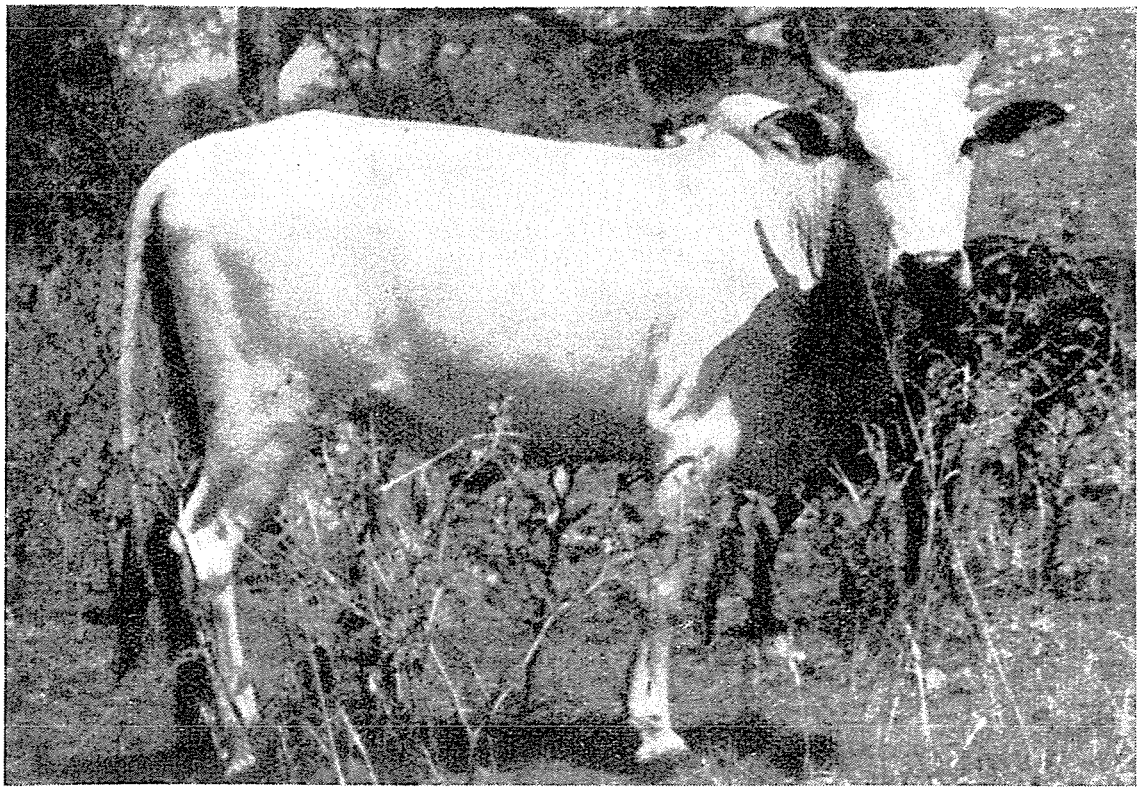


FIGURE 86. *Southern Sudan Hill zebu "Latuka" bull.*
Courtesy of J. D. M. Jack

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.

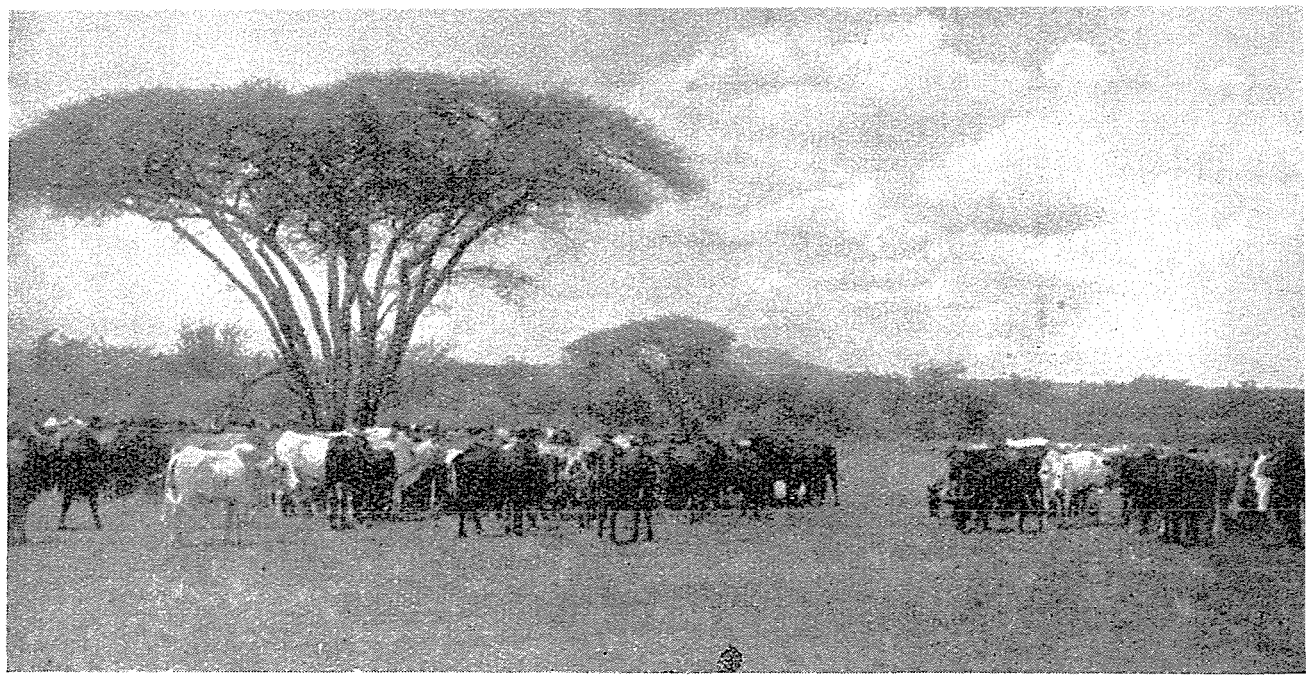


FIGURE 88. *Tanganyika shorthorned zebu yearlings at Kongwa Ranch.*
Courtesy of H. G. Hutchison

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.

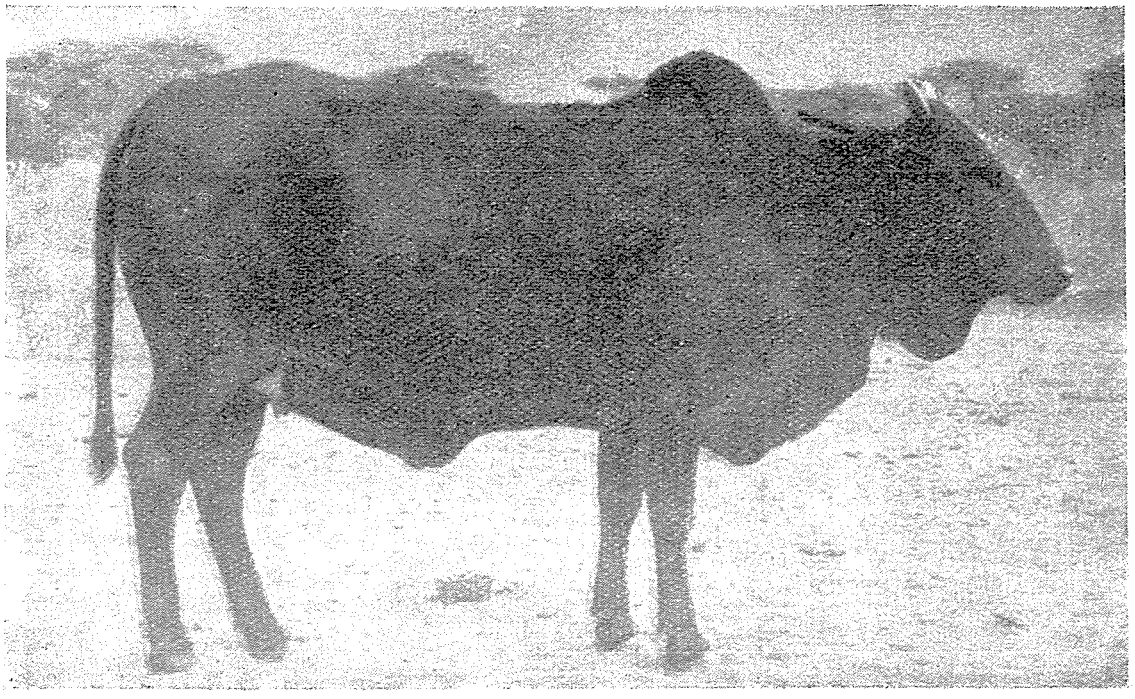
In Lake Province the Wakuria and other tribes have adopted the practice of using cattle as draft animals for tillage purposes (Hutchison, 1955).

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



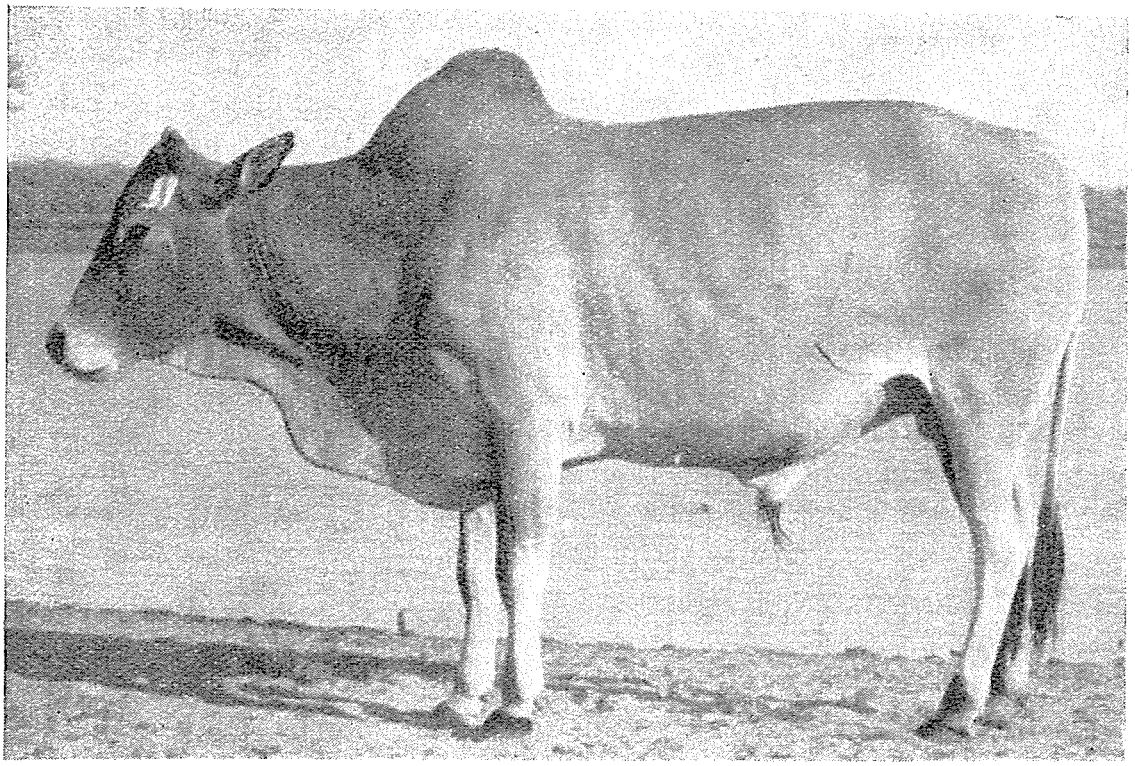
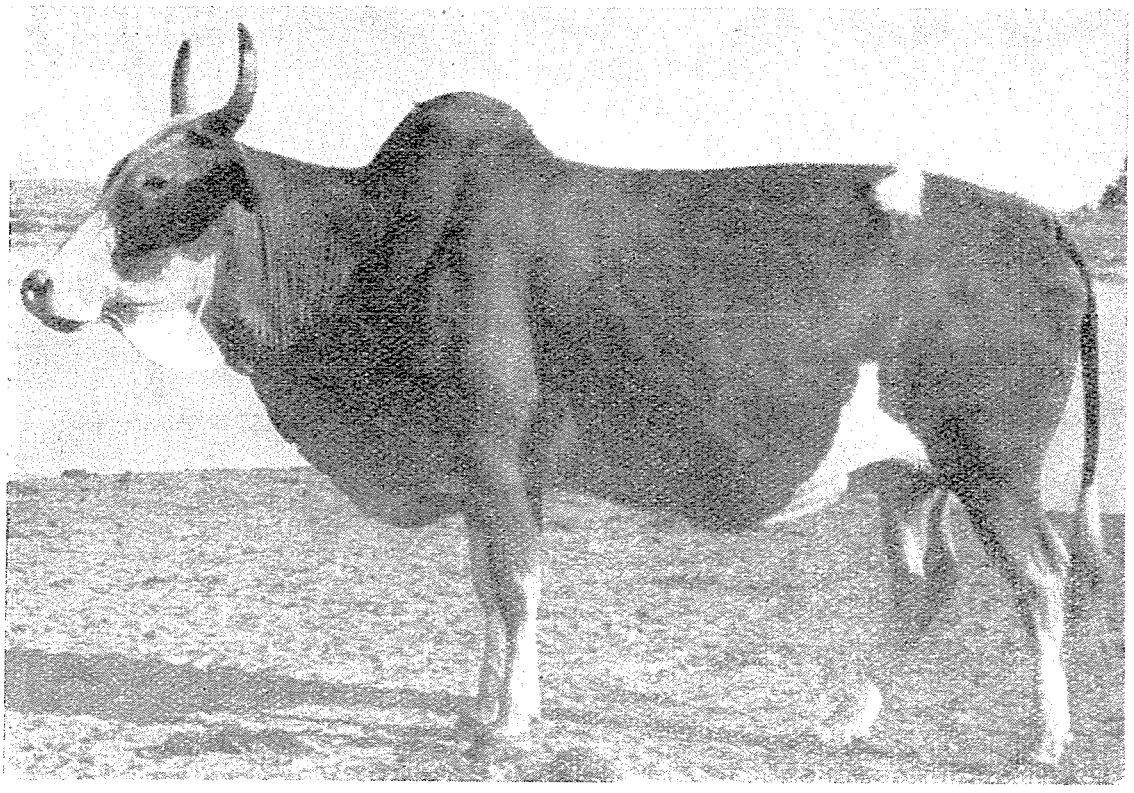


FIGURE 90. *Tanganyika shorthorned zebu (Sukumaland) steer.*

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 zebus. 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 (ranched)	17	39.6	28	304	31	403	84	583
Sukumaland (ranched)*	20	41.2	40	257	6	493	49	482
Pawaga (farmed) ...	3	52.3	8	288	15	369	24	465
MALES								
Masailand, Ugogo (ranched)	29	39.8	19	327	12	505	4	768
Sukumaland (ranched)*	25	41.9	23	346	14	533	5	672
Pawaga (farmed) ...	1	45.0	1	274	—	—	—	—
OXEN								
Masailand, Ugogo (ranched)	—	—	47	313	43	431	8	600
Sukumaland (ranched)*	—	—	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 epivaginitis. 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
Pibor Post (Altitude: 140 m.)													
Mean rainfall, mm.	7	10	37	77	126	107	142	138	120	68	37	17	886
Kapoeta (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.

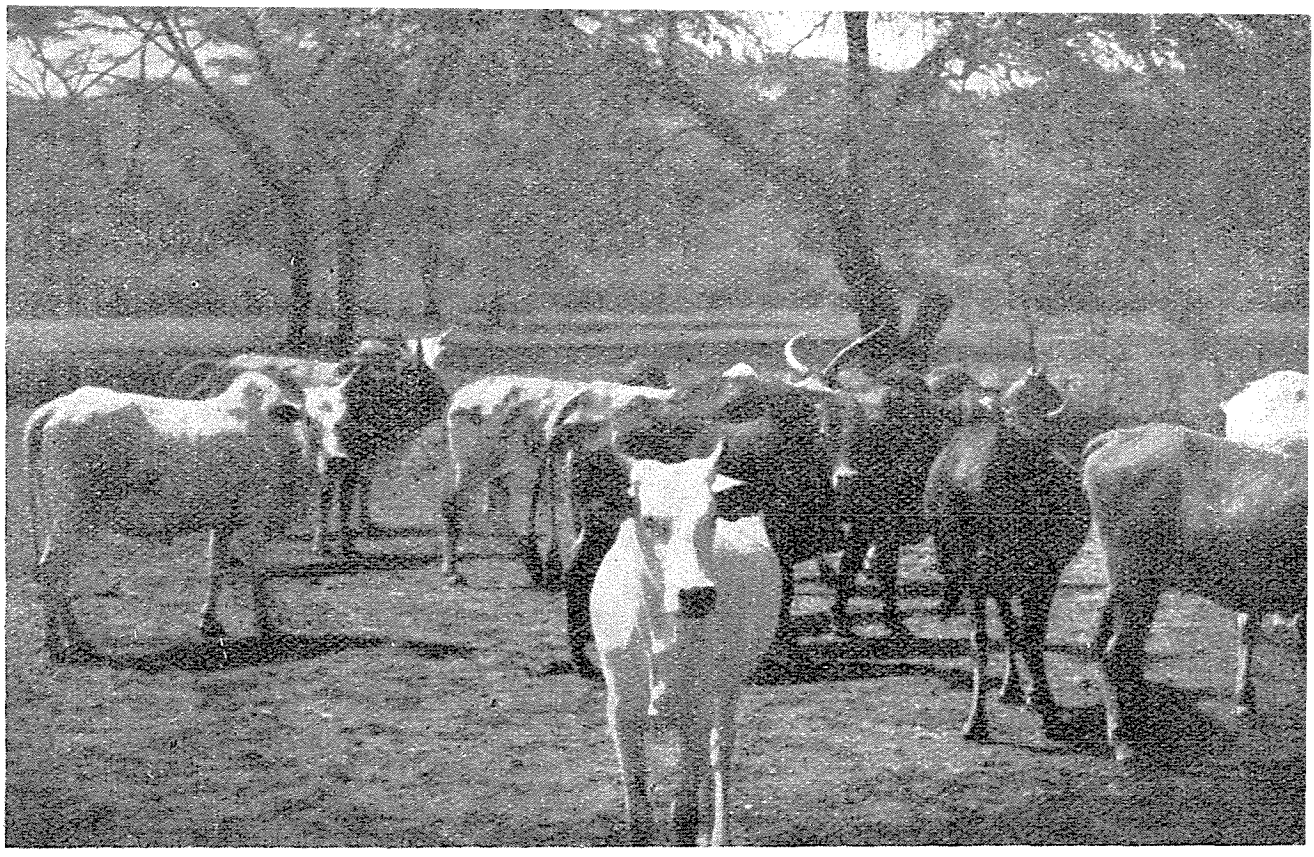


FIGURE 92. *A herd of Toposa cattle in the dry season.*

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,

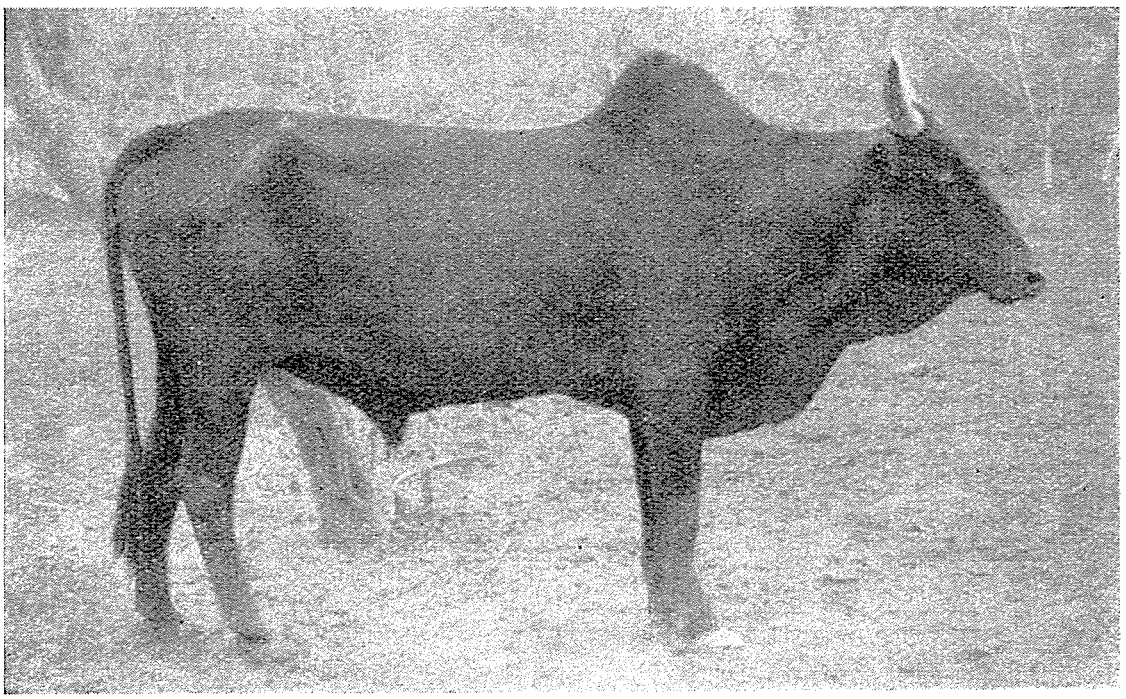
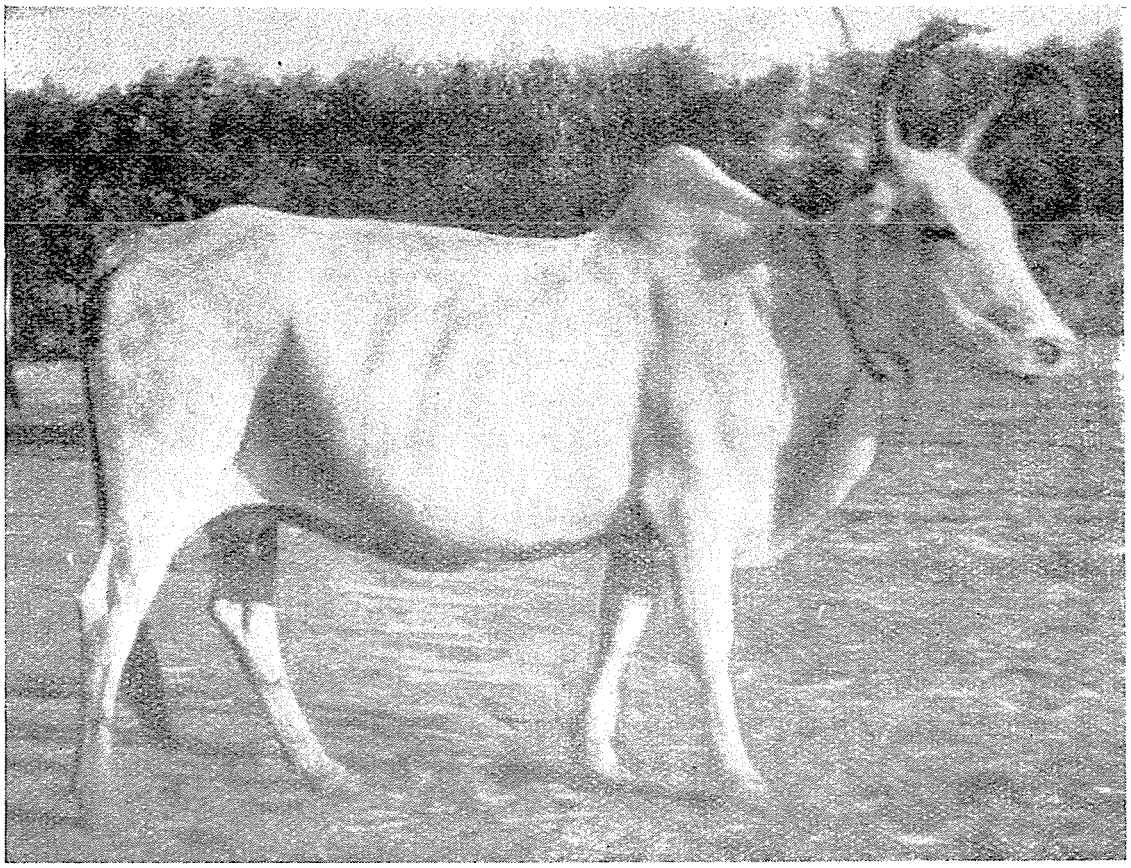


FIGURE 93. *Murle bull at the close of a severe dry season.*

FIGURE 94. *Murle cow at Malakal Government Dairy.*

Courtesy of E. A. McLaughlin



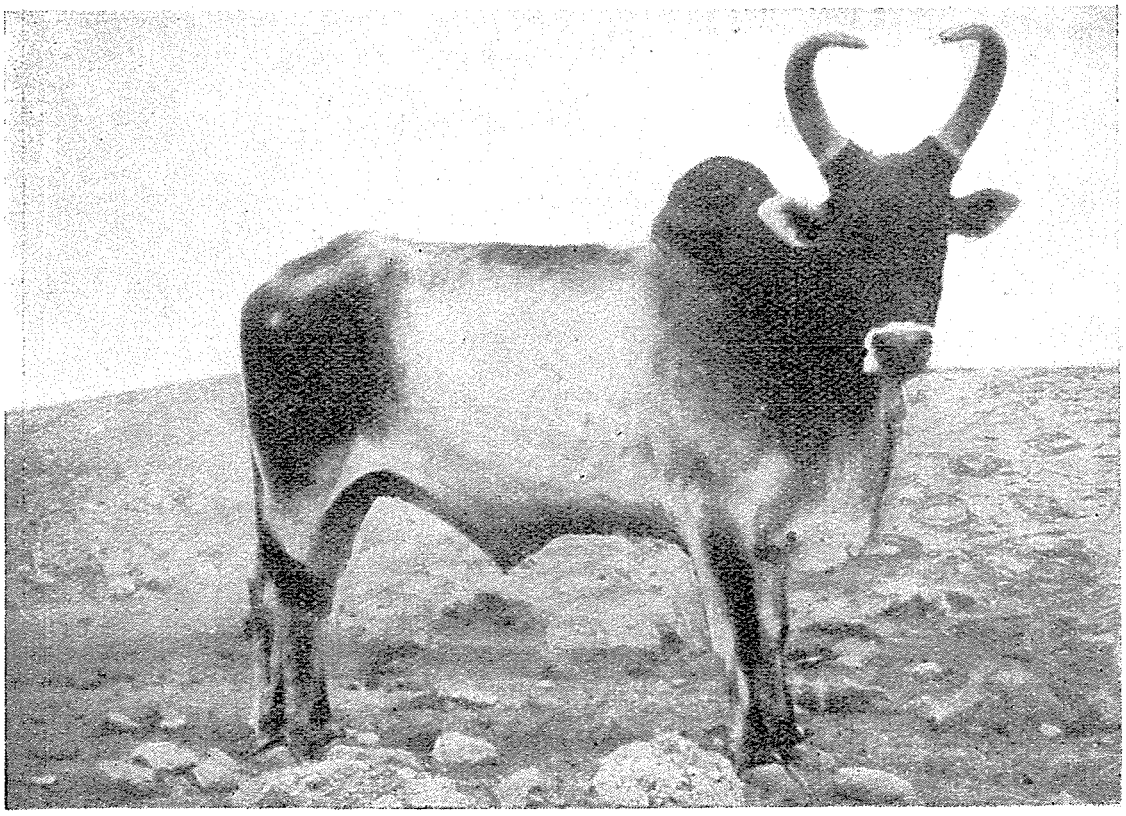
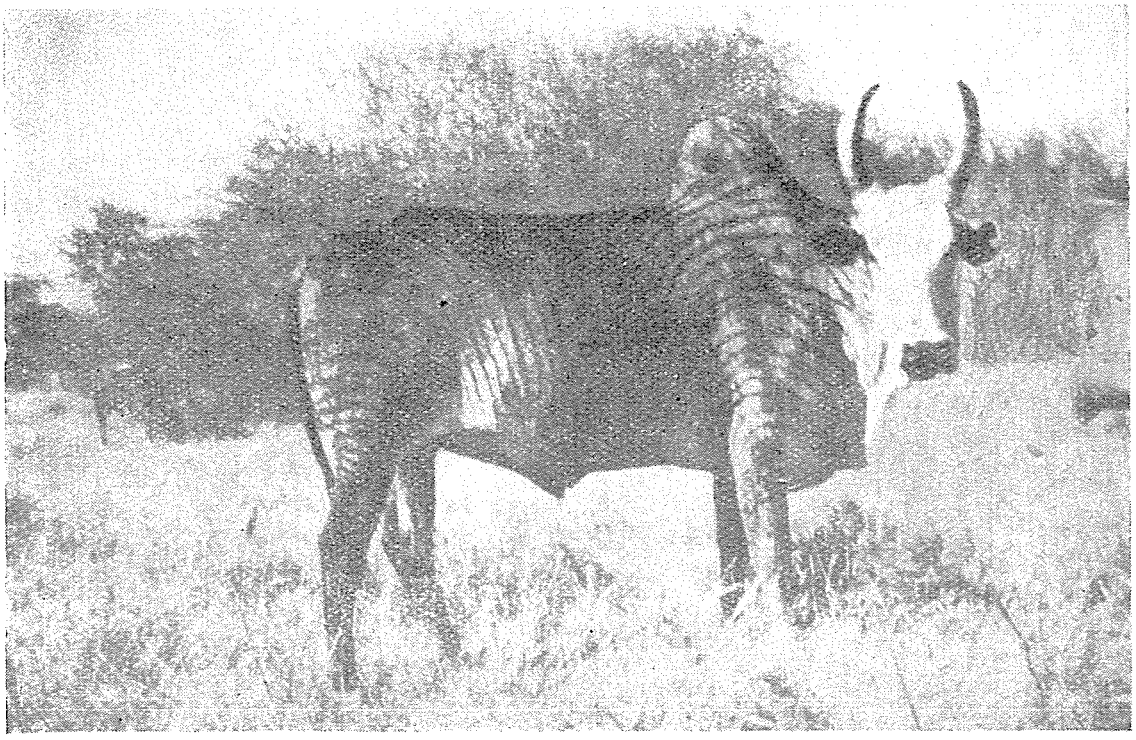


FIGURE 95. *Toposa steer.*

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



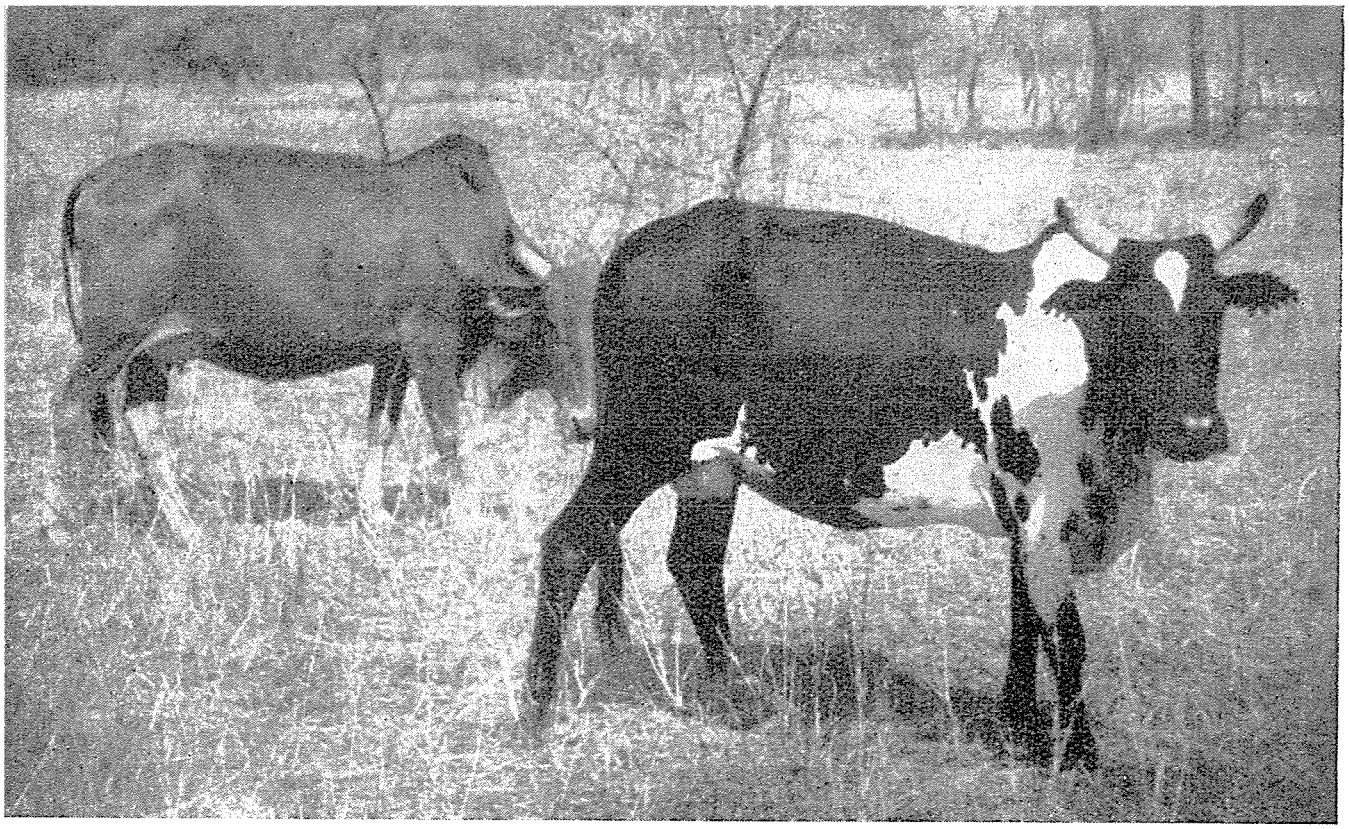


FIGURE 97. *Toposa cows at the height of the dry season.*

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.