

A Contribution to the Study of African Native Cattle.

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A. C. MACDONALD (1865-1926) who first recognised the Afrikaner as a native beast. Archibald Campbell Macdonald was in the service of the Department of Agriculture, Cape Colony, from 1889-1902. He then became Deputy-Director of Agriculture, Transvaal, from 1903 to 1907. From 1st July 1907, to 11th March, 1920, he was Director of Agriculture, Kenya. He died at Kabete on 6th July, 1926. (H. H. Brassey-Edwards, M.R.C.V.S.)

PREFACE.

ONE of the most striking features concerning Cattle Husbandry in Southern Africa is the fact that little or nothing has been done by Europeans to improve indigenous stock by selection, especially in view of the environmental difficulties experienced in farming, *e.g.* drought and disease. This is all the more astonishing when one considers that in Great Britain and Holland, the original home of most white South Africans, skilful selection has led to the creation of some of the finest breeds in Europe. The practice in Southern Africa has been in the vast majority of cases to improve native stock by grading with European breeds, a measure which in the opinion of Bisschop (1934) leads to degeneration in the arid and semi-arid regions of the country. As it is, the greater part of the Union is no longer occupied by pure indigenous cattle, but by nondescript herds destined, as in Egypt, to be absorbed ultimately into the *Brachyceros* type.

Four excellent examples are provided by South Africa alone illustrating the advantages of improvement by selection, namely, Afrikaner cattle, Blackhead Persian sheep, Angora goats, and the ostrich.

The authors, both of whom have travelled fairly extensively in Africa and have for many years realised the potentialities of indigenous cattle, endeavour in this contribution to give an outline of the cattle types of Africa with their approximate distribution. This after all is the basis of cattle husbandry whether improvement is to be effected by selection or by grading up.

A classification based on conformation now being available, a new approach suggests itself, namely the distribution of blood groups and its relationship with the physical classification. This and other fundamental problems, particularly in regard to genetics and nutrition, offer much scope to those who have Native Cattle Husbandry at heart.

In conclusion, we wish to express our indebtedness to the officials of the various Administrations for their co-operation in the compilation of data. By their precise replies to the Questionnaire, they have made the compilation of this article possible. Cordial thanks are due to the Secretary for External Affairs, Pretoria, for arranging the issue of the Questionnaire and for translations, and to the Secretaries of Agriculture and Native Affairs, Pretoria, for their support. Particular appreciation is expressed to the Director of Veterinary Services (Dr. P. J. du Toit) for allowing his staff to participate in this compilation, chiefly in connection with the typing and photography. The assistance of others who rendered help *e.g.* by the loan of photographs is acknowledged in the article, but a special word of thanks is due to Dr. A. D. Thomas for his aid in French translation.

R. W. T.
H. H. C.

Onderstepoort.

CHAPTER I.

PRELIMINARY.

INTRODUCTION.

The object of this paper is to make available the data collected from (a) certain African territories and (b) certain extra-African countries as the result of a Questionnaire issued by the Secretary of Native Affairs (his file N.A. 13/327) through the Secretary of External Affairs in 1931.⁽⁴⁾ The replies received from the African countries form the basis of Chapter II and those from outside Africa have been dealt with under Chapter III. Additional data, however, have been incorporated.

The Questionnaire was drawn up by one author (R. W. T.) and replies have been assembled into narrative form by the other author (H. H. C.) who received the files in November, 1935.

Although at present receiving but scant attention, the problem of Native Cattle Husbandry really interests three State Departments, *viz.*, the Division of Veterinary Services which is concerned chiefly in conformation and relationship to disease, the Division of Animal Husbandry in the economic position from the European standpoint and the Department of Native Affairs which considers the matter naturally more from the native aspect.

A definite policy has not yet been laid down, but it is hoped that one of the results of this contribution will be to focus attention on the subject and thus hasten the formation of some policy. This obviously will be to the benefit of South Africa as a whole.

HISTORICAL OUTLINE.

As has been emphasised frequently, but little attention has been paid in South Africa to Native cattle as compared, for example, with the position in India.⁽⁵⁾

After the Anglo-Boer War of 1899-1902, A. C. McDonald of the Transvaal Department of Agriculture (see Frontispiece) showed some interest in Afrikaner cattle. Not only did he select, with the assistance of the Repatriation Department, a herd of 50 head as a nucleus for further improvement⁽⁶⁾, but he expressed himself as being "rather inclined to the idea that the Afrikaner cattle are

⁽⁴⁾ At a meeting held in the office of the Director of Native Agriculture, Pretoria, in 1930 and at which both authors were present, it was agreed that a preliminary step in any investigation in native cattle should be the issue of a Questionnaire. Others present were Professor A. M. Bosman (University of Pretoria) and Mr. G. P. Lestrade, Ethnologist, Native Affairs Department, Pretoria.

⁽⁵⁾ Even in Africa [Pierre, of French West Africa (1906), and Carlier, of Belgian Congo (1912)] detailed attention was given to this subject over 20 years ago.

⁽⁶⁾ The result of this experiment is not known. It is believed the cattle went to Potchetstroom School of Agriculture.

descended from one or other of the breeds which were brought down from North Africa by the Native tribes". (*Transvaal Agricultural Journal*, October, 1904.) This view is now generally accepted. At the same time Sir Arnold (then Dr.) Theiler collected the skulls of indigenous cattle and sent them to Professor Conrad Keller of Zurich for craniological study. The result of this investigation appeared as a thesis in 1911, Hendrik Molhuysen of The Hague having worked up the material for a doctorate at the University of Zurich (Molhuysen, 1911). Subsequently Sir Arnold Theiler with Daniel Kehoe, M.R.C.V.S. (1888-1928) made observations on native cattle, but unfortunately the notes were not published and are now not available. Again in 1922 Sir Arnold Theiler made an effort to develop this important branch of Animal Husbandry. He endeavoured to arrange that an official at the Potchefstroom School of Agriculture should "undertake anatomical research into the various breeds of cattle . . . under" his control; but owing to departmental difficulties the scheme lapsed. In the meantime, however, a few skulls had been received at Onderstepoort from South-West Africa (Groenewald and Curson 1936) and Tanganyika (Curson 1936) and these now form part of the Osteological Collection.

In 1927 one of us (H. H. C.) was appointed Professor of Anatomy in the University of South Africa (Transvaal University College) and the Director of Veterinary Services kindly allowed the investigations to proceed. In 1929 the second author was appointed Director of Native Agriculture of the Union of South Africa and a commencement was made in 1930 in the establishment of a herd of white cattle (*Nyoniaipumali*) at Nongoma, Zululand. The greatest impetus, however, was given to the investigations in 1933 when Dr. H. Epstein of Welverdiend near Potchefstroom made available his notes on researches undertaken in Europe in regard to the racial history of African cattle⁽⁷⁾.

From time to time articles and references to native cattle in the Subcontinent have appeared in the literature (Nobbs of S. Rhodesia, 1927, and Duerst, 1931)⁽⁸⁾. These have in the main been referred to in the papers published since 1930 from Onderstepoort, including a list of references on the Afrikander (Curson and Bisschop 1935).

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It was Epstein who in 1933 first linked the scattered facts and put forward a working hypothesis in regard to the origin of our cattle, associated with, of course, the various human migrations that have taken place since the earliest times.⁽⁹⁾

(7) Unfortunately Dr. Epstein's monograph on *The Origin of Africa's Indigenous Domestic Animals* has not yet appeared in print.

(8) Duerst should certainly be consulted.

(9) While unfortunately Epstein's researches have not been published *in toto*, an idea of his views may be gained from a study of Epstein (1933), Curson and Epstein (1934), and Epstein (1934). He no longer holds the view (letter of 10.4.36 to Director of Veterinary Services) that "Hamitic Longhorn cattle are pure descendants of *Bos primigenius* Hahnii, but a mixture.

In short, it is believed that the first cattle to be domesticated in Africa were "the giant horned wild oxen of the Nile Valley called by Hilzheimer *Bos primigenius* Hahni, *nova sub-species Hilzheimer*".

Then at the end of the Neolithic era, there entered Lower Egypt from Asia . . . cattle of an entirely different type, namely, the Brachyceros or Shorthorn. These accompanied the first invaders of Mediterranean stock⁽¹⁰⁾, who on their arrival compelled the original tribes (of Negroid stock) to retreat westwards. The migration of the people of the Mediterranean stock no doubt occupied many centuries, and it was notable for the arrival, about the end of the 3rd pre-Christian millenium, of Semitic tribes, who were accompanied by lateral horned cattle of zebu type (the present day Afrikander). This invasion further disturbed the Negroid people in what is to-day Upper Egypt and Abyssinia; and many tribes were compelled to seek safety by retreating southwards *viz.*: the Bushmen, Hottentots and Bantu.

In consequence of the first invasion some of the original Hamitic Longhorn cattle were taken westwards along the Mediterranean littoral to what is now Morocco. There the stream of migration divided, one branch proceeding north into Spain and Portugal and beyond, and the other south into what are to-day French West Africa, and the various territories along the Gulf of Guinea, but particularly Liberia and Nigeria. Descendants of cattle which were taken into Europe are seen to-day in the Raza de Barroza, Raza Minhota, and Raza Alentejana of Portugal and the Andalusian cattle of Spain. Da Costa (1931), however, considers the Raza Alentejana a relative of the Afrikander. From the Iberian Peninsula Brazil imported cattle and the Franqueiro breed there represents the Hamitic Longhorn. Great Britain too, has representatives in the Black Cattle of Wales, West Highland Cattle and Herefords. While the Hamitic Longhorn has disappeared from North-East Africa, Sir Harry Johnston (1906) encountered descendants in Liberia and judging from the cattle of French West Africa and Nigeria, there is but little doubt that the present West African Zebu, with its large lyre horns and characteristic head, contains a large proportion of Hamitic blood.

As mentioned above, the first invaders of Egypt brought cattle of shorthorn type, which in time displaced the Hamitic Longhorn in Lower Egypt and even during the period of the New Kingdom (1580-945 B.C.*) they were dominant. In the course of time their owners were also compelled to seek pastures new, and again the path to the west along the Mediterranean was selected. As before, when opposite Gibraltar, the stream divided, one to the north into Spain,

⁽¹⁰⁾ At the time of the Pharaohs, except for the "Egyptian aristocrats of the Pyramid Age" (who were of Alpine stock), the inhabitants of Africa belonged to Elliot Smith's Negroid type [Perry (1935)]. Elliot Smith's types are Nordic, Mediterranean, Alpine, Mongolian, Negro, and Australoid [*Human History* (1933)].

* Yahuda (1934), p. xvii.

France and Great Britain and the other south along the shores of the Atlantic until the southern arm of the Gulf of Guinea was reached after centuries of travel. Representatives of this type are to be found to-day not only along the Gulf of Guinea as far south as the Cameroons, but around the northern part of Africa as far east as Eritrea.

In the meantime had arrived, as mentioned above, the Lateral-horned Zebu. These cattle had a great influence on the Hamitic Longhorn occurring in Upper Egypt and Abyssinia, in fact as a consequence of the intermixture between the two stocks was created the Sanga type, the most common to-day in Africa south of the Sahara. Fortunately as a result of representatives of the Lateral-horned Zebu stock coming into possession of the people now called Hottentots, cattle of this type were saved for posterity. The Hottentots being in the van of the human stream which migrated southwards, kept their herds pure. It can be imagined that the Hottentots would follow the Great Lakes and when south of Nyassa would bear to the west and so reach what is to-day the South-West Africa Protectorate. Sir Harry Johnston believes that "the first Bantu invasion from across the Zambesi" (quoted by Prof. I. F. Maingard *S. African Jl. Sc.* 1929, p. 845) took place about 700 A.D., so that the Hottentots must have reached Southern Rhodesia before this date. When the Hottentots arrived on the shores of the Atlantic they worked their way south around the Cape of Good Hope and on the arrival of the Dutch colonists in 1652, the advance guard with its numerous herds had already entered what is now the Eastern Province.

Above have been described the probable migration routes of the three parent stocks of African cattle, *viz.*: the Hamitic Longhorn, *Brachyceros*, and Lateral-horned Zebu. Reference will now be made to the likely paths taken by the owners of the Sanga cattle, established in Abyssinia and Upper Egypt by the intermixture of Hamitic Longhorn and Lateral-horned Zebu types.

Following comparatively close on the heels of the Hottentots were tribes which included the Bantu of to-day. This migration, accompanied by their herds of Sanga cattle either divided into western and southern streams soon after their departure from North-East Africa (probably Abyssinia), or left at different periods. In any case the western nomads passed through the southern part of the Anglo-Egyptian Sudan, and skirted the *Glossina* region of French Equatorial Africa until Lake Chad was reached. Here to-day are to be found representatives of Sanga cattle. The southern stream probably passed through Uganda as had the Hottentots, and followed the Great Lakes until the Zambesi was reached. There it can be imagined, the various tribes dispersed, some going west into Bechuanaland and Ovamboland, and others south into Southern Rhodesia and the Transvaal, and the remainder east into Portuguese East Africa and Zululand. As is well known, the advancing Bantu came into contact not only with the Hottentots, but also the European settlers in the Eastern Province of the Cape of Good Hope.

Epstein believes that the next derived type, the Shorthorned Zebu, reached Africa from Asia when the power of Persia was at its zenith and afterwards during the Arab invasion. He further considers that it represents the influence *in Asia* of *Brachyceros* on the Lateral-horned Zebu. Map I represents the Shorthorned Zebu as arriving only by sea, but this is not the case. While osteological evidence may support this view, a study of the hump, which is thoracic and musculo-fatty (in contradistinction to that of its supposed progenitor, the Lateral-horned Zebu) certainly does not do so. In any case the Shorthorned Zebu is a comparatively recent arrival and distribution along the East African coast as far south as the Zambesi was due primarily to Arabs and Indians engaged in commerce. At some period centuries ago a migration must have occurred in the direction of Nigeria from north of Kenya, for not only are there cattle of the Shorthorned Zebu type in the territories bordering on the Gulf of Guinea, but another West African Zebu, the Lyre-horned Zebu, represents an intermixture between the Hamitic Longhorn and Shorthorned Zebu types. Hitherto only five racial groups have been defined in Africa, but it is considered that in view of numbers and uniformity of type, the West African Lyre-horned Zebu deserves to be classed as a sixth group or type⁽¹¹⁾.

Before closing the matter of migrations it should be stressed that migration is still occurring,⁽¹²⁾ the Shorthorned Zebu being the principal type concerned. A study of Map II of the distribution of native cattle shows that the Zebu of East Africa is gradually extending westwards from Northern Rhodesia through the Belgian Congo to the Sudan. In the reply to the Questionnaire—see next section) received from the Cameroons it is learned that zebu cattle are of recent introduction into the north, having come through Northern Nigeria along with their owners from French West Africa.

In describing the cattle of the various African territories, the countries associated with the various migrations will be dealt with as follows:—

- | | |
|--|--|
| First and Second Migration Routes..... | Egypt, French North Africa, Gold Coast, Nigeria, and French Equatorial Africa. |
| Third and Fourth Migration Routes..... | Abyssinia, Anglo Egyptian Sudan, Uganda, Kenya, Belgian Congo, Tanganyika, Northern Rhodesia, Southern Rhodesia, Portuguese East Africa, South West Africa, and Union of South Africa. |
| Fifth and Sixth Migrations | East Africa to West Africa. |

⁽¹¹⁾ A distinct polled type such as is featured by Keller in Ancient Egypt [Kronacher (1921)] need not be discussed here.

⁽¹²⁾ The European partition of Africa has been the most effective check to tribal migration.

CLASSIFICATION OF NATIVE CATTLE.⁽¹³⁾

The indigenous cattle of Africa may be provisionally classified thus:—

<i>Non-Humped.</i>		<i>Humped or Zebu.</i>	
Hamitic Longhorn			{ 1. Original <i>lateral horned Zebu</i> , now called Afrikander. 2. <i>Shorthorned Zebu</i> . Essentially of Asia, but well represented in East Africa.
Brachyceros.	1. <i>True Zebu</i> (Asiatic in origin)		
			{ 3. <i>Sanya</i> , best represented in South Africa. 4. <i>Lyre horned Zebu</i> , best represented in West Africa.
	2. <i>Pseudo-Zebu</i> (African in origin)		

In the main sub-division, the presence or absence of the hump, irrespective of situation and structure, is the determining feature. In the further sub-division into True- and Pseudo-Zebu, not only the geographical origin, but also the type of skull and presence or absence of bifid superior spines of the thoracic vertebrae (from 6th vertebra backwards) have been considered.

The True Zebu has most frequently a long coffin shaped skull and the orbital arches are not prominent. In addition the profile is generally convex, and the thoracic superior spines are bifid.

The Pseudo-Zebu is not only not so uniform in conformation, but the skull shows marked evidence of Hamitic Longhorn influence, being wide in the forehead and the orbital arches prominent. The profile is generally flat. In the Sanga the superior spines of the dorsal vertebrae vary greatly, being either single or bifid; but nothing is known regarding the Lyre-horned Zebu, since no osteological material has been examined. The status of the latter has been determined entirely by photograph, which although as valuable in some respects as a written description, is not sufficient.

Suppose the *type of hump* were used as the criterion for the sub-division of the Zebu, we should have:—

Cervico-thoracic and muscular hump....	{ 1. Original lateral-horned Zebu. 2. Sanga.
Thoracic and musculo-fatty hump.....	
	{ 3. Shorthorned Zebu. 4. Lyre-horned Zebu.

Of the two schemes the former appears to be the more suitable.

A Plea for Co-operation.—The only method of deciding which types occur in a territory is to inspect the cattle *in loco*. Failing this, the alternative method is to (a) procure photographs (lateral view) of typical bulls and cows, with particulars regarding the withers height and nature of hump *in each* case, and (b) obtain, if possible (i) the skull of a good representative of the type, both bull and cow, and (ii) a transverse slice of the hump, about 2 inches in width and taken vertically from the summit of the hump. The

⁽¹³⁾ This classification does not entirely agree with that of Da Costa (1931).

section of the hump, preserved of course in formalin, will at once indicate whether it was taken from *either* a Lateral-horned Zebu (Afrikander) or Sanga *or* from a Shorthorned Zebu or Lyre-horned Zebu. The hump of the Sanga resembles the Afrikander while that of the Lyre-shaped Zebu appears to differ in no way from its Short-horned relative. No data are available concerning the hump in the crosses between the groups mentioned.

The differences between the various types and sub-types are exceedingly well-marked, but in time when skull material is available it will be advisable to express certain features in a statistical manner. Not only will it be necessary to show the most constant features in measurements within the same group, the range of variation in a particular type or sub-type, but also the differences between the several classes.

A word is also necessary in regard to the measurement of cattle. The age, weight and sex must always be given and the following measurements, preferably in centimetres (*cm.*), are suggested:—

- (a) Length of body, *i.e.* from point of shoulder to *Tuber ischii*.
- (b) Height at withers. In the case of cattle with a hump the details including and excluding the hump should be given.
- (c) Height at hookbones, *i.e.* in a line joining the *T. coxae*.
- (d) Depth of chest, *i.e.* immediately behind elbow.
- (e) Width of chest across back, and behind shoulder.
- (f) Width of hookbones.
- (g) Width between thirls, *i.e.* Femur, *Trochanter major*.
- (h) Minimum width between pinbones, *i.e.* *Tuber ischii*.
- (i) Heart girth.
- (j) Length of head from summit of *Torus frontalis* to cranial end of nasal bone.
- (k) Width between eyes at medial canthus.
- (l) Length of croup, *i.e.* from *Tuber coxae* to *Tuber ischii*.

In points which do not lie in a line parallel to the vertebral axis, the measurement is not taken in a direct line but in projection.

QUESTIONNAIRE.

While the Questionnaire might have been inserted after the section Historical Outline, it is felt since much has already been written independently on migration and classification that it would be better if placed here.

“ Countries and Territories from which information is desired.

India.	Algeria.
Egypt.	South West Africa.
Morocco.	Northern and Southern Rhodesia.
Sweden.	Uganda.
Brazil.	Kenya.
Northern and Southern Nigeria.	Norway.
British and French Cameroons.	Tanganyika.
Belgian Congo.	Argentine.

Introduction.

With a view to building up certain types of native cattle in native areas, the Department of Native Affairs of the Union of South Africa is desirous of securing the most complete information possible on all types of native cattle found throughout the continent of Africa, and also of such other types in other parts of the world which resemble in colour marking, conformation, or other special features, certain special types found in the Union. It is hoped by tracing the breed-history of certain types to establish to some extent the breeding lines to be followed with native cattle in South Africa, particularly with reference to the type of local or imported sire to be used.

The countries co-operating in furnishing the information requested will, if they so desire, be supplied with a complete copy of all the information secured with an analysis of the position in relation to South African cattle prepared by the officer responsible for the work in the Union.

General Questions.

1. If possible, give the origin of recognised types or breeds of cattle.
2. Are the breeds or types mentioned under (1) believed to be indigenous or were they imported? If the latter, when and from where?
3. State whether the breeds or types mentioned are lumped or straight-backed.
4. Give a full description of the colour marking of each breed or type mentioned.
5. State whether polled, horned, or a mixture of both, with a description of the horns.
6. State whether the animals are of good beef type or milking type; or neither; or both.
7. State which of any breed described is supposed to be the original breed and whether such breed or type was founded on other types now extinct; and, if the latter, please supply a description, if possible, of such original extinct breeds or types as can be secured from paintings, rock drawings, and sculpture, etc.
8. State which breed or type was first domesticated, the approximate date of domestication, and whether still in use.
9. Please supply photographs in triplicate of typical specimens of both males and females of each breed or type dealt with.
10. Do any of the breeds or types described possess any special features such as slow maturity (say, five to seven years) or display extreme hardihood against adverse climatic conditions (such as great heat, drought), disease resistance, ability to range over great distances, etc.
11. Special mention must please be made and the fullest possible particulars given of any white cattle with dark points which exist in any of the countries mentioned.⁽¹⁴⁾ By dark points is meant black ears, muzzles, eye rings or eye lashes, black teats, black hoofs, or spotted or black markings below the knee and hock; also whether any animals answering this description have black skins covered with white hair and whether black spots show through the white hair causing a silvering or spotted appearance, particularly as the animal advances in years.
12. Which breed or type described is considered to be the most valuable and why.

⁽¹⁴⁾ This point is stressed, for one of us (R.W.T.) considers the colour of the coat, particularly white, an important point in the relationship of native cattle types.

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13. Please give the territorial distribution of any type or types described in such manner as to permit of tracing the areas mentioned on a map. Please also give a description of the areas such as elevation and whether open highland, grass, bush, or forest country; or whether low-lying, hot sandy, marshy bush or forest country with heavy or low rainfall in each case.

14. Whether partially resistant to or immune from any disease such as nagana or other widely distributed and known trouble.

15. Any other information.

In addition to the information asked for under the foregoing general points, information on specific questions would be much esteemed from the following countries:

India.

1. Is the Krishna Valley Indian Zebu any better as a beef or milk producer or in any way different in colour or conformation from the general type of Indian Zebu?

2. Where can the best strain of beef and milking zebu be obtained in India and at what price for males and females?

3. Can any information be supplied as to when cattle were first domesticated in India and whether the present-day Zebu is considered to be descended (without the infusions of other blood) from the original stock.

Egypt.

1. When were cattle first domesticated in Egypt? Did domestication take place during the third Egyptian Dynasty, say, 5,000 to 4,800 B.C. or at an earlier date?

2. Do desert or other rock drawings, sculptures, or other works of art indicate what the conformation of these original animals was like and particularly whether they were humped or straight-backed. Could photographs of any such early and later works of art in which cattle are depicted be supplied?

3. If the straight-backed and humped types both existed in Egypt in the early ages, which was the original type; and, if the straight-backed was the original (which seems likely) when was the humped type introduced, from where, and by whom?

4. Which types of breeds predominate in Egypt to-day? Which is considered the best type or breed for beef and or milk and why?

Morocco and Algeria.

1. Is the predominating type humped or straight backed?

2. Can the origin or breed history of the predominating types be given?

3. Can any photographs be supplied of rock drawings or other works of art depicting cattle of the early ages with approximate dates?

Nigeria (Northern and Southern) and Cameroons (British and French).

1. The closest possible description of the cattle of this area is desired with the breed history or origin particularly of two types, i.e. the Cow Fulani cattle, which are of the usual Zebu type (white with black points and humped) and the small type found in the forest country believed to be straight backed.

Belgian Congo.

1. A full description, the breed history, and origin of the large Ruanda cattle is greatly desired. The colour and markings, whether they are heavily humped, and the type of horn growth, beef, and milk qualities should be specially commented on.

Particulars of any other special types are also desired and particularly whether the small forest type mentioned under the Nigerias and the British and French Cameroons exists and, if so, where and to what extent and whether straight backed.

Norway and Sweden.

1. It is understood that the Scandinavian Fjällras or mountain breed are polled cattle mostly pure white with black points though, in many cases, silvering is noticeable. Is this correct?

2. Is it correct that they are entirely straight backed, i.e. without humps?

3. Any information as to their breed, history and origin, milking, beef qualities, hardihood, etc., will be greatly appreciated.

Brazil and the Argentine.

It is considered possible that the type of cattle in parts of Africa may have been influenced by introductions from Spain and Portugal during the period of Moorish occupation and particularly when the Moors were expelled from Spain; and, further south, they may have been introduced by Portuguese traders, after the discovery of the Cape. If this is the case, then it is likely that the type introduced would have resembled the type introduced into, and which still abounds in, many parts of the South American continent. It is therefore very desirable:—

- (a) To ascertain as nearly as possible the date when cattle were first introduced into South America.
- (b) By whom were they introduced? Presumably the priests of that time?
- (c) Were the animals introduced of any distinct type or breed recognised in Spain or Portugal to-day?
- (d) Does the present Creollo type, descended from the original importations, closely resemble the original or foundation stock?
- (e) An accurate description of the existing type, with photographs, of typical bulls and cows is greatly desired.¹⁵

To summarise, it may be stated that:—

1. General information was required concerning the cattle of twelve African territories and five extra-African countries⁽¹⁵⁾.

2. Special information was requested from six of the African territories and from each of the extra-African territories.

3. In regard to general information particulars were required with reference to:—

- (a) Not only the country of origin but also the racial origin. Emphasis was laid on the evidence afforded by "paintings, rock drawings and sculptures, etc."
- (b) The types of breeds recognised in each country, with details of the horns and humps.
- (c) The value of the various types in regard to beef or milk production.
- (d) The resistance of cattle to disease and adverse climatic conditions.

⁽¹⁵⁾ It was possible to add information from other territories. These are indicated by asterisks.

- (e) Special mention was made of colour, particularly white cattle with dark points, it being believed that this would throw light on the question of relationship of types.
- (f) The territorial distribution of the various types.
- (g) The associated environmental features, *e.g.* altitude, rainfall, type of vegetation, etc.

SUMMARY.

Apart from the Introduction, reference has been made:—

- (a) To the steps leading to the present investigation;
- (b) to the probable migration routes *in* Africa since the earliest folk-wanderings where such have been accompanied by cattle. As Prof. Dart (1933) remarks, "There is no more vital aspect of anthropology than the study of domestic animals". Map I indicates both the probable migration routes *to* Africa and *within* Africa, along with suggested dates of these events;
- (c) to a provisional classification of native cattle based on the presence or absence of the hump and then on the shape of the skull. Of interest is the fact that the so-called True Zebus are Asiatic in origin while the Pseudo-Zebus are African in origin;
- (d) to the Questionnaire issued to the governments of certain countries outside the Union of South Africa⁽¹⁶⁾.

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⁽¹⁶⁾ An important factor from the point of view of limitation is Glossina. Curson and Neitz hope to publish such a map shortly.

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CHAPTER II.

THE NATIVE CATTLE OF AFRICA. ⁽¹⁷⁾

INTRODUCTION.

Further to the Questionnaire it will be observed that in the data which follow, emphasis has been laid upon cattle types and their general distribution. The replies as a rule having furnished so little information in regard to environmental conditions, *e.g.* altitude, rainfall, and vegetation, it is felt, that having mapped out the distribution of cattle (see Map II), one could more profitably compare this with good topographical maps such as those already compiled by Shantz and Marbut (1923).

The same remark applies in general to other points raised, *e.g.* economic uses of cattle, resistance to disease and adverse conditions, maturity, etc. So little work has been done on beef and milk production that the authorities with justice could not be expected to reply in detail to this question. Where information exists it has been included in the text.

⁽¹⁷⁾ According to *Vet. Jl.* of 18.4.36 (quoting *Meat Trades Jl.*) the distribution of cattle by continents is Asia 185,541,000, Europe 141,984,000, South America 104,840,000, North America 93,830,000, Africa 22,547,000 and Australasia 18,606,000.

Concerning resistance against disease and adverse conditions in general, it can be accepted that native cattle, which have been subjected to the vicissitudes of the country of their origin for centuries, are able to withstand such adverse circumstances better than European cattle. Again local cattle are more resistant than introduced cattle. The term "acclimatised" expresses the state when animals introduced into a certain locality have acquired and are able to resist the many vicissitudes of the area in question, *e.g.* climatic conditions, pasturage and local diseases. A striking example of adaptation is the Shorthorned Zebu which according to the Tanganyika veterinary reports is superior to the Ankole.

In regard to maturity, while puberty is as early or earlier when compared with European breeds, production maturity cannot be expected as soon in Africa owing to the different environment.

(A) FIRST AND SECOND MIGRATIONS.

In a description of the cattle of North and West Africa we must consider the human migrations into Egypt, the gateway of Africa from Asia. As has already been described the early wanderings were along the Mediterranean shore to Morocco, and then either north into Europe or south to the countries around the Gulf of Guinea. We may now pass on to a description of the cattle in the territories associated with those early migrations.

Egypt.

The reply furnished by the Veterinary Service of the Egyptian Ministry of Agriculture and forwarded through the High Commissioner, Cairo, to the Department of External Affairs, Pretoria (High Commissioner's letter 248/6/32 of 4.4.32), states⁽¹⁸⁾ as follows:—

Origin.

(a) "The date of cattle *domestication* is rather obscure, but it took place from the earliest stages of Egyptian history, even before the 3rd Egyptian Dynasty (*c.* 4000 B.C.). It is known that King Mina (Menes) was very interested in agriculture and land reclamation. He utilised both man power and cattle power to alter the position of the river Nile from the desert to its present position. Most of these indigenous animals were *polled* [our italics! Polled cattle were known in ancient Egypt—see Neffgen (1904) and Kronacher (1921)], but became extinct about 2000 B.C., and replaced by the types⁽¹⁹⁾ mentioned" below. See Fig 4.

⁽¹⁸⁾ Accompanying this were 18 excellent photographs, 4 of ancient monuments showing the Hamitic Longhorn type, 1 showing the original pre-Roman Brachyceros type (see Fig. 2 of "A Note on the Three Parent Stocks of African Cattle" by Curson, H. H., *Onderstepoort Jl. Vet. Sc. and Animal Indust.*, 1935), 2 of the present Shorthorned Zebu, 1 of the Afrikander, 2 of European cattle and finally 8 of the Egyptian cattle of to-day.

⁽¹⁹⁾ Curson uses the term *type* to indicate the main classes of cattle, *e.g.* Hamitic Longhorn, Lateralthorned Zebu, Brachyceros, Shorthorned Zebu, Lyre-horned Zebu and Sanga. The word *subtype* is employed for each sub-class within the main class, *e.g.* in the Sanga main group are, among others, the following subtypes:—Ankole, Baila, Bechuana, Ambo, Zulu and Makalanga. *Breeds* may be evolved from the subtypes, *e.g.* Black "Nkone" and "Nyoniaipumuli" from the Zulu.

Photographs were supplied illustrating from ancient monuments the extinct type; but while these indicate horned cattle (Hamitic Longhorn), the text again refers to the cattle as being "mostly polled"! It is, however, considered that the term *horned* and not *polled* is meant. See Fig. 1.

(b) In describing the types of cattle *introduced into Egypt subsequently*, the following are referred to:—

- (i) Afrikander. These "were brought into the land during the many . . . conquests of the ancient Egyptians . . . and therefore it is the oldest in date . . . nearly 3000 B.C." See Fig. 3.
 - (ii) European cattle (*Bos taurus*). These "were imported especially by the Romans on their conquest of Egypt⁽²⁰⁾ and their settling to farming . . ." See Fig. 4.
- and (iii) The Zebu *i.e.* Shorthorned Zebu (*Bos indicus*). These were "imported especially by the Arabs during their invasion of the country and therefore it is of more recent date" (669 A.D.).

The result of the intermingling which has since followed is shown in Figures 5–12; but a comment made in describing the present cattle of Egypt namely that they "can hardly be considered now as distinct breeds" is significant.

(c) The above details summarised indicate that Egyptian cattle first became domesticated "probably before and during the Neolithic era" (Curson and Epstein 1934), but that about 2000 B.C. they became extinct. They were, however, replaced from without Egypt during three series of invasions, when (a) the Afrikander (presumably from Asia), (b) *Bos taurus* from Europe and (c) *Bos indicus* from Asia were introduced.

Present Cattle.

In view of the remark made above regarding the non-distinctiveness of the so-called types of cattle, it is perhaps advisable to refer to them not so much according to their conformation (the usual method), but in accordance with their geographical distribution. The document sent from Cairo gives the following information:—

- (a) In *Lower Egypt* are to be found the (i) Damietta (Fig. 5 and 6) and (ii) Baladi or Beheri (Fig. 7 and 8) cattle, the former predominating along the coast.
 - (b) In *Upper Egypt* along the Nile occurs the Saiidi type (Figs. 9 and 10.)
- and (c) In the *desert* are the Marriouti or Arabian cattle (Figs. 11 and 12).⁽²¹⁾

⁽²⁰⁾ Octavianus (Augustus) defeated Cleopatra's forces at Actium in 31 B.C. and thereupon became master of Egypt. The Roman garrison consisted of one legion, approximately 4,000 men.

⁽²¹⁾ According to information kindly furnished by the Chief Veterinary Officer, Palestine (his V/8/2/20 of 8.3.35), an Arab breed occurs in his territory. No photograph accompanied his description of the breed, but it is likely to be essentially of *Brachyceros* type as is the Marriouti beast.

“ All types mentioned show predominance of red (of lighter or darker shade), occasionally black is found and also white spottings . . . the horns are nearly cylindrical, not longer than eight inches, bluntly ended with either horizontal outward or downward sweeps. The Damietta cattle have finer and occasionally more pointed horns with an upward sweep ”.

“ All types of Egyptian cattle are somewhat slow to mature, hardy against heat and drought (especially the Marriouti) and possess great resistance to indigenous diseases ”.

“ Dark points are met with in all types of Egyptian cattle, especially the black muzzle, eye rings, eye lashes, black hoofs and black legs under knees and hocks. Black skins covered with white hair are not found among Egyptian cattle . . . Red animals with black shoulders, necks, and quarters are much in favour ”.

Special features of the various types may be mentioned thus:—

- (i) The Damietta cattle “ are very slightly humped (due to the predominance of European blood) . . . and are valuable in their native district for milk purposes ”. The distribution is, “ predominates near the coast of the Mediterranean to the north-east of the Delta ”.
- (ii) “ The Baladi type is the most valuable, because of its size and strength for work purposes. It is found in Lower and Central Egypt ”.
- (iii) Saiidi cattle are “ met with in the southern provinces of Upper Egypt along the Nile banks ”.
- and (iv) The Marriouti type is “ rare in numbers ” and is to be “ seen in the desert near the coast of the Mediterranean to the north-west of the Delta ”.

In regard to immunity against local diseases, it is stated that “ all Egyptian cattle are highly resistant to Stiff-sickness and Foot and Mouth Disease (not the suckling calves). They are also resistant to Texas or Egyptian Fever (except in some cases of debility and old age) ”.

To summarise, it may be stated that while the conformation is somewhat similar in all Egyptian cattle (due to crossing “ for very many generations ”), yet geographically, certain groups are recognised, *viz.* the Damietta and Baladi in Lower Egypt, the Saiidi in Upper Egypt, and the Marriouti or Arabian cattle of the desert. These cattle possess immunity to certain local diseases.

Discussion.

Origin.—As indicated, *domestication* occurred “ probably before and during the Neolithic era ”, and the cattle were mainly of long-horned and humpless type, now called the Hamitic or Egyptian Longhorn. It is not agreed by the authors (H. H. C. and R. W. T.) that these cattle became “ extinct about 2000 B.C.”

As to the *subsequent introduction* of cattle, whereas Curson and Epstein believe that they arrived in the order Brachyceros, Lateral-horned Zebu (Afrikander) and Shorthorned Zebu, the Egyptian authorities hold that the Afrikander came first, to be followed by European (? Brachyceros) cattle during the Roman occupation and then by the Shorthorned Zebu. It is generally accepted that the last named accompanied the expansion of Islam during the VIIIth century.

The cattle stated to be of European origin are of Brachyceros type, and are believed by Curson and Epstein to have been introduced prior to the Roman occupation *from Asia*, as the "mural reliefs of the temple of Hatshepsut in Dair-al-Bahri" (Yahuda 1934, p. 8) show. Their influence on the present cattle of Egypt is striking.

Epstein (1933) has referred to the part played by the Lateral-horned Zebu in Egypt, and according to him the Sanga (or so-called native cattle of Central and Southern Africa) represent the cross between this Zebu and the original Hamitic cattle. Judging by the hump of the Egyptian cattle of to-day, the importation of Lateral-horned Zebras (Afrikander) into North-East Africa must have been on a very large scale⁽²²⁾.

Present Types.—Confirming the observation that there is a uniformity of Egyptian cattle, owing to the intermingling of centuries, is Flower's (1932) comment that in his time (?) "the domestic cattle of Egypt . . . were all of one shorthorned type from Alexandria to Aswan".

One naturally enquires what the photographs indicate? The reply is that with the exception of the hump which is *cervico-thoracic* and best marked in the bulls, the cattle show Brachyceros features. The hump, which is also prominent in the Saiidi cow, Fig. 10, is of the shape observed in the Afrikander and Sanga types and *not* of the form and situation observed in the Shorthorned Zebu, which according to the opinion of the Ministry of Agriculture, Cairo, is responsible for the marked hump of the Saiidi cattle.

What has probably happened is that formerly (up to some centuries ago), the cattle of Egypt were generally of the Sanga type; but that through the constant introduction of cattle of the Brachyceros type (now admittedly from Europe), the conformation has become almost Brachyceros-like, the hump, however, retaining the characteristics of that of the Afrikander (or Sanga) type. In this connection it is significant that the "Damietta cattle are very slightly humped" (due to the predominance of what Curson and Epstein prefer to term Brachyceros⁽²³⁾ "blood").

As will be manifest later, in Algeria apparently all evidence of the cervico-thoracic hump has disappeared and the cattle are definitely of Brachyceros type.

⁽²²⁾ On the other hand the importation and influence of Sanga cattle from the Sudan must also be considered.

⁽²³⁾ The Cairo reply uses the word European.

It would seem that in Egypt unlike in East Africa, the Short-horned Zebu did not swamp the country⁽²⁴⁾. Again the same process, as described in the last paragraph but one, is occurring in the Subcontinent to-day, where cattle of Sanga type through indiscriminate crossing with European cattle are being replaced by nondescript animals of *Brachyceros* type.

French North Africa.

The subjoined particulars were provided mainly by the Heads of the Service de l'Élevage of Algeria and Morocco, who were approached in the first instance through the British Embassy, Paris. The particulars forwarded from Paris to Pretoria were sent under cover of letters dated 25th January, 1932 (concerning Morocco) and 9th March, 1932 (concerning Algeria) and addressed to the Minister of External Affairs (General The Honourable J. B. M. Hertzog).

Origin.

The cattle of North Africa are essentially of one type, *Brachyceros*; but through differing environment and admixture in the distant past the blood of other types (*e.g.* Afrikander in Egypt and probably Hamitic Longhorn in North West Africa), sub-types have arisen. From these sub-types, breeds have been created chiefly by selection, on the initiative of the French authorities, when they took possession of the country. Johnston (1906, p. 908) refers to rock engravings of cattle in the Sahara.

While the relationship with the *Brachyceros* cattle of Europe is generally recognised, Saint-Hilaire is not inclined (p. 189) to support the theory of an origin from Asia by way of Egypt.

Present Cattle.

The territories to be considered now are Tunis, Algeria and Morocco.

*Tunis.**

No questionnaire was sent to Tunis, but for completeness information bearing on the country will be given.

According to Saint Hilaire (1919), the cattle resemble those of the Guelma "variété" of Algeria to which we shall refer later. He adds that the cattle of Tunis are among those having the best conformation in North Africa, owing to improvement brought about by local selection and thus giving the most rapid results (p. 194). See Figs. 13 and 14 (Plate XIX of Saint-Hilaire 1919) which show a typical Tunisian bull and cow.

Algeria.

In addition to Saint-Hilaire's volume, replies to the questionnaire are available from the Departments of Constantine, Algiers and Oran. Unfortunately not the originals but their translations were received for this compilation.

⁽²⁴⁾ Little or nothing is known of the genetics of the hump. It is obviously of importance in classification.

The following breeds (*variétés*) are to be found:—

- (a) Cheurfa occurring in the Department of Constantine.
 - (b) Guelma found throughout the country, but chiefly in the eastern part of Algeria.
 - (c) Kabyle from Constantine to Algiers.
 - (d) Oran found in the Department of the same name.
- And (e) Chaouia occurring in the Department of Constantine. This breed is mentioned in the reply from Constantine, but no particulars are given except that it resembles the Guelma and Cheurfa breeds.

Illustrations are available of the Chuerfa bull (Fig. 15) and of the Guelma bull and cow (Figs. 16 and 17).

The Cheurfa breed is believed by some authorities to represent the “*variété*” from which the Guelma was evolved (Saint-Hilaire, p. 192), since its distribution, especially in the south of Constantine, is more extensive than that of the Guelma. The main differences are the better development of body and the “*prédominance de blanc*” of the coat, giving a light grey colour. “The coat of the bull is always darker than that of the ox and the cow” (Reply of 25.4.32 from Constantine). In general the Chuerfa is taller and bigger and more in demand than the Guelma.

It is clear from the reply from Algiers and Oran that the authorities do not distinguish between the above two breeds, for the cattle of Algeria are roughly classed into (a) the Guelma of eastern Algeria and (b) the Moroccan cattle of western Algeria. The former are described as short, the height varying from 1.15 m. to 1.25 m., the horns are small and carried horizontally, they are sharp pointed and the colour is white at the base and black at the tip. There is a band of white hair above the muzzle which with the buccal mucosa is black. The colour of the coat varies from a deep iron grey of the head, neck, shoulders, lower flank, and leg to a pale grey elsewhere, except the under surface of the belly which in the majority of cases is white. The conformation is pleasing from an European standpoint, the body being thick set and the ribs well rounded. As is noticeable in Figs. 16 and 17, the tail is long, light grey in colour and ends in a black tuft.

The Kabyle breed is an excellent example of the effect of environment on conformation. Through grazing on poor pastures for generations the cattle, which are of *Brachyceros* type, have degenerated and vary now in size from 0.8m. to 1.15m. While in general resembling other cattle of East Algeria, the Kabyle has in proportion a longer skull and is “*plus osseuse que le Guelma*” (Saint-Hilaire, p. 192).

The Oran cattle are described as somewhat less regular in build than other Algerian cattle, but bulkier and larger in size; varying between 1.20 m. and 1.25 m. They have no doubt been influenced by Moroccan cattle which appear to possess some proportion of Hamitic Longhorn blood.

Morocco.

The Chief of the Cattle Breeding Service of Morocco writing from Rabat on 29.12.31 states that the origin of Moroccan cattle is uncertain.

Moroccan cattle occur also in the Department of Oran, "being met with regularly in the markets of Marnia and Ain-Témouchent". They are bigger than the eastern cattle and range up to 1.40 m. in height. The horns grow outwards and upwards in a regular curve . . . the withers are thick and well defined, the back broad and its line often regular. The rump tends to narrowness with the haunches protruding. . . . The fore limbs are strong and regular and the chest deep. . . . The coat varies from jet black to dull white, passing through all shades of red which is the predominating colour (Reply from Oran). See Figs. 18 and 19 illustrating the type (Plate XXI from Saint-Hilaire).

Saint Hilaire states (p. 196) that in East Morocco the cattle of the mountainous region are short with a dark coat and resemble the Kabyle cattle.

In a publication issued by the Service del'Élevage in 1923, while it is stated that the cattle are characterised by a lack of uniformity, two breeds, however, may be recognised. The first, *la race brune*, has a dun coat with black extremities and the second, *la race blond*, has a pale coat with the extremities slightly pigmented or without pigmentation at all.

Attempts at improving the native herds by grading up with European, especially French breeds, and the Shorthorned Zebu, are being made.

North African cattle are stated to be indifferent milkers, especially those of Western Algeria. The reply from Constantine describes the milk as rich in butter-fat, and that from Algiers and Oran gives the average milk yield as up to six litres, although 8-10 litres may be occasionally obtained. Saint-Hilaire believes that in Morocco with its better climatic conditions the possibilities for improving the milk yield are superior to those of Algeria and Tunis. He adds that in the "Vallée du Sebou par exemple, elles donnent jusqu'à 14 à 15 litres" (p. 196).

In regard to live weight he states (p. 195) that whereas the average figure for Algerian and Tunisian cattle does not exceed 250 Kg. probably 50 Kg. less according to the Oran data), the cattle of Maghret, Morocco, give an average of 275 Kg. Cattle are, however, met with which exceed 400 Kg.

West Africa.

As will be seen (p. 12) questionnaires were sent only to Nigeria and the French Cameroons (Mandated Territory), but it is felt that information bearing on other territories should be recorded, for it is in West Africa that least is available about indigenous cattle.

West Africa represents, as does South Africa, a *cul-de-sac* and it is the furthest point which could be traversed by tribes migrating from the north and east. Unlike South Africa, however, the unfortunate nomads could not continue following the coast-line southwards (as did the Hottentots in South Africa) for their advance was blocked by the immense equatorial barrier of *Glossina*. Presumably what happened was that the earliest people with their Hamitic cattle did not penetrate the dense forest region bordering the Gulf of Guinea, but dispersed in the more open country between French Senegal and Northern Nigeria.

The succeeding wave of migration, with *Brachyceros* herds, on finding only the littoral unoccupied were accordingly compelled to inhabit the *Glossina* infested jungle along the Gulf of Guinea. These territories are known to-day as French Guinea, Liberia⁽²⁵⁾, Ivory Coast, Gold Coast, Dahomey, Southern Nigeria and French Camerouns. Through living in such an unfavourable environment *Brachyceros* cattle have in the course of centuries (or rather millenia) deteriorated and are now considerably smaller in size than their relatives in Europe, *e.g.* the Jersey, Guernsey and Kerry. While dwarf-like and of no value at present for dairy purposes, the type is at least resistant to Nagana, a malady which would kill European cattle in a few weeks.

Above have been outlined the First and Second Migrations, but a description of West African cattle would be incomplete, unless reference were made to the Fifth and Sixth Migrations. The former concerns the arrival in West Africa, in the vicinity of Lake Chad, of nomads from North-East Africa (probably Abyssinia), accompanied by Sanga cattle. As will be seen in Fig. 36, these cattle, represented to-day by the Bornu cattle, are similar to the Sanga cattle of South and Central Africa.

The Sixth Migration refers to the passage of the Shorthorned Zebu from the East African coastlands westwards north of the Equatorial "fly" region, to Northern Nigeria and French West Africa (north of the *Glossina* region). From these cattle, along with the early Hamitic Longhorn stock, has arisen the Lyre-horned Zebu, best represented in West Africa and to which this is the first reference as a distinct type. Stewart of the Gold Coast writes (14.1.36) that the cross between the Shorthorned Zebu and *Brachyceros* has given rise to an intermixture which exists in large numbers, but until more details are available as to the uniformity and conformation of the hybrid, it cannot be considered in a general survey. It was Pierre (1906) who attributed the origin of what is apparently the Sanga (see Figs. 24-26) to this cross.

Another new feature is the use of the term Lateral-horned Zebu (in place of longhorned Zebu) for Afrikander, made necessary by the incorporation of a sixth cattle type, the Lyre-horned Zebu which is also longhorned.

(25) On Sir Harry Johnston's evidence Hamitic Longhorn cattle also occur in Liberia.

To summarise, it may be stated that the following cattle types are to be found in West Africa:—Hamitic Longhorn (few in Liberia), Brachyceros, Shorthorned Zebu, Sanga, and Lyre-horned Zebu.

Each territory will now be considered separately.

*French West Africa.**

It was from a French veterinarian, Pierre, that the first description of West African cattle was received. In his *L'Élevage dans l'Afrique Occidentale Française* Pierre classifies the genus Bos thus:

- (a) " les bovidés zébus " *i.e.* humped cattle, and
- (b) " les bovidés taurins " *i.e.* non-humped cattle.

(a) The term zebu in West Africa, as indicated above, appears to include not only the Shorthorned Zebu seen in East Africa, but also cattle with lyre-shaped horns and a thoracic hump. The general information suggests a strong infusion of Hamitic Longhorn blood, which can be well understood when one considers Sir Harry Johnston's (1906) evidence concerning Mandingo cattle in Liberia.

The Zebu is described as occurring throughout French West Africa north of latitude 14°. South of this line trypanosomiasis and piroplasmiasis are the factors limiting its extension.

Pierre, as the result chiefly of environmental influence, further groups the zebu as follows:—

- (i) The Peulhe or Gobra sub-type,⁽²⁶⁾
- (ii) The Moorish or Gabaruyé sub-type,
- (iii) The Nigerian or Foulbé sub-type, and
- (iv) The Fogha sub-type.

The four sub-types are shown in Figs. 20-23. The Peulhe and Moorish cattle quite evidently belong to the Lyre-horned Zebu type. It must be remembered that in British Nigeria several types of Zebu cattle also occur, and these are not to be confused with the French Nigerian Zebu.

(b) Pierre includes in the designation taurine, not only the Ndama cattle (of Brachyceros type), but also the intermixtures arising between cattle of Zebu and Brachyceros types. In this paragraph reference is made only to true Brachyceros cattle, their crosses being left to the following paragraph. Pierre mentions the Race de Borgou and Race Cotière, but these are also " *varieties* " of Brachyceros⁽²⁷⁾.

Among the derived types of cattle originating through crossing are:—(a) The Bambara or Mandé and (b) the Djakoré or Senegalese cattle. The *former* is described by Pierre as uniform and widely

⁽²⁶⁾ Pierre actually uses the word " *variété* ".

⁽²⁷⁾ Pierre describes the Race Cotière as frequently being hornless. Stewart in the Gold Coast encountered six polled cattle out of approximately 200,000 (private communication).

distributed. Figs. 24 and 25 show the conformation. It will be noted that there is a fairly prominent cervico-thoracic elevation, and Pierre, instead of describing a "bosse" or hump, mentions that the withers ("le garrot") are sometimes elevated and very large. The latter is said to be the cross between the Gobra bull (Lyre-horned Zebu) and the Ndama cow (Brachyceros). The hump (*i.e.* the thoracic musculo-fatty structure) is said to have disappeared, but remarkable to relate, the Djakoré beast "reprend tous les caractères zootechniques du père à la 3e ou 4e génération" (p. 109). See Fig. 26.

Pierre makes no reference to Mandingo cattle which Johnston describes as "the dominant type of the Mandingo Plateau and the regions of the Upper Niger, Senegal . . ." (p. 907). See Figs. 27 and 28.

*Gold Coast.**

Thanks to Pierre and Stewart (P.V.O., Gold Coast) much information is available concerning Brachyceros cattle not only in the Gold Coast but throughout West Africa. It was the second authority who first used the name West African Shorthorn for cattle of this type. Two papers (by Epstein and Curson respectively), summarising the chief facts regarding Brachyceros cattle in Northern Africa, were published in the *Journal of the South African Veterinary Medical Association*, Vol. V, No. 3, 1934.

Stewart (*Ann. Rpt.* 1929-30, p. 10) confirms Pierre's observation that the country south of latitude 14° is not occupied by Zebu cattle in any number. He states that "these cattle (zebu) are imported (from French territory) and travel to the markets of the Colony and Ashanti for slaughter." He refers to the importation of zebu bulls for breeding purposes and adds (p. 17) that "the best type of zebu for crossing is the short deep chested beast which is bred in the north-west of French Haute Volta." Presumably the bull he shows opposite p. 17 is of good type. It resembles somewhat the East African Shorthorned Zebu except for the horns which suggest Brachyceros influence. See Fig. 29.

Referring to the cross between the Zebu bull and Brachyceros cow Stewart gives an excellent photograph of the calf which is humped, a feature contrary to Pierre's experience. See Fig. 30.

Stewart in discussing resistance to disease states that Brachyceros cattle are more resistant to Nagana, Lung sickness and Streptothricosis⁽²⁸⁾ than the Zebu, while the latter are more resistant to Rinderpest. This resistance to Nagana is transmitted to the progeny.

According to the same authority (*Annual Report*, 1934-35) there are 192,000 cattle in the country.

⁽²⁸⁾ In the *Annual Report Vet. Dept. Nigeria* for 1925 (p. 15), this is called Contagious Impetigo. It is not clear whether this is the Contagious Impetigo described by Hornby in *Vet. Jl.*, June, 1920, in Central Africa. See also a note on Saria by Curson in *Vet. Jl.* of Nov., 1920.

*Liberia.**

As far back as 1906 Johnston described "the black and white or brown and white dwarf small horned cattle" as "the dominant breed in the coast regions of Liberia" (p. 907). He adds "the other type of Liberian cattle, generally called the Mandingo ox, is an interesting form, which in some respects suggests a dwarf variety of the Egyptian longhorned, straight-backed, uniform-coloured cattle". He believes the Mandingo to be "a hybrid between the *Bos taurus*⁽²⁹⁾ and *Bos aegyptiacus*" which view appears very probable, the Hamitic characteristics predominating except possibly for size.

Johnston, in a footnote (p. 908), states that rock engravings in the Sahara indicate the use of cattle as transport animals "before the camel became abundant." Possibly close inspection of the engravings would show the type of cattle employed *e.g.*, whether Hamitic, Brachyceros, Shorthorned Zebu or Sanga! See Figs. 27 and 28.

*Sierra Leone.**

Johnston (1906, p. 907) describes the Mandingo beast as "the dominant type . . . of Sierra Leone", but the Brachyceros is also present (Stewart *Ann. Rpt.* 1930-31).

According to Minute A/76/29 of 28.5.36 from the Colonial Secretary, Sierra Leone "The Acting Director of Agriculture reports that cattle in Sierra Leone are all of the same breed—the Mandingo ox—". Fig. 1, Plate XVIII of Dr. J. J. Simpson's article on Entomological Research in Sierra Leone (*Bull. Entom. Res.* IV 1914) shows cattle resembling a Hamitic Longhorn-Brachyceros cross as indicated by Johnston. Only examination of the skull, however, will solve the point. The Brachyceros-Shorthorned Zebu and Brachyceros-Hamitic Longhorn crosses urgently require study.

*Gambia.**

Although nothing definite is known, it would seem that *Bos brachyceros* is the dominant type of Gambia. In any case the cattle population is very small (letter 1184/30/1911 of 16.10.35, P.V.O., Gold Coast).

*Portuguese Guinea.**

The cattle are essentially of Brachyceros type and according to Da Costa (1931) comprise two distinct sub-types ("races"), *viz.*: the Foulah which has a straight profile of the head, is white in colour, and found along the Oco; and the Manjaca, occupying the Brames region, with a concave profile and black coat.

The cattle population in 1932 was 62,000.

Nigeria.

The Questionnaire was answered by Capt. W. W. Henderson, M.R.C.V.S. and the reply sent through the Chief Secretary's Office, Lagos (12636/62 of 11.3.32) to the Secretary for External Affairs.

(29) Johnston's name for *Bos brachyceros*.

In a former paper Curson (1934) endeavoured to classify the cattle of this Colony according to the information supplied by Brandt (1925); but as suggested on that occasion recent additional evidence now makes a revision of the classification necessary. Brandt's article was unaccompanied by illustrations, but apparently the position is that "with the exception of the small percentage of humpless cattle⁽³⁰⁾ owned by the Pagans the cattle are all of the Zebu type" (Anderson, A.W. 1933). The type of beast, in most cases, resembles the Lyre-horned Zebu of French West Africa. See Figs. 31-34.

As far as sub-types are concerned, the following is Brandt's original description:—

- (a) The Fulani, "a large breed with the prevailing colour white, although some are found with small black flecks. The hump is large and the horns are long and curved upwards." See Figs. 31 and 32⁽³¹⁾.
- (b) A smaller edition of (a).
- (c) Another Fulani breed, being "large-humped, narrow bodied, red . . . with long wide-spreading horns." See Fig. 33.
- (d) "A long-backed humpless breed with medium length horns of huge diameter; the prevailing colour is white, but all colours are met with; found chiefly in Bornu." This is the Sanga⁽³²⁾.
- (e) "The Shuwa of Bornu—a parti-coloured, medium sized, very compact breed, with short legs, practically no hump and short horns."

From recent issues of the *Annual Report of the Agricultural Department, Nigeria*, it is learned (*Report of 1930*) that herds had been established of the (a) White Fulani, (b) Shuwa-Bornu and (c) Adar-Sokoto-cattle, and later (*Report of 1933*) the Godali-Sokoto-cattle are mentioned. Particulars with regard to conformation and utility are, however, not yet available, but Figs. 31-36 show the type.

It is gratifying that investigational work affecting native cattle is being undertaken in Nigeria, an important contribution being that of Anderson (1933) who summarizes his observations as follows:—

"1. Nigerian pastures are of low feeding value, especially during the dry season. As judged by chemical standards the mineral balance does not appear to be abnormal but pica is prevalent and is prevented or cured by administration of sodium. Increasing the caloric, but not the mineral intake, improves rate of weight and hastens sexual maturity.

⁽³⁰⁾ *i.e.* Brachyceros.

⁽³¹⁾ It is not stated what type of hump occurs. It appears to be a Lyre-horned Zebu. See Curson and Bisschop (1935).

⁽³²⁾ The hump is cervico-thoracic and small. See Fig. 36.

2. The standard of the cattle is very low in spite of careful selective breeding on the part of herd owners. Environmental conditions are such that *improvement by European stock is impossible*. With the maximum improvement in nutritional conditions economically possible, the most advantageous policy appears to be to breed within the existing herds for a combination of high milk yield and high reproductive rate."

One is interested in the remark that "careful selective breeding" is undertaken by herd owners. Nigeria must be one of the few parts of Africa where this is done by natives.

Anderson's view supports that of du Toit (1927) who, in discussing cattle improvement in Nigeria, recommended "selection from native stock" in preference to grading up with European stock.

French Equatorial Africa.

French Cameroons⁽³³⁾.

The only information relating to Equatorial Africa is that concerning the French Mandated Territory of the Cameroun. The reply to the Questionnaire was arranged through the British Embassy, Paris, which forwarded the reply in question to the Minister of External Affairs under cover of a letter dated 26th April, 1932⁽³⁴⁾.

The reply is instructive not only for the description of cattle types but also for information on cattle husbandry.

Cattle Types.

The cattle are either non-humped or humped⁽³⁵⁾. The former group comprises *Brachyceros*, this being almost if not, the extreme southern limit of distribution. The cattle are said to be 75-1. m in height, very well built and very lively. Strangely they live in the mountains, but this is due to the fact that their owners were forced to retreat from the fertile plains of the Diamaré and the Adamaona at the time of the Peulh migration about 25 years ago. "The small animal, which is on the way to extinction still exists in small herds in the Mandara, in Namchi-Allan-Tikas and in the south. It does not constitute a commercial article and the kirdi or pagans rarely concern themselves with it, for they do not drink milk and only eat beef in exceptional circumstances. On the death of a pagan one or more oxen are sacrificed and the corpse is rolled up in the hides of the slaughtered animals."

The latter group is of recent origin and appears to include the following types:—(a) Shorthorned Zebu or Arabian humped cattle, (b) Lyre-horned Zebu and (c) Sanga.

⁽³³⁾ No reply can be traced from British Cameroons, now a part of Nigeria.

⁽³⁴⁾ Unfortunately the French version was not available, a translation having been made before reaching me. (H. H. C.)

⁽³⁵⁾ The reply states that the cattle of the river region, called Kouri after the tribe owning them, are non-humped; but the description indicates they are of Sanga type, being similar to the Bornu cattle of Nigeria.

The Arabian cattle or Choas are described as "well assorted, well formed" and intermediate in height between the next two sub-types to be described, *viz.*: Poulfoulo and Mbororo—1·30-1·40 m.—"They fatten easily and are widely used for the transport of women and merchandise. Their home is in the districts of Fort Foureau and Mandara and from Mandara onwards to Lagone in Upper Balgué".

The Lyre-horned Zebu appears to be represented by the short Poulfoulo (1·25-1·35 m.) and the tall Mbororo (1·3-1·7 m.) cattle. "The Poulfoulo sub-type is owned by the Peulhs or Poulhos who arrived in two distinct migration waves, one *via* Baguirmi and the other *via* Northern Nigeria. The cattle are prolific and hardy and survive everywhere. The skeleton is small and light, but the capacity to put on beef is marked, the weight of four quarters (minus the head) varying between 55-60 per cent. in the case of adult oxen. The milk yield is low, 3-4 litres a day being the average. Good milk cows with sufficient feeding may give up to 6 litres. The milk (as is generally the case in humped cattle) is rich in fat, 19 litres yielding 1 Kg. of fat".

The Mbororo cattle, usually dark chestnut in colour, are owned by the Mbororo people who are essentially nomads and related to the Peulhs, who, however, are settling down in small colonies or villages under a *lamido* (chief or sheik). The cattle are characterised by immense upward curving horns, and a powerful frame. They would be suitable for draught purposes but for slaughter are inferior to the Poulfoulo.

The Sanga or Kouri cattle are of large size (1·4-1·5 m.) and possess horns of extraordinary length and diameter, which nevertheless are remarkably light. The coat is generally light in colour (ivory) and the cattle found about Lake Chad are wonderful swimmers, travelling from island to island under the direction of the herd boy.

Cattle Trade.

Although attached to his herd, the breeder has from time to time to dispose of a certain number of animals in order to provide for his needs. These are either slaughtered in the large centres, especially on market days, or driven to the south of the colony where stock-breeding is impossible, or lastly, and this is the most frequent, to Nigeria. Generally old cows and those which only calve very rarely, infertile heifers, old reproducers and superfluous bull-calves form the subject of these transactions. Fertile cows are only sold on the market in exceptional circumstances and are generally exchanged for other stock, mostly horses. The young bulls are taken to the market at the age of 2, 3 or 4 years. Sometimes the traders go to the villages and make their purchases from amongst the flock. If intended for Nigeria the animals bought on the various markets are grouped in herds; these by successive stages reach the big markets of Maidougari, Kano, Sora, and are sometimes driven as far as Port Harcourt. The cattle trade with Nigeria is by far the most important, and consists mostly of animals coming from the weekly markets of Marona, Mindiff, Bogo Fudere and Adanuri.

The reasons for this trade movement towards Nigeria are as follows:—

A higher rate of exchange.

Traffic facilities, improved roads, and, generally speaking, safety from tsetseflies.

Facilities exist for exchanging the money obtained for goods (easily saleable at a profit on their return) such as fabrics, silks, pearls, sugar, salt, etc. These commodities are abundant at Maidougari and Kano.

Animals purchased in the north of the colony for 300 francs have fetched prices ranging from £4 to £5 at Yerona.

Apart from the private *Compagnie Pastorale*, the cattle trade is in the hands of the Hausas. A few Europeans installed at Marona have for some years been draining large numbers of cattle into Nigeria. At present they seem to prefer the trade in oxhides and sheepskins.

The cattle number approximately half a million, and are confined mostly to the northern districts.

The absence of photographs, while to be regretted, in that confirmation of the classification is not possible, is amply compensated by the detailed description provided by the French authorities.

SUMMARY.

In regard to the present cattle types and their distribution, this information, associated with the First and Second Migrations of Hamitic Longhorn and *Brachyceros* cattle respectively, is actually summarised pictorially in the photographs and in Map II. To discuss each country individually it may be stated as follows:—

Egypt.—(1) The view of the Egyptian authorities in regard to *origin*, is more or less in accord with that published independently by Curson and Epstein (1934). Certain points advanced by the Cairo reply requiring further consideration are:—(a) belief that original cattle of Egypt were polled⁽³⁶⁾ and became extinct about 2000 B.C.

(2) The monuments of Egypt furnish valuable evidence concerning the early history of the country, the types having been Hamitic Longhorn, *Brachyceros*, Lateral-Horned Zebu (*Afrikander*) and a polled type having the body conformation of the Hamitic Longhorn.

(3) The cattle of to-day are more or less uniform being best described as belonging to *Brachyceros*. The cervico-thoracic hump accompanying a *Brachyceros* conformation is remarkable.

⁽³⁶⁾ It is quite likely that a typing error occurred either in Cairo or Pretoria, the word "horned" being meant. The compiler of this contribution (H. H. C.) did not see the original reply. See p. 21.

French North Africa.—(1) The cattle of French North Africa are of one dominant type, Brachyceros, and as one proceeds westwards to Morocco they are coarser due possibly to the influence of cattle of Hamitic Longhorn type, which persisted there longer than elsewhere.

(2) Environmental changes, chiefly reflected in the poor pasturage, are responsible for the evolution of several sub-types of Brachyceros cattle.

(3) A few details are given concerning Tunis, a territory not included when the original Questionnaire was despatched.

West Africa. French West Africa.—(1) Cattle of the Brachyceros, Lyre-horned Zebu and Shorthorned Zebu (but not the Lateral-horned Zebu) types occur. Whether pure Hamitic Longhorn cattle still exist is unknown.

(2) In addition there is the Bambara which is said to be a hybrid (Zebu × Brachyceros) but from Figs. 24 and 25 it appears to resemble in conformation the Sanga. The Djakoré too is apparently also a representative of the same type.

Gold Coast.—(1) The dominant type in this territory is Brachyceros.

(2) Stewart notes the resistance of Brachyceros cattle to Nagana, Lung sickness and Streptothricosis and the resistance of the Zebu to Rinderpest.

Liberia.—(1) The dominant type in Liberia is also Brachyceros, but it appears probable that descendants of Hamitic Longhorn cattle still occur.

Sierra Leone.—(1) According to Johnston the Mandingo (or as it appears to be, a Hamitic Longhorn-Brachyceros cross) is the dominant type. Brachyceros is also probably represented.

Gambia.—(1) Apparently Brachyceros is the dominant type.

Portuguese Guinea.—(1) The Brachyceros cattle are of two main sub-types, Foulah and Manjaca.

Nigeria.—(1) The types represented are Brachyceros, Short-horned Zebu, Lyre-horned Zebu and Sanga.

(2) Research work is being carried out in regard to nutrition and animal husbandry.

French Equatorial Africa. French Cameroons Mandated Territory.—(1) Not only do Brachyceros cattle occur, but also apparently (there being no photographs) Shorthorned Zebu, Lyre-horned Zebu and Sanga.

(2) The cattle trade is briefly referred to.

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(B) THE THIRD AND FOURTH MIGRATIONS.

In describing the cattle of Central and South Africa we must have in mind the Third and Fourth Migrations referred to previously and indicated on Map I. While it would seem that the Hottentots of the Third Migration travelled together on their southerly journey, the Bantu tribes of the Fourth Migration, on the other hand, showed a tendency either to migrate in separate bodies and to settle where conditions suited, or if the migration was *en masse* to hive off and occupy country which appealed to them, irrespective of the general southward direction taken by probably the most adventurous of the nomads.

The reason for this view is that the cattle of the Hottentots, *i.e.* Lateral-horned Zebus, are to be found nowhere else in Africa but in the Union of South Africa. Of course within recent years the Afrikaner has been introduced into the northern territories, *e.g.* Northern and Southern Rhodesia, where centuries ago its ancestors roamed at will. The Sanga cattle of the Bantu tribes, on the other hand, are to be found scattered along the migration route from Abyssinia to the Sub-continent, *i.e.* in the vicinity of the Great Lakes, except Lake Nyassa, where the Shorthorned Zebu now predominates. For convenience the Sanga cattle of Central Africa are shown on Map I as Ankole but this term has also a restricted meaning.

(37) Only new (*i.e.* not in previous list) references given.

It is apparent that the extension westwards from the East Coast by the Shorthorned Zebu is of comparatively recent date⁽³⁸⁾. It seems likely that the Sanga was found throughout East Africa before the arrival of the Shorthorned Zebu, in fact, according to Epstein, it still occurs in Madagascar. Orde Browne (1925) in describing the Zebus of Kenya between Mt. Kenya and the Tana River, refers to cattle of the Sanga type in Kenya as recently as 1890 in his statement (p. 117), "There was, however, a breed of cattle which has now died out, which possessed far larger horns than the existing breed (Zebu), and are said to have been finer animals in every way. They are said to have been very numerous and to have been killed off in the epidemic of rinderpest, which occurred apparently about 1890. . . . There are no traces of these animals now left, except the horns, which are occasionally to be met with, made into drinking vessels; these nearly always came from Emberre".

*Abyssinia.**

According to Volume 1 of the *Encyclopaedia Britannica* (14th Edit., 1929, p. 73) the number of cattle in Abyssinia is estimated at between 10-15 millions. As it is in that part of Africa where the Sanga cattle are believed to have originated, it is convenient to refer to the cattle of to-day, "of which the most remarkable are the immensely horned Sanga or Galla oxen". Most cattle are of Shorthorned Zebu type [letter of 18.10.35 from Col. R. J. Sturdy, M.R.C.V.S.⁽³⁹⁾], but according to the *Encyclopaedia Britannica* "there are also two breeds—one large, the other resembling the Jersey cattle—which are straight backed". While it is evident that the cattle of Jersey type are *Brachyceros*, it seems likely that the large straight-backed cattle are in reality Sanga in which Hamitic Longhorn characteristics predominate, and the hump (cervico-thoracic) accordingly is not prominent.

The respective areas of distribution are roughly *Brachyceros* in the north, Shorthorned Zebu in the eastern districts and Sanga in the west.

*Anglo-Egyptian Sudan.**

The *Annual Report of the Veterinary Department for 1925* (p. 16) groups the native cattle as follows:—(a) Shorthorned Zebus, probably throughout the eastern part of the territory, (b) Sanga along the Upper Nile to link up with cattle of the same type in Uganda and (c) a type along the Abyssinian boundary, apparently of *Brachyceros* origin.

(38) Tissie (*Proceedings 5th Pan-African Veterinary Conference, 1923*, p. 116) believes that the zebu of Madagascar was "primarily imported from Africa" by the Arabs who "colonised the Comoro Islands during the 9th century", and then went to Madagascar.

(39) Col. Sturdy was the first veterinarian of Kenya and once travelled through Abyssinia. Recently he accompanied a veterinary section to the latter country during the Italian campaign.

Uganda.

Information on the cattle of Uganda was supplied by the Acting Director of Veterinary Services (Hart, R. L. L.) and forwarded to the Secretary for External Affairs by the Chief Secretary, Entebbe, on 12th October, 1932.

On account of its preciseness it is subjoined hereunder.

“ The cattle of the Uganda Protectorate are descended from two widely divergent types, the straight backed, long horned Nsagala or Ankole cattle of the Western Province and the humped Zebu cattle of the Eastern and Northern Provinces. Cross bred stocks intermediate between the two parent strains exist in these provinces and in Buganda.

2. The Ankole cattle are supposed to have been brought originally from the North, the Zebu from the East. It is impossible to give an approximate date as to when such introduction occurred, *vide* paragraph 7.

3. Ankole cattle are straight backed with a most rudimentary hump, the Zebu humped; crosses vary in accordance with the degree to which the respective strains predominate.

4.

ANKOLE AND ALLIED BREEDS OF CATTLE ALSO CROSSES PREDOMINANTLY ANKOLE.	<i>Luhima</i> Name.	ZEBU AND PREDOMINANTLY ZEBU STRAINS.
<i>Typical Colours.</i>	<i>Luhima</i> Name.	<i>Typical Colours.</i>
(1) Deep red.	Bihogo.	(1) Greys.
(2) Red.	Gaju.	(2) Whites.
(3) Red and white.	Magabo.	(3) Yellows.
(4) Light red.	Sina.	(4) Light reds.
(5) Yellow.	Kisa.	(5) White with black spots.
(6) Strawberry roan.	Luhusimu.	
(7) Red (white spots numerous).	Mayenje.	<i>Less Common Colours.</i>
(8) White markings few.	Kiremba.	(6) Black.
(9) Red (white blaze on face).	Kyasa.	(7) Deep red and red.
		(8) Mixed colours, but dark ground or markings predominating.
<i>Less Common Colours.</i>		
(10) Black.	Kyozi.	
(11) White.	Kitale.	
(12) White (red spots).	Bugondo.	
(13) Brindle.	Ngobe.	
(14) White blaze on throat.	Kiroko (Toro).	
(15) Black (red spots on back).	Kikara (W. Masaka).	
(16) Grey and black.	Nsama (Toro).	
(17) Red and black.	Njumba (Toro).	
(18) Grey.	Mpula; Mbubi.	
(19) Black and white (definite recognised colour schemes, but difficult to describe.)	Mutambulire. Mpuga.	
(20) Dark body, white head.	Thinda.	

5. Polled cattle occur in both strains and their crosses. Zebu and cross bred are short or medium horned. The Ankole breed and the crosses that are predominantly Ankole are long horned.

6. Judged by European standards no native cattle in this Protectorate are at present good as milk or beef producers, but some strains are capable of distinct improvement by selection.

7. No reliable tradition or record exists as to the past history of the stock or stock owners of the Protectorate.

8. See reply to paragraph 7. So far as is known no breed or strain ever domiciled in the Protectorate has become extinct.

9. A series of photographs in triplicate illustrating various types of Protectorate stock is attached. These photographs were taken on the Koja Experimental Stock Farm where small herds of the various distinct sub-breeds or types are collected.

10. Normally bulls reach their maximum growth at five years, cows calve down at three years three months as a rough average, though some calve before reaching three years. The Zebu type is generally hardier and has greater powers of resistance to disease and such adverse conditions as poor grazing or fly infestation. In one district, Karamoja, Eastern Province, the cattle (Zebu type) have considerable powers of drought resistance and ability to cover long distances to water.

11. White cattle of the type mentioned in the Questionnaire have not been noted.

12. The Ankole cattle as being the largest animals in the Protectorate are probably considered the most valuable, but the question of value depends entirely on local demand and the suitability of introduced stock to live under the conditions where such a demand exists.

13. The best Ankole pastures are principally low ridges of Acacia Savannah country. *Themeda triandra*, the finer *Hyparrhenias*, and *Andropogons*, with *Brachiarias* in shade are the typical grasses. Rainfall occurs in two well defined seasons annually. The average altitude is approximately 4,500 feet.

The Eastern Province pastures, occupied by Zebu stock in greatest concentration, are low lying Combretum Savannahs, taller *Hyparrhenia* spp. and *Panicum maximum* being the typical grasses. The average altitude is approximately 3,500 feet.

14. As already stated the Zebu and the predominantly Zebu strains of stock in the Protectorate are, conditions being equal, more resistant to the majority of stock diseases than the Ankole and the crosses in which it is dominant. East Coast fever, Redwater and Anaplasmosis are enzootic in approximately all parts of the Protectorate except Karamoja district (Eastern Province).

No breed has any marked power of resistance where epizootic trypanosomiasis of the *T. congolense* type is concerned.

15. The Zebu breeds in the Protectorate vary greatly in size, the Karamoja breed being large and the West Nile, Teso, and Sesse Island stock being small.

Of the various cattle-owning communities in the Protectorate only the Bahima of the Western Province and Karamojans can be said to display much intelligence or interest in the management of their stock”.

Two interesting maps appear in the *Annual Report of the Veterinary Department for 1934*. The one shows the cattle population in each district along with information on the racial type of native owner (*e.g.* whether Nilotic, Hamitic, or Bantu), and human populations. In December, 1932, there were 2,151,668 head of cattle in the territory. The other map gives the distribution of the four species of *Glossina* in Uganda.

Kenya.

Thanks to information supplied to one of the authors (R.W.T.) by the former Director of Agriculture (Holm, A.—File Dairy/3/—), our knowledge of Native Cattle Husbandry in Kenya is considerable. Mr. Holm also kindly supplied 8 photographs, some of which (Figs. 41, 42, 44 and 45) are reproduced here.

Cattle.

As indicated in Map II, the cattle are of the Shorthorned Zebu type and according to Mr. Holm (letter of 27.8.32) “similar in appearance to the Thar Parkar and Scindi breeds of cattle in India. Although small differentiations appear in different districts, the various types (sub-types) are definitely Zebu”.

As is generally the case, the various sub-types are named after the tribes owning them, thus we have:—(a) Boran in the Northern Frontier Province, (b) Kavirondo in the South-West of Kenya, (c) Nandi also in the South-West, (d) Akamba in South-East Kenya and (e) Masai in South Kenya.

According to a report of the Veterinary Department dated February, 1932, and entitled *Comparison of Types of Native Cattle at Animal Husbandry Centres*, we learn that six centres have been established under the Veterinary Department “with a view to developing the potential resources of the indigenous cows of the various pastoral tribes for . . . milk production”. Measurements were taken of twenty-five cows of certain sub-types and the average is recorded hereunder.

Subtype.	Station.	Height at Shoulder.	Length from Point of Shoulder to Seat of Tail.	Girth.	Breadth of Hips.	Calf at Birth.
Akamba (Fig. 45)....	Machakos.....	44" (111 cm.)	35" (78 cm.)	54" (137 cm.)	13.3" (33 cm.)	—
"	Ngong.....	45" (114 cm.)	38" (96 cm.)	58" (147 cm.)	16" (40 cm.)	35 lb. (15.8 Kg.)
Boran.....	Isiolo.....	45.5" (115 cm.)	37" (93 cm.)	56" (142 cm.)	15.5" (39 cm.)	38.5 lb. (17.4 Kg.)
"	Ngong.....	50.0" (127 cm.)	42.9" (108 cm.)	63" (161 cm.)	18.4" (46 cm.)	40.0 lb. (18.1 Kg.)
Kavirondo (Central)..	Maseno.....	44.0" (111 cm.)	34.5" (87 cm.)	54" (137 cm.)	13.7" (34 cm.)	32.0 lb. (14.5 Kg.)
" (North)..	Sangalo.....	45" (114 cm.)	35.5" (79 cm.)	55" (139 cm.)	13.7" (34 cm.)	33.5 lb. (15.2 Kg.)
Nandi (Fig. 42).....	Farraton.....	45.5" (115 cm.)	36.5" (92 cm.)	57.7" (145 cm.)	15.3" (38 cm.)	41.5 lb. (18.8 Kg.)

Holm (letter Dairy/3/— of 27.8.32) states that colour markings of the various types are extremely mixed and include reds, greys, blacks, black and whites, red and whites, etc. The Boran sub-type is generally putty-grey with a fair proportion of blacks and reds and greys. He adds that good grazing produces a tendency to "go to beef rather than towards extra milk production"⁽⁴⁰⁾, and further that "native cattle reach sexual maturity very quickly, although they do not reach maturity as far as growth is concerned until five or six years of age".

The work referred to above was commenced in 1927, particular attention at Ngong being paid "to impress upon the native mind the extent to which the excessive mortality in livestock could be diminished by the adoption of certain veterinary measures and to demonstrate" the value of controlling breeding and rearing young stock systematically.

In 1928 at the suggestion of Dr. Orr of the Rowett Institute it was decided to educate the native stockowners in animal husbandry especially from the dairy aspect. The position as at February, 1932, was described in a *Report on Improvement on Native Cattle in Kenya Colony*, also kindly furnished by Mr. Alex Holm. Recently, however, Mr. John Anderson (1935) who was taken over from Dr. Orr's staff, has published a valuable paper on *Improvement of Native Cattle by Selective Breeding and Herd Management*, in which he records increased milk yield, by the use of only natural grazing. His summary is as follows:—"The preliminary results here recorded demonstrate that the unselected native cattle⁽⁴¹⁾ bought at random in the reserves, show great promise as producers of milk and dairy products if kept under controlled and regular conditions of management. Under such conditions the milk yield is more than double than that of a native cow under native methods of husbandry. Furthermore, the managed animals become productive at a much earlier age. Though specific age data are not fully available, observation clearly reveals that animals bred from native foundation stock and kept under good management have a much faster rate of growth and attain a much greater body weight. Selected bull calves have been reared which at 16 and 20 months of age weighed 627 and 756 lb.

Although the amount of milk produced is small compared with that produced by imported grade stock, this is compensated for by its very high butter-fat content. Whereas heavy milking breeds usually average a little over 3 per cent. butter-fat, milk from the native cow gives an average of 5.7 per cent. The average yield of butter-fat per cow over all dairy farms in Kenya for 1932 is given as 32 lb. At the Ngong station the average yield for the year 1933-34 was 42 lb. per cow".

This is surely proof that native cows if submitted to an improved environment will be an asset to the country, whereas if allowed to range without restraint they can only hasten the deterioration of

⁽⁴⁰⁾ Anderson's work, however, proves that if controlled the cows in an improved environment double their milk yield.

⁽⁴¹⁾ Boran and Masai. In the *Report of 1932* figures relate to Boran and Machakos (Akamba) heifers.

grazing as seen in overstocking and soil erosion. According to Deck (1936) soil erosion and increasing aridity are urgent problems in the Territory, particularly in the Ukamba country where the grazing capacity has already been exceeded to the extent of six times the normal.

Much is being done to educate the natives in animal husbandry, the local natives being guided by officials of the Department of Agriculture. East Coast Fever, being enzootic in the native reserves, has compelled the authorities to adopt the policy of selection among the native cattle rather than to resort to grading up as in South Africa.

Ghee or clarified butter is the chief native economic dairy product, the output in 1932 from native dairies being estimated at about £25,000. Anderson (1935) estimates that the ratio of milk to ghee is 2.07 gallons to 1 lb. ghee.

As a result of overstocking in the native areas a factory is shortly to be erected to dispose of surplus native cattle in any way that will prove economic, *e.g.* canning, drying of meat, and the manufacture of foods and fertilisers.

Belgian Congo.

Thanks not only to the publications of Carlier (1912) and Le Plae (1933); but also to replies furnished by His Excellency the Governor-General of the Belgian Congo through His Majesty's Consul at Leopoldville (his letter of 19.5.32); interesting information is available regarding native cattle, especially along the eastern frontier of the Belgian Congo⁽⁴²⁾.

Classification of cattle types in the Congo has been based largely on the absence or presence of horns and in the latter case, whether they are long or short. While the horn length is an important feature, it seems preferable also to consider the general conformation, especially the shape of the skull and the position and structure of the hump. As an example we may mention the cattle of Kivu, which vary not only to the extent of possessing polled as well as horned representatives, but also among the latter in having members with short, medium and long horns. Yet if we group these animals according to conformation they are seen to belong to the Sanga type⁽⁴³⁾, there being a uniformity in all respects except the horns.

While Epstein believes that the dominant type, the Sanga, arose from the intermixture between the Hamitic Longhorn and the Lateral-horned Zebu (Afrikander) in North-East Africa (probably Abyssinia), Le Plae states that this type "semble provenir de croisements répétés entre des zébus asiatique et des bêtes bovines africaines". He adds, as we know, that for many centuries there has been intercourse between the people of India and those of East

(42) We are indebted to Dr. L. Tobback who along with his letter of 26.1.35 sent a useful summary of the position as well as photographs.
Introduction.

(43) Called Zebu africain (*Bos africanus*) by Le Plae (p. 89).

Africa. It is, however, not clear what were the original "bêtes bovines". For suppose they lacked a hump (as did the Hamitic Longhorn), would they, when crossed with the thoracic-humped Zebu of Asia, produce the cervico-thoracic hump of Sanga cattle? Unfortunately even with the facilities available throughout Africa, but little is known concerning the behaviour of the hump in genetics. It is nevertheless certain that the Shorthorned Zebu of East Africa only differs from its Asiatic relation by containing some amount of African blood, and that owing to its hardy constitution it has replaced the Sanga almost throughout Uganda, Kenya and Tanganyika. Evidently a foothold has also been established in the Belgian Congo, for according to Fig. 40 in Le Plae's work and a description provided by the same and other authorities, the Lugwaret cattle, north-west of Lake Albert, are of the Shorthorned Zebu type.

Other indigenous cattle of Glossina-ridden Congo belong to the Sanga group, those along the mountainous eastern frontier being the most important.

While in Map II the Sanga cattle of Central Africa are referred to as Ankole, this term strictly refers to the Ankole district of Uganda.

Present Sub-types.

Commencing at the northern aspect of the Eastern frontier, and adjacent to the Anglo-Egyptian Sudan, we have the following sub-types:—

1. *Wadai-Dinka*.—Although each of these sub-types is referred to by Le Plae as a "race", it seems desirable to consider them together, for they both occur in the extreme north-eastern corner of the territory, and have several points of resemblance, *e.g.* size, coloration, shape of horns and general appearance. Figs 46 and 47 of Dinka bulls indicate the general type. The influence of the Shorthorned Zebu is seen in the well developed dewlap, but the hump in each case is cervico-thoracic in situation. These cattle are of the same type as found in the adjoining districts of the Sudan.

2. *Lugwaret or Bahu Cattle*.—As mentioned above, north-west of Lake Albert are cattle of the Shorthorned Zebu type and these form an intrusion, in fact, break the continuity of the Sanga line from Abyssinia to the northern end of Lake Tanganyika⁽⁴⁴⁾. The cattle are small and thick-set (0.95 m. to 1.25 m.) of good conformation, and variously coloured, the most usual pattern being small, black, red or yellow patches on a white ground, very frequently crowded on the flanks. The general appearance is strongly zebu (*i.e.* Shorthorned type) and in males the hump is sometimes very well developed. See Fig. 48 (from Le Plae, p. 98).

3. South of the country occupied by the Lugwaret tribe the cattle are of Sanga type (and known generally as Ankole, Watussi, or Bahema cattle) as far as the north-eastern corner of Lake Tanganyika. According to the reply from the authorities in the Belgian Congo the cattle in the Ituri region are very much mixed as one

⁽⁴⁴⁾ Here, due to Glossina, occurs another gap until the Baila cattle (Sanga) of North-East Rhodesia are encountered.

would expect, on the south there being Sanga cattle and to the north Shorthorned Zebu. Chief Blukwa, however, living to the west of Lake Albert, has apparently been so successful in selection that he has built up "une race speciale". He has selected bulls with short horns and cervico-thoracic humps (in preference to the usual long-horned bull or the Shorthorned Zebu bull), and as will be seen from Fig. 49 (from Fig. 26—Le Plae) the cows are of the same conformation.

As one proceeds south along the frontier, cattle with exceedingly long horns are to be found in the vicinity of Lake Kivu, but they reach their maximum in the herds of Ruanda Urundi (formerly part of German East Africa). Fig. 55 (from Fig. 1, Le Plae) shows two animals of the sacred herd belonging to the King of Ruanda. So striking are these cattle that they have even been featured on the red 60 c. postage stamps of the Belgian Congo. Fig. 54, which is a photograph of the stamp in question, indicates the bull on the right as showing the hump when grazing.

It would appear that the artist has incorrectly represented the position, for it is only the thoracic hump which retains its dorsal position during grazing.

Owing to trypanosomiasis cattle are imported into the Congo from Angola, Ngamiland, and Southern Rhodesia.

The approximate cattle population is 1,300,000, of which a million occur along the eastern frontier.

Tanganyika.

The information available from Tanganyika was supplied by Mr. H. E. Hornby, Director of Veterinary Science and Animal Husbandry in response to the Questionnaire. In addition, also to a request from one of us (R. W. T.) through the Superintendent of Education, Tanganyika (Mumford D. B.), for special information on the distribution of white native cattle (see paragraph 11 of Questionnaire), a minute from Col. F. J. McCall, former Director of Veterinary Science in Tanganyika, is instructive⁽⁴⁵⁾. Both of these are reproduced *in toto*, the former being dated 5th March, 1932, and forwarded by the Chief Secretary, Tanganyika to the Secretary for External Affairs, Pretoria. The latter was dated 12th December, 1930, and forwarded to Pretoria (to R. W. T.) by Mr. Mumford⁽⁴⁶⁾:

The cattle population in 1930 was 5,170,162 compared with 1,700,352 about 1913 (*Annual Report for 1930*).

Reply to the Questionnaire.

1. If possible, give the origin of recognised types of breeds of cattle.

There are two distinct breeds:

⁽⁴⁵⁾ Mr. Mumford, in forwarding R. W. T.'s request to Col. McCall, mentioned that the distribution of white cattle was important in "view of the light it may throw on movements of tribes". (Letter Nov. 28th, 1930.)

⁽⁴⁶⁾ Interesting observations on Animal Husbandry appear in the *Medizinal Berichte unter die Deutschen Schutzgebiete* of the pre-Great War period.

One is large-horned and small humped and will be referred to as the Ankole breed; the other is short-horned and large-humped and will be referred to as the African Zebu.

The origin of both types is unknown. There are reasons for thinking that the Ankole cattle were introduced only three or four hundred years ago by people known as Bahimas who came from Abyssinia (Le Plae), while the Zebus are undoubtedly closely related to the Indian breeds and probably originated in Asia.

2. Are the breeds or types mentioned under (1) believed to be indigenous or where they imported? If the latter, when and from where?

See reply to (1).

3. State whether the breeds or types mentioned are humped or straight-backed.

The Ankole breed has a small hump approximating to that of the Afrikander. The Zebu has a much larger hump; at its maximum development this is 1 foot high with a tendency to sag.

4. Give a full description of the colour marking of each breed or type mentioned.

The Ankole breed is without distinctive coloration, so that specimens of every ordinary colour common among cattle may be found. Nevertheless whole coloured reds, browns and yellows definitely predominate. There is no predominant colour of the Zebu, and beasts of every colour may be seen; nevertheless local races may have a distinctive coloration, so that Iringa cattle are mostly red; Singida cattle, white; Mkalama cattle, dun; and so on.

5. State whether polled, horned, or a mixture of both, with a description of horns.

Polled animals form a very small minority of the Ankole cattle and are not liked. The horns are in every way an important feature of this breed, and individual animals are known by the shape of the horns.

It is possible to divide the Ankole breed into local races which vary in size of horn: one, the Ishesha, has horns resembling and no larger than the Afrikander's; but other races have enormous horns which, typically, grow outwards, upwards and backwards.

Polled Zebu cattle are rare; the great majority of this breed carry short-horns which grow outwards and upwards, though other shapes such as outwards and downwards are often seen.

6. State whether the animals are of good beef type or milking type; or neither, or both.

Judged by European standards neither breed is of a good beef type, though a fat Zebu ox yields a very fair carcass. Neither breed is of good milking type, and in this respect, also, the Ankole is worse under the usual conditions of seasonal starvation. In good nutritional environment the Ankole is the bigger beast and the better milker.

7. State which of any breed described is supposed to be the original breed and whether such breed or type was founded on other types now extinct; and, if the latter, please supply a description, if possible, of such original extinct breeds or types as can be secured from paintings, rock drawings, and sculpture, etc.

As stated in my reply to question (1), the Ankole breed is believed to be of comparatively recent introduction and so may be called original. The Zebu is almost certainly an offshoot of an Asiatic breed, but whether by intermixture with a type, now extinct, is unknown; there appears to be no archaeological evidence on the point.

8. State which breed or type was first domesticated, the approximate date of domestication, and whether still in use.

See replies to (7) and (1).

9. Please supply photographs in triplicate of typical specimens of both males and females of each breed or type dealt with.

It is regretted that only one photograph illustrating the Ankole breed—an outstanding bull and a good polled cow—can be supplied. On the other hand, a number of photographs of Zebu cattle are appended. These photographs are cut from the 1926 and 1929 *Annual Reports of the Veterinary Department* of this Territory, where they illustrate articles by the former Director, Mr. F. J. McCall, C.B.E., M.C., who was much interested in the subject which forms the basis of this questionnaire.

10. Do any of the breeds or types described possess any special features such as slow maturity (say five to seven years) or display extreme hardihood against adverse climatic conditions (such as great heat, drought), disease resistance, ability to range over great distances, etc.?

A characteristic feature of the Ankole breed is its slow maturity under the poor conditions in which it usually lives. Under better conditions this feature is much less marked. The home of these animals is well-watered mountain grassland, and handicapped as they are by great horns they are not suited to withstand hardships. They succumb readily to Rinderpest, and although local races have acquired immunity to tick-borne diseases such as East Coast Fever, this breed should not be considered as disease-resistant, but rather the reverse.

Zebu cattle are on the whole hardier. Local races have been evolved which are highly resistant to many serious diseases and, in addition, maintain their condition when food is scarce and innutritious and when they have access to water only every other day.

11. Special mention must please be made and the fullest possible particulars given of any white cattle with dark points which exist in any of the countries mentioned. By dark points is meant black ears, muzzles, eyerings, or eye lashes, black teats, black hoofs, or spotted or black markings below the knee and hock; also whether any animals answering this description have black skins covered with white hair and whether black spots show through the white hair causing a silvering or spotted appearance, particularly as the animal advances in years.

There are few or no Ankole cattle of this colour, but zebus having white body hairs in spite of a black skin and points are common, particularly in the Singida district of the Central Province. There is nothing radically distinctive about this type of

colouring, and in the same herds as animals having it, may be found some with white skin as well as hair (though this is a bad colour, tending to sunburn), and others the visible skin of which is partly black and partly white. Silvering, as seen in the Indian Krishna Valley breed, is rare.

12. Which breed or type described is considered to be the most valuable, and why?

The owners of each breed prefer their own, though one can imagine the owner of a Zebu exchanging it for an Ankole, but not the reverse. From the European point of view the Zebu is definitely the more useful animal; hardier, maturing earlier, milking better, working better and furnishing a better carcass. But it is no use saying this to a native owner of Ankole cattle: he judges altogether differently.

13. Please give the territorial distribution of any type or types described in such a manner as to permit of tracing the areas mentioned on a map. Please also give a description of the areas such as elevation and whether open highland, grass, bush, or forest country; or whether low-lying, hot and sandy, marshy bush or forest country with heavy or low rainfall in each case.

There is a great fly-belt running south from Pasha Gulf of Lake Victoria. The fly-free country to the west of this belt is a strip of mountain grassland along the borders of the Belgian countries of Ruanda and Urundi. This is the home of our Ankole cattle, and it is contiguous with the habitats of the same breed in the Belgian territory and in Uganda. A few herds of cattle of the same breed are found on the eastern side of the Pasha Gulf-Tabora belt, but here they are in contact with and tend to be swamped by the more virile Zebu.

Whereas the Ankole ox is essentially an animal of mountain grassland, the Zebu can adapt itself to almost every kind of vegetation community, and the limiting factors of its distribution in this Territory are neither climatic nor geophysical, but simply tsetse-fly belts.

14. Whether partially resistant to or immune from any disease such as Nagana or other widely distributed and known trouble.

Neither breed has any naturally high resistance to disease, but by selection local races of both breeds have been evolved to overcome most diseases except nagana. Thus all the adult cattle of certain areas are immune to East Coast Fever, but this does not prevent a ninety to one hundred per cent. mortality occurring among other cattle of the same breed moved from a clean to one of these enzootic areas. Odd cattle premunised against a single strain of trypanosome are found near every fly-belt, but herds of cattle immune to all strains of nagana are so rare as to be of negligible importance; the individual animals of these herds are generally stunted by the numerous attacks from which they have suffered and recovered. See, also, reply to question (10).

15. Any other information.

This will be gladly given if asked for and obtainable.

“ The Superintendent of Education,
Malangali,
Iringa.

*Reference your letter of 28th ultimo.—Native herds
of white cattle in East Africa.*

The description you give tallies with 95 per cent. of the Boran cattle encountered along the northern border of Kenya. The cattle of Somaliland to a lesser extent fall into the same category. In Tanganyika the cattle of Sekenke, Mkalama and many parts of Singida are in a very high percentage of cases white animals, with dark skins, relatively small horns, have black tips to their tails and ears and very often show black on the extremities of their limbs. Our best herd of native cattle on the Government Stock Farm, Dar es Salaam, namely the white herd, is entirely made up of this type of animal. I have observed that such animals appear to mate most successfully with the Krishna Valley Indian Zebu. Several of this latter breed have been imported by the Government, the cows are usually white but the bulls although as a rule born white with age change through silver grey to dark grey. In the case of the Boran cattle quoted above and also in those of Somaliland, a silver grey coloration amongst oxen is not uncommon, but the characteristic is not so well marked as in the Indian Krishna Valley Zebu cattle. White is a very common colour amongst the cattle of the Wanyaturu of Singida and Mkalama, but further south in Dodoma amongst the Wagogo herds black and whites and brown and whites predominate, whilst in Iringa and the Southern Provinces of Tanganyika, red is the commonest colour encountered.

2. On the whole experience has taught me to expect that in the dry arid sandy countries of low altitude, always provided migrations, wars, disease and other factors have not been unduly operative there, we can expect to find white cattle with dark skins and white sheep with black heads. It would appear that cattle with white coats and dark skins seem able to bear the great heat of these low arid countries better than do other colours. These natural phenomena have been completely obliterated over a great part of the highlands of East Africa probably due to the raids and incursions of the Masai. To-day, according to the Masai, “ a good beast can never be a bad colour ”, with the result that in their herds and in those of tribes such as the Nandi, Algayo, Kikuyu, Warusha, Wachagga, Wakamba and to a lesser extent the Kavirondo, the stock are of most nondescript type.

3. In connection with the cattle of Boran I ought also to have mentioned the cattle of Suk, Tukanna and Karamoja regions. These occupy the hot low country between Mt. Elgon and the Sudan to the North and to the East as far as Lake Rudolph. In this section of the country, whites predominate, but the male stock show signs of darkness and greyness on the back; the horns, however, in these parts are very characteristic, being relatively large (nothing like the size and length of the Belgian Ruanda cattle) with a peculiar uplift which gives the head a hartebeest appearance. Possibly these notes may be of interest, but if Mr. Thornton, Director of Native Agriculture for the Union, wishes further information and cares to write to

me on the matter, I shall be only too pleased to help, for the whole subject interests me greatly. A certain amount of information bearing on native cattle is contained in the various Annual Reports issued by this Department”.

Parish (1917) in discussing the extreme variation of coat colour states: “one other commentary which must be made in connection with colour is that true colours of practically every breed can be seen, Shorthorn reds and whites, Friesland black and whites, Herefords and South Devons, interesting food for thought for those who consider purity of colour is necessarily associated with ancient lineage”.

The two groups of indigenous cattle referred to by Hornby are shown in Figs. 56, 57, 58 and 59, while their distribution is indicated in Map II.

It was in Tanganyika that systematic work was first carried out on native cattle. Soon after the close of the Great War, McCall assembled herds of cattle at Pugu, Dar-es-Salaam and described them with photographs in his *Annual Reports*, especially that for 1926. Unfortunately during the financial depression of 1931-33, these herds were broken up and valuable data lost, but the work has since been reorganised on a smaller scale. Cross-breeding experiments between Shorthorned Zebu and Ankole and between Shorthorned Zebu and European breeds are being conducted and among other things it is hoped that the problem of the hump will be cleared up. Particular attention has been paid to nutrition so that the effects of cross-breeding shall not be affected adversely by a plane of nutrition below the full requirements of the animals. Overstocking with its attendant problems is also receiving consideration (Hornby 1936).

French (1936) has recently published a useful paper on the weights of the various parts of the body of Shorthorned Zebus.

It is significant that after many years experience in Central and East Africa, Hornby (1931) “decided definitely that the occasions when a good purpose is served by issuing grade bulls, derived from crossing indigenous and European breeds, to natives are so few that as a policy such issues are not justified”.

*Angola.**

As indicated in Map II, the cattle of Angola are, according to Dr. Emilio Martins (conversation 6th September, 1934), of two chief sub-types belonging to the Sanga group. These are the Ovambo and Bechuana cattle (see Figs. 64-66 and 67-70).

According to Da Costa (1933) there were 1,500,000 head of cattle in the country.

Northern Rhodesia.

Information on native cattle types was compiled by the Director of Animal Health whose memorandum was despatched by the Chief Secretary, Livingstone, under cover of his letter Vet./A/28 of 18.2.32 to the Secretary for External Affairs, Pretoria. No photographs were available, but a map indicating the Glossina areas and the approximate distribution of cattle was enclosed.

As already described (Curson 1936), the indigenous cattle include the Bechuana sub-type in Barotseland, and the Baila or Mashukulumbwe sub-type between the Zambesi and Kafue rivers. A third group, entirely dissimilar to the two previous, the Shorthorned Zebu or Angoni type occurs "in the Tanganyika plateau and in the Fort Jameson district". The Bechuana and Baila⁽⁴⁷⁾ cattle belong to the Sanga type and possess cervico-thoracic muscular humps (sometimes ill-defined) and large lyre-shaped horns, particularly the former. See Figs. 60-62.

The reply (para. 4) to the Questionnaire indicates that the colour of cattle varies greatly as is generally the case among native stock; but it is added that "Chief Lewanika of the Barotse people maintained a herd of pure white cattle with black points. These were all slaughtered when Lewanika died in the year 1916".

From a tabulated statement concerning some oxen slaughtered at the Central Research Station, Mazabuka and prepared for the Agricultural Economic Commission of 1931, we learn that two grass fed Baila oxen weighed 872 and 781 lb. The dressed weight was 437 and 440 lb. respectively. At the *same* time grades were slaughtered and "it was hoped . . . that the figures would show that it was more profitable to produce an improved animal". Too few animals were slaughtered to come to any definite conclusion, but MacDonal, the observer, comments (his letter of 30.6.31 to R. W. T.) that "the animal dressing to the best advantage was . . . the younger Baila (live weight 781 lb.)". The reply to the Questionnaire (para. 6) states that the cattle mentioned above "are of the beef type".

Further details from the reply to the Questionnaire are as follows:—

The various types "are slow in maturing. They are extremely hardy and can stand great heat, but cannot remain long without water. All possess a . . . high immunity to tick-borne diseases. The Batonga people who possess Baila cattle do not herd their animals from about the 1st September until the middle of November. During this time they are allowed free range over great distances. . . . The Barotse breed is undoubtedly the most valuable for sale purposes owing to the large size, but unfortunately Pleuropneumonia exists in that Province and the numbers are dwindling year by year. Angoni cattle are not much good for transport purposes, but the Baila breed make exceedingly good trek oxen"!

"All the breeds . . . have a high immunity against tick-borne diseases and it is possible the Baila breed is also partly resistant to trypanosomiasis. In the low-lying districts throughout the territory fluke and worm infestation is prevalent, but no great mortality can be directly attributed to either of these causes".

412,808 head of the 522,693 cattle are native owned.

(47) The view is expressed in the reply that the Baila sub-type "would appear to be a cross of both", i.e. the Bechuana and Angoni cattle. Purchase, H. S. (in a conversation on 15.2.35) mentioned that the Barotse cattle are clearly divisible into two groups, the West or Plains cattle with gigantic horns and the East or Forest cattle with small horns.

*Nyasaland.**

Although a Questionnaire was not sent to the Nyasaland Administration, it is convenient to include this country in our survey of indigenous cattle.

As will be seen in Map II the cattle of Nyasaland are essentially of the Shorthorned Zebu type which has gradually spread from the littoral, and, owing to its hardiness, has displaced the Sanga⁽⁴⁸⁾. In fact Shorthorned Zebras are now to be found in North-East Rhodesia as the so-called Angoni cattle.

As the Zambesi river, constituting a formidable barrier to migration especially during the summer months, flows just south of the southern extremity of Nyasaland, it was probably in this vicinity that the Bantu hordes halted and subsequently dispersed in all directions, but chiefly south-east to west in a fanlike fashion. As mentioned previously Sir Harry Johnston believes that this took place about 700 A.D.

Obviously reliable information will never be obtained regarding the details of those prehistoric folk-wanderings, but judging from the present distribution of cattle, the tribes accompanied by the cattle known as Ovambo to-day must have migrated westwards. As described above, the territory they occupied comprises now Angola and South-West Africa Protectorate. Then following the Ovambo herds were the nomads possessing the Bechuana cattle which are to be found to-day in no less than six countries, *viz.*: Angola, Northern and Southern Rhodesia, South-West Africa Protectorate, Bechuanaland Protectorate and Transvaal. Proceeding due south were the owners of what are now the Makalanga and Zulu sub-types, the former keeping to the plateau of Southern Rhodesia while the latter preferred the warmer climate of the coast. It is, of course, also likely that the original owners migrated in the reverse order to that just suggested.

So many factors, *e.g.* distribution of *Glossina*, stock diseases, wars, further migrations, and climatic conditions are concerned in this problem that it is doubtful whether the veil of obscurity will ever be raised from the events of the past millenium.

At the end of 1934 the cattle in the territory numbered 190,381, of which, 8,597 were European owned (*Annual Rpt. Vet. Dept.* 1934).

South-West Africa Protectorate.

In response to the Questionnaire several authorities in the Protectorate expressed their views in regard to indigenous cattle, and the Native Commissioner of Ovamboland (G. Hahn, Esq.) kindly provided photographs. Those who furnished information were Drs. Hans Sigwart (12.11.31), A. Maag (9.11.31) and G. Schmid, Government Veterinary Surgeons, and Messrs. G. Hahn (24.4.32), W. H. A. Schneider (15.12.31) and Carl Schlettwein (29.11.31).

⁽⁴⁸⁾ Mr. S. G. Wilson, M.R.C.V.S., believes that Sanga cattle are also to be found in Nyasaland (conversation).

The data varies in no way from that set down by Groenewald and Curson (1933) in regard to Ovambo cattle, and Curson (1934) concerning Bechuana cattle. The Damara cattle originally brought to the country by the Hereros are of the same type as Bechuana cattle. Both sub-types, the short sturdy Ovambo and the longhorned and longlegged Damara are sub-types of the Sanga group.

It must be emphasised that in compiling the two references just mentioned, valuable assistance was obtained from several of the persons mentioned in the first paragraph.

Photographs of Ovambo cattle appear in Figs. 64-66. The cattle population (1935) is roughly 854,899, including probably 150,000 animals of Ovambo type. Approximately 560,520 head belong to Europeans (letter G4/1 of 3.7.36 from S.V.O., Windhoek).

High Commission Territories.

Nothing has been published by the High Commission Administration regarding the native cattle types of Bechuanaland, Swaziland or Basutoland, nor was a Questionnaire sent to any of the officials of the three territories under consideration.

*Bechuanaland Protectorate.**

The cattle of the Bechuanaland Protectorate have been described and the distribution of the sub-type to which they belong has been published in *Farming in South Africa* (Sept., 1934). In other words, the cattle known in Northern Rhodesia as Barotse, those of South-West Africa called Damara, and those known elsewhere as Mangwato or Ngami or Batawana are all members of the Bechuana sub-type which occupies the arid grass region of central South Africa. Figs. 67-70 are sufficient to indicate the conformation.

Of the 1,300,000 cattle (1934) approximately 125,000 were European-owned and of these probably 40,000 were "improved".

During an official visit to the northern districts of the Protectorate in 1930-31 one of the authors (H. H. C.) not only investigated the Glossina problem, but other factors bearing on the cattle industry; since at the time the export trade to the northern copper fields (Northern Rhodesia and Belgian Congo) was of great economic importance⁽⁴⁹⁾.

As this aspect has not hitherto been described, it is felt that it may serve as an example of what is required in the way of a description of cattle husbandry.

⁽⁴⁹⁾ A report dated 19.3.31 was submitted to the Resident Commissioner Bechuanaland Protectorate, Mafeking.

The Cattle Trade in Ngamiland.

Introduction.—The territory generally referred to as Ngamiland corresponds to the Ngamiland (magistracy Maun) and Chobe (magistracy Kasane) Magisterial Districts. These together form the northern portion of Bechuanaland Protectorate and occupy the middle region of the vast Kalahari plateau, an area characterised by the remarkable Okovango Delta.

The extent of the territory is approximately 25,000 square miles and the population numbers probably 25,000 souls, 20,000 belonging to the Ngamiland Magisterial District. The dominant tribe is the Batawana which, however, numbers but 2,000. In fact, the Ngamiland District corresponds more or less to the area known as the Batawana Reserve. Of approximately equal number and of growing importance is the Damara tribe, which was allowed to remain in the territory after the German-Damara campaign of 1904. Since the remaining population, made up of several tribes, is comparatively poor (especially in cattle), we will confine our attention to the Batwana and Damara tribes.

The principal area of occupation in the Chobe District is the right bank of the Chobe River. Here the Batawana, numbering approximately 500, are the principal cattle owners, as indeed they are in Ngamiland proper.

Away from the alluvial banks of the Okovango and Chobe Rivers is flat, waterless, sandy country, covered by dense bush, and occupied by a few wandering Basarwa who naturally possess no cattle (Curson, 1932).

General Remarks.—As far back as the early days of Kimberley, traders were interested in the country. They came with their wagons of goods, bartered them for cattle and returned to the south. Later, stores were established; but it was not until 1920 that the industry received the attention it deserved, this being the year that Messrs. Susman Bros., Livingstone, having lost heavily through Pleuropneumonia in Barotseland, Northern Rhodesia, transferred much of their business to Ngamiland. Others have followed and there is now marked trade rivalry.

According to Stigand (1923), the census of 1921 gave the number of cattle in the Batawana Reserve, which for practical purposes corresponds to the Ngamiland district as 103,989; but he indicates that probably another 50,000 should have been added to this figure. Even to-day it is impossible to give a reliable estimate of the livestock.

For the Chobe district the Acting Assistant Resident Magistrate (Capt. Beeching, R.) furnished the following estimate for 1931:—

<i>Tribe.</i>	<i>No. of Cattle.</i>
Batawana	3,375
Basubia	1,323
Bakuba	258
Basarwa (Bushmen)	123
Aliens	307
TOTAL	5,386

The traders naturally prefer barter, but may give half cash and half goods. The Administration, on the other hand, considers cash purchase preferable and in order to stimulate competition has recently granted several new trading licenses. The cash price varies considerably, depending on the centre, the season and the demand, but average figures early in 1931 were as follows:—

Big oxen, £3. 10s.; other oxen, £2. 10s.-£3. 10s.; Cows £1. 10 s. and Tollies, 10s.-£1.

Care and Management.—With regard to the care and management of cattle, the methods employed by the Batawana and Damara, the chief stock owners, vary somewhat. The *Batawana* being the "aristocracy" of the country, look upon all work as menial, and therefore employ Bakuba or Basarwa herdmen, who, when opportunity offers, would not hesitate to steal a beast, and in any case are neglectful of their masters' interests. The *Damara*, on the other hand, are skilled cattle-men, and through good management their herds have increased from a few hundreds, at the time of their arrival in 1904, to thousands at the present day.

Most of the leading *Batawana* families live at or near Maun, the administrative centre, and their cattle are grazed in the vicinity especially since the Pleuro-pneumonia outbreak of 1927. As a result of overgrazing through concentration of stock, pasture is sought along the edge of the "fly" area where infection by *Glossina* may take place, particularly along the lower Boro river where conditions for agriculture, too, are excellent. Calves are naturally separated from their mothers and grazed near the homestead. Milking is done as a rule about midday, the native wooden pail being seldom employed (Curson, Thomas and Neitz, 1933). So far has civilisation penetrated that tins or even enamel buckets are used even in the most distant places. After weaning, the yearlings graze with the main herd, but the bulls are not castrated until about 3 years of age, in fact one may see a team of 6-8 bulls ploughing! Under these circumstances heifers calve at an early age, *i.e.* about 2-2½ years. Calving takes place in the crowded bush or palisade kraal, which in the wet season may resemble a morass. Pasture is generally sufficient during the rainy season, but towards the end of the dry season (September, November or even December) it has been exhausted through overstocking. So serious is the position at times, *e.g.* early in November, 1930, there was hardly a blade of grass along the motor road from Tschiri *via* Maun to Lake Ngami (Sihitwa), except along the Gabarachia-Kgoboga section, which had been deserted on account of tsetse-fly. In other words, along a 100-mile stretch there was no grazing available, 25 miles being occupied by "fly" and the remainder being bare through overgrazing.

Under such conditions not only do hundreds of cattle perish from poverty, their skeletons bleaching along the parched flood-channels, but internal parasites cause a great deal of harm. The natives too, especially the children, suffer much from the loss of milk.

Several Batawana, instead of concentrating their cattle in the southern part of the territory, *e.g.* at Maun or Tsau, send them north to Nokanen and Gomare where losses such as described above are

less common. If the cattle posts are frequently visited and the Bakuba and Basarwa servants supervised all will be well, if not, unnecessary losses will take place. A few owners brand their stock in the European manner.

The *Damara*, on the other hand, leave nothing to chance. In the first place, they have not the advantage of grazing and their herds are not welcomed along the fertile swamps. Being strangers they have been compelled to keep their stock in the drier country around Lake Ngami and between this and Tsau. They are, however, more nomadic than the Batawana and will travel many miles to obtain good pasture. The more distant portions and the sandveld, even as far north as 35 miles south of Namaseri, are ranged in order to get grazing. The horizon is eagerly scanned, and if rain has fallen, the *Damara* mounts his donkey and rides away to investigate what the prospects are. If water has collected in a pan he will bring his cattle and make this his headquarters until he can find better grazing. In the dry season, however, when the sandveld is a barren waste, most rely on the herbage about Lake Ngami, where reeds, rushes, sedges and grass provide sufficient grazing until the wet season. Drinking water is usually a problem and away from the swamp area wells are dug and cattle watered by hand therefrom, a difficult task which the *Damara* carries out most conscientiously. As would be expected *Damara* cattle can stand drought conditions better than the Batawana; but in the southern parts of the Kalahari cattle may go for several days without water!

Unlike most South African tribes, the *Damara* allow, in fact encourage, their women folk to take an interest in their stock. The cattle kraals are large enclosures in which often the family hut is situated, this being done to prevent overcrowding and interfering. It is preferred that cows should calve in the kraal rather than out at pasture, and the milking is done once daily, often at sunrise, by women. The milking pails are of wood and as far as hygiene is concerned, the Batawana is superior to the *Damara*, for the latter seldom clean the receptacle, in fact it is stated that custom decrees that this should be washed only once annually. Butter is made (by swinging a calabash to and fro) and this is used not only in exchange for grain, but after the addition of some herb, is employed by the women for anointing their bodies. Calves at weaning are grazed with the main herd, any showing trouble in returning to their mothers have a slit cut above the nose and by irritation a knob-like structure eventually forms. Searing or scarifying is often resorted to for conditions such as ophthalmia, lameness, etc., while in several cases cattle are disfigured by the native method of branding, *e.g.* lines along body, cut ears, etc.

Bull calves are castrated at a younger age than under Batawana ownership, from 1-2 years being the usual period. The end of the scrotum is cut off, the testicles are grasped, one in each hand, and with a see-saw-like motion, they are pulled out, the animal in the meantime being firmly secured. A bullock is thrown by seizing the tail, running with it until it stumbles or hesitates, and then swung off its feet when the head is firmly held.

Damaras, not being agriculturists, are generally keen to sell their young oxen, but will seldom part with a cow. As they take to agriculture, there will be less inclination to part with oxen.

Despatch of Export Cattle to Northern Rhodesia.—With regard to trading when the cattle have been disposed of at one of the various trading stations scattered throughout the Delta they are, branded and then inoculated against anthrax. They are next despatched periodically to headquarters, generally at Maun, and after permits have been obtained from the stock inspector, may proceed to their destination, as a rule, north of Kazungula. The journey northwards, however, depends on many factors, *e.g.* state of market, condition of grazing, presence of water, etc.

The firms chiefly engaged in the cattle trade are:--

Messrs. Susman Bros., who are the chief exporters;

Messrs. Orphanides Bros.;

Messrs. R. F. Sutherland, Ltd.; and

Messrs. H. C. Werner, of Lusaka, Northern Rhodesia.

Whereas until about 1920, cattle were exported chiefly to the railway at Palapye Road or *via* Ghanzi and Letututu to the Southern Protectorate, within the past decade the vast majority have been sent north to Kazungula for the Northern Rhodesian and Belgian Congo markets.

Cattle are sent on the long journey of 250-300 miles to Kazungula Crossing (Zambesi River) generally after the rains, as otherwise drinking water would be scanty, in fact there are stretches of country along which, during the dry season, water is not procurable for 2-3 days. In the rainy season, January to April, the greatest distance between any two pools or pans would be 10 miles. In order to encourage the export trade, the Administration has sunk wells at two places, Sakobs and Xana, between Puluhele and Tsotsoroga Pan, but the whole water problem is exceedingly difficult.

The cattle are sent forward according to size, *e.g.* big oxen, tollies and cows, so as to make grazing easier. *En route* large bush kraals are constructed, not only to prevent animals wandering, but also for protection against lions at night. Each consignment is under the charge of a European foreman who has 2 natives for each 100 head. The cattle move slowly along at the rate of 10-15 miles *per diem*, unless circumstances ordain otherwise; but obviously the condition of the stock must not suffer in any way. When the market is slack, as it has been since 1930, the cattle are grazed in suitable localities, *e.g.* along the Chobe river, between Kachikau and Kazungula, until they are required. The route taken by cattle is along the so-called cattle or "fly"-free road, and shown on the accompanying map, Fig. 72. It will be observed that as far as Makaranga, the motor and cattle routes are widely separated, except at Tsotsoroga Pan, but north of this, they cross frequently. Owing to the sandy nature of the country, cattle are kept from the motor road otherwise

it would be rendered useless for motor traffic. A dipping tank of 5,000 gallons is available at Kasane, 9 miles from Kazungula, but parasitic conditions, *e.g.* due to ticks, lice and acari, are chiefly seen in winter.

All slaughter cattle proceeding to Northern Rhodesia or the Belgian Congo, are quarantined a month at the Northern Rhodesian Quarantine Station at Kazungula. On the Bechuanaland Protectorate side of the Zambesi river, a Government Veterinary Officer is stationed at Kazungula (just opposite the Rhodesian Station), and he is responsible for the health of the animals prior to the crossing which is carried out towards the end of each month. Before the cattle are swum across, they are inspected by a veterinarian of the Northern Rhodesian Government and then branded with the letter K, on the right hindquarter, the latter operation being carried out in a crush by a stock inspector of the Bechuanaland Protectorate Government.

The crossing of the Zambesi river, which at this point is approximately 600 yards wide, is carried out by natives who, standing in a large barge, attach ropes about the horns of the cattle. Other natives then paddle the barge across stream, the animals really being pulled along. Five to seven head are taken at a time and the journey across occupies 15-20 minutes, whereas the return trip is done in half that time. On reaching the Northern Rhodesian side, a shelving bank is selected and as soon as the cattle feel the ground, the head ropes are loosened (one boy to each beast), and they walk ashore without difficulty. The Quarantine Station, in charge of a stock inspector, is situated about 50 miles from Livingstone and has a river frontage of about 6 miles. Dipping is carried out weekly, and before cattle are released inspection by a veterinarian is again carried out.

The fees for the crossing are as follows: 1s. per head to the Bechuanaland Protectorate Government—supervision or inspection fee, 1s. per head to Messrs. R. F. Sutherland & Co., who carry out the crossing, and 3s. per head to the Northern Rhodesian Government for inspection, grazing and dipping. The Bechuanaland Protectorate Government fee is paid to the Magistrate at Kasane, and herd boys during the quarantine period of one month are provided by the owners.

The cattle on arrival at Livingstone are either killed for local consumption (since Northern Rhodesia can hardly supply its own needs), or sent in sealed railway trucks to the copper mines in Northern Rhodesia or Belgian Congo. Each train is under the charge of a policeman who has instructions to shoot any cattle which may escape from a truck, *e.g.* as the result of a derailment. It has been suggested that breeding stock from Ngamiland should be exported to the north. Not only is this undesirable at present, for the reason that it is not certain whether Ngamiland is in a position to do so, but since the Northern Rhodesian authorities suggest a 'six months' quarantine, it is perhaps better to postpone this plan until the matter has been further considered.

Available export totals *via* Kazangula are as follows:—

1920	1,931 head.	1928	5,882 head.
1921	3,900 „	1929	4,405 „
1922	3,629 „	1930	7,386 „
1923	6,302 „	1931	9,090 „
1924	6,669 „	1932	6,392 „
1925	7,541 „	1933	—
1926	9,914 „	1934	1,800 „
1927	6,510 „	1935	No record.

Ngamiland, being so isolated and having no centres of European activity, *e.g.* mining or factories, depends entirely on the cattle industry. If there is no market for their stock, the natives are unable to pay their annual tax of 25s. The traders, having invested large sums of money in the country, have made serious efforts to improve the position by finding new markets. Attempts have even been made to establish business relations with the diamond mines in Angola, the cattle being driven through the Caprivi Strip *via* Bagane Drift, and thence along the right bank of the Kwando River to Saurimo, a distance of over 1,000 miles.

In the circumstances, the interest of the Bechuanaland Protectorate Government in the cattle trade can well be understood.

Vicissitudes of Cattle Husbandry.—Since the eradication of Pleuro-pneumonia (*interimane*) at the Caprivi border in 1927, there is probably no healthier cattle country in Africa. The cause of the greatest mortality is starvation (*libupama*), but this is due to the concentration of herds in the south of the territory, leaving untouched the rich pastures north of Gomare. Following on the weakened state associated with malnutrition, many animals in seeking water are unable to extricate themselves from the muddy “melapo” and thus die of exhaustion. Nagana (*tsetse*), *i.e.* chiefly *T. congolense* disease, is responsible for comparatively few deaths especially now that the value of trypanocides is widely known. In any case, by careful herding *Glossina* infection may be avoided. Anthrax (*kwatshi*) is reported to be prevalent at Kachikau, Maun, Toten, Lake Ngami and Tsau, but it is probably less serious than is believed. Anthrax vaccine is issued free to natives and all export cattle are inoculated at Maun. Mange and lousiness are common in winter. Export cattle while in the vicinity of Kasane (where the only cattle dip-tank is situated) improve after a few immersions. Fascioliasis and other worm infections are common in the swamp region. “Bad” water (whether due to mineral, animal or vegetable matter) is undoubtedly responsible for mortality. It is more than likely in some cases that decomposing algae are harmful and that after drinking from polluted ponds death follows after a short illness. Pammel (1911) records *Nodularia spumigera* as being suspect in Australia, and there is reason for believing that a similar agent has been encountered in South Africa (*e.g.* Worcester). Poisonous plants also play an important rôle. The chief malady affecting young cattle is calf paratyphoid (*sibiti*).

*Basutoland.**

Owing to Basutoland being surrounded by Union territory, and cattle of European breeds having been introduced in large numbers over many years, the original native cattle, formerly chiefly of Zulu conformation, scarcely exist. In their place are the usual nondescript animals tending towards the *Brachyceros* type.

*Swaziland.**

As will be seen from Map II, the cattle of Swaziland are of the Zulu sub-type.

Southern Rhodesia.

The reply (letter of 5.11.31) from the Prime Minister, Southern Rhodesia, to the Minister of External Affairs, Pretoria was to the effect that the native cattle of Southern Rhodesia had already been described by Nobbs (1927) and that the Government was not in possession of a copy of the paper in question. The reference, however, was given.

Unfortunately Nobbs' original article was not accompanied by photographs nor by a map showing distribution of cattle types, but in subsequent papers by Bisschop and Curson (1933) and Curson (1934) this information has been provided.

All that it is necessary to state now is that there are two distinct types of native cattle, the Bechuana beast and the so-called Makalanga or Mashona beast.

Nobbs (1927) described the Bechuana as the Mangwato or Amabowe and his comments are as follows:—"The Mangwato is a distinct type, deserving of the distinction of a breed, not to be confused with the Matabele⁽⁵⁰⁾ or Makalanga. It is found (in Southern Rhodesia) particularly in the south and west of Gwanda district, in the southern end of Bulalima-Mangwe, and across the border to the south of Tuli also. This breed is one which has contributed its share to the Matabele, and was in existence long before the advent of that warrior race. Mangwato cattle are large-framed, the fat oxen averaging 600 lb. dressed weight. They stand on long, strong limbs and carry very wide-spreading thick, heavy horns. They make heavy, powerful trek oxen of great endurance, and the carcass is of good shape and quality, though maturity is only reached at eight or nine years. The cows yield, as native breeds go, a good quantity of rich creamy milk, and generally furnish about ten calves. They show a resistance to the common diseases, and probably possess some degree of inherited immunity. Red or red-white colours predominate though most colours are found, and they show that fixity of type which is characteristic of long-established breeds".

⁽⁵⁰⁾ Nobbs describes the Matabele cattle, but as he himself notes, "they are of a very mixed derivation so recently collected and amalgamated that the original types are known and distinguished, and they possess no common characteristics distinguishing them as a breed . . ."

He makes no reference to the presence of a small hump, cervico-thoracic in situation and muscular in structure, an important feature of Sanga cattle in general.

The Makalanga cow was described by Bisschop and Curson (1933) and it remains to be stated that the bull, like the cow, varies greatly in conformation. All Makalanga cattle are small and of light build, a good ox rarely exceeding 800 lb. Some animals are sturdy while the majority are weedy. The cow shown in Fig. 74 is a good example, but the bull represented in Fig. 73 has poorly developed limbs. The distribution of the type is shown in Map II.

In regard to *origin* of cattle in Southern Rhodesia we may quote Hall and Neal's (1902) ⁽⁵¹⁾ remarks concerning the ruins of that country as follows:—"In the more ancient débris heaps and under ancient cemented floors are *horns* of very small oxen—short horned—smaller than Guernsey cattle and probably the breed from which the present Zambesi cattle originated. They were preserved by the cement-work by which they were hermetically sealed from the action of the weather. Long-horned cattle were not introduced into South Africa until late in the seventeenth century" (p. 153).

Until the horns have been examined it is difficult to pass an opinion, but assuming they belonged to cattle is it certain they were not of calves, which according to our view were of the Sanga type? It has already been stated above that long-horned cattle were introduced south of the Zambesi first by the Hottentots and later by the Bantu. It was only in the seventeenth century that Europeans introduced cattle into South Africa.

In connection with prehistoric ruins one should read Gwatkin's (1933) articles in *The Rhodesian Mining Journal* on "The Ancient Forts of Penhalonga" in which he discusses the view that they were cattle pits. Another paper by Capt. Wilson entitled "The Ancient Civilisation of the Rift Valley" and appearing in *Man* (Vol. 32, p. 298) suggests a prehistoric Great North Road to Egypt. Apart from Egypt where valuable historical records are represented on ancient monuments, nothing is known elsewhere in Africa regarding the earliest cattle, except what is indicated in this Report.

Of the 2,716,762 cattle in the territory in 1934, 1,708,607 were native owned.

*Mozambique.**

Map II does not represent at all accurately the distribution of cattle in this territory. All that can be stated is that the Zambesi River forms a convenient line of demarcation between the Short-horned Zebu to the north and the Sanga cattle (sub-type Zulu)

⁽⁵¹⁾ This reference was brought to our notice by a correspondent signing himself "L. F.", his letter being dated 29.3.33.

to the south. According to Botelho (1933) there were approximately half a million head of cattle in the country in 1932, distributed as follows:—

Lourenco Marques	375,770
Inhambane	15,944
Quelimane	12,076
Tete	72,462
Mozambique	4,817
Cabo Delgado	—
Niasa	2,013
Manica and Sofala	36,067
TOTAL	519,149

*Union of South Africa.**

As described by Curson (1936) "the time has long passed for describing the indigenous cattle of the Cape, Orange Free State and Southern Transvaal. Apart from the scattered Afrikaner herds, there has been so much intermingling with cattle of European origin that a nondescript type, possessing chiefly *Brachyceros* characteristics, has arisen"⁽⁵²⁾. As shown in Map II the cattle of the Northern Transvaal are of Bechuana origin, and those of Natal of Zulu type.

As photographs have already been given of Bechuana cattle (Figs. 67-70), it is necessary only to show the Afrikaner (Figs. 77 and 78) and Zulu (Figs. 79-82). The Zulu beast is a member of the Sanga type and as mentioned in the classification (p. 11), while the hump is cervico-thoracic and muscular, the skull is quite different, the circular horns, especially in the cow, being upright and lyre-shaped. The Afrikaner on the other hand has oval horns which are disposed in a lateral direction. Again the convex profile of the elongated Afrikaner skull differs materially from the straight profile of the broad Zulu skull.

Figures 81 and 82 are photographs of a bull and a cow of the Black "Nkone" breed which by selection has been evolved from the Zulu sub-type. A herd has been established at Onderstepoort.

Thompson (1932) has described a herd of so-called Sacred cattle of Sanga type in the Transkeian Territories. These Bolowana cattle as well as another herd described by Soga (1931) apparently represent the most southerly of our indigenous cattle, in fact, they may be compared to islands in a sea of nondescript grades.

SUMMARY.

It being believed that the Third and Fourth Migrations were responsible for the extension of indigenous cattle from North-East Africa (probably Abyssinia), the cattle types occurring in the various territories concerned may now be summarised:

⁽⁵²⁾ Centres of such nondescript cattle are to be seen throughout Africa in the neighbourhood of towns. The ubiquitous European, wishing to improve the milk yield of native cattle, soon introduces *Brachyceros* breeds.

Third Migration.

It is remarkable that the Lateral-horned Zebu or Afrikander is found only in the Union of South Africa, chiefly in the north-western part of the Orange Free State.

Fourth Migration.

Sanga cattle occur in Central and South Africa either alone or associated with the Shorthorned Zebu, which came apparently from India and constituted the Sixth Migration.

Abyssinia.—(1) The cattle are of three types, Shorthorned Zebu, Brachyceros and Sanga, the last-mentioned receiving its name from the giant horned Galla or Sanga oxen of Abyssinia.

Anglo-Egyptian Sudan.—(1) The same three types occur in the Sudan.

Uganda.—(1) The Shorthorned Zebu is dominant in the east while the Sanga (Ankole) is most numerous in the south-west.

(2) Crosses are numerous. These naturally tend either towards the Sanga or the Shorthorned Zebu side.

(3) At the Koja Experimental Farm observations are made into native cattle.

Kenya.—(1) The cattle of Kenya are all Shorthorned Zebus.

(2) Much experimental work is being undertaken in order to improve the milk yield of native cattle, the results being most promising.

Belgian Congo.—(1) Sanga cattle, which vary from polled animals (a few) to giant horned specimens in Ruanda-Urundi, occur along the mountainous eastern border.

(2) Apart from the eastern frontier and a few small centres elsewhere, *e.g.* Katanga, the country is Glossina-ridden.

Tanganyika.—(1) The dominant type is the Shorthorned Zebu, only a small part of the territory in the north-west being occupied by Sanga (Ankole) cattle.

(2) More attention has been paid in Tanganyika to native cattle problems than elsewhere in Africa.

Angola.—(1) The cattle are entirely of Sanga type, the sub-types represented being the sturdy Ovambo and the long legged Bechuana.

Northern Rhodesia.—(1) Both Shorthorned Zebus and Sanga cattle occur, the former in the north-east being an extension of the Sixth Migration, and the latter resulting from the Fourth Migration.

(2) Two sub-types of Sanga are to be found, the Bechuana or Barotse in the west and the Baila (or Mashukulumbwe) in the central region.

Nyasaland.—(1) The dominant type is Shorthorned Zebu.

South-West Africa Protectorate.—As in Angola, two sub-types of Sanga cattle are to be found, the Ovambo in the north and Bechuana (or Damara or Herero) in the central areas. In the south the cattle are nondescript as in the Cape Province.

High Commission Territories, Bechuanaland Protectorate.—

(1) The dominant sub-type is Bechuana which offers much promise of improvement by selection.

(2) A description is given of the cattle export trade of Ngamiland.

Basutoland.—(1) The cattle are nondescript as a result of influence of European breeds.

Swaziland.—(1) Sanga cattle (Zulu sub-type) predominate.

Southern Rhodesia.—(1) Two sub-types of the Sanga occur, namely, the Makalanga (or Mashona) and the Bechuana.

Mozambique. (1) The cattle are of Sanga type south of the Zambesi River (Zulu sub-type), but of Shorthorned Zebu type north of the river:

Union of South Africa.—(1) The greater part of the country is occupied by cattle of nondescript type, originally Sanga, but gradually tending towards *Brachyceros*.

(2) The Afrikaner is the native type which through selection by European farmers has attained universal renown. The second indigenous variety hitherto neglected is the Zulu, a sub-type of the Sanga.

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(C) FIFTH AND SIXTH MIGRATIONS.

All that is necessary to state is that, judging from the present distribution of cattle, when the Bantu people migrated from North-East Africa, not only did they proceed southwards (as described under the Fourth Migration) but also in a westerly direction. Evidence for this is provided by the fact that the Bornu cattle of Northern Nigeria or Kouri cattle of French Equatorial Africa are of Sanga type and must have come from probably Abyssinia. This constitutes the so-called Fifth Migration. The Sixth Migration refers to the westerly passage of the Shorthorned Zebu along with Arab owners from the coast of East Africa, probably from the North of Kenya. If this route were followed towards Lake Chad the *Glossina* regions of the Southern Anglo-Egyptian Sudan and French Equatorial Africa would have been avoided, *i.e.* assuming that the northern limits of tsetse-fly have not altered much within the past millenium.

The lyre-horned Zebu appears to represent the cross between the Hamitic Longhorn and Shorthorned Zebu.

Summary.

As we have seen there are cattle of Sanga and Shorthorned Zebu types in West Africa. Knowing that these are best represented in North-East and East Africa, it is suggested that they accompanied the wanderings of Bantu tribes and Arab warriors from North-East and East Africa respectively.

CHAPTER III.

SOME EXTRA-AFRICAN CATTLE.

INTRODUCTION.

As it was obvious that certain breeds of cattle outside Africa bore a striking resemblance to some African types or sub-types, it was decided to seek information from the countries in question so as to acquire knowledge as to their origin. In this way it was hoped light might be thrown on the origin of African cattle.

At this point it should be stressed that Curson and Epstein's paper (1934) on the skull of the three parent stocks of African cattle with comments on migration routes, and Curson's paper (1935) on the hump of African cattle, had not appeared, so the position regarding origin was not so clear then as it is to-day.

Accordingly a Questionnaire was sent to the countries under consideration. Thanks to the Secretary of the Imperial Council of Agricultural Research, New Delhi, replies were obtained from the Directors of Agriculture of Madras, United Provinces and Bombay. As is well known to those who have been to East Africa, the native cattle are of the so-called Indian Zebu or Brahman type. Hence our desire to approach the Indian authorities. Again, owing to white cattle (Fulani) with pigmented skins having been encountered, in Nigeria (during a tour of that country by R. W. T. in 1911) and Zululand, and being aware that cattle of similar coloration occurred in Scandinavia, a Questionnaire was despatched to both the Swedish and Norwegian Boards of Agriculture. Finally, having observed in the Argentine (during a visit to that country by R. W. T. in 1927) that "Criollo" cattle possessed skulls similar to those frequently seen in African Sanga cattle, it was decided to approach the Minister of Agriculture, not only in Buenos Aires but also at Rio de Janeiro, since "Criollo" cattle are to be found in Brazil as well.

So generous was the response to our enquiries that it will be impossible in an account of this nature to discuss anything but that which bears on African cattle. Not only were complete accounts furnished in most cases of the breeds of the various countries but excellent photographs accompanied the descriptions. To the authorities of the respective countries we extend our cordial thanks.

It will be convenient, however, to refer to data available from Great Britain, Palestine and Jamaica although no Questionnaire was sent to those countries.

India.

It is not generally known that, of the 186 millions of cattle in Asia, India possesses the largest number, namely 167 millions. In fact India is the greatest cattle country in the world, the United States of America coming next with 61 millions (*Vet. Rec.* 18th April, 1936, p. 517).

As mentioned on p. 623 the Indian Zebu or rather the Shorthorned Zebu is characterised by an elongated skull with generally a convex profile, and a musculo-fatty thoracic hump. On dissection, the thoracic vertebrae are seen to possess bifid superior spines, as in the Afrikander. It must be emphasised that not all Indian cattle are shorthorned. Some breeds, *e.g.* Hallikar and Amrit Mahal have long horns, while according to Epstein (letter of 10.4.36 to Director of Veterinary Services) in a Nepalese breed the skull resembles that of the Afrikander. See *Onderstepoort Journal*, Vol. 7, No. 1 (1936).

After reviewing the particulars forwarded from India it was obvious, as stated by Holm (see Kenya), that the Indian breed resembling most closely the cattle of East Africa was the Thar Parkar. See Fig. 83. A description of the breed, taken from leaflet No. 19 of 1926 and issued by the Department of Agriculture, Bombay, is given hereunder:—

“ *Breeds of Cattle in the Bombay Presidency—*
8. *The Thar Parkar Breed.*”

The Bombay Presidency to-day possesses some eight breeds of cattle, which undoubtedly at one time must have been pure breeds, as to-day in certain localities fairly pure types of these breeds are to be found.

Sporadic reappearance of typical animals is to be found in each breed, undoubtedly reversion to the one-time pure breed. These, however, are getting few and far between owing to in-breeding in the mongrel herds to be found to-day.

These breeds are or have been so bred that they are particularly useful to the tracts in which they are found, and it is very doubtful if any other breed could give the necessary good work that the breed now found in the locality is capable of. To illustrate, the long legged, upstanding Kankrej is particularly suited to the deep rutted sandy roads of Gujerat, and the Dangi with its flint-like hoof, and its dark skin is particularly useful in the heavy rain Ghat tracts and wet rice cultivation of these areas.

The breeds of the Presidency can be divided into the following grades according to their usefulness:—

Heavy, Light and Medium *draught*, *milking* or *dual* purpose:

The Heavy *draught* breeds being the Kankrej, Krishna Valley and Gir Breeds.

The Light fast *draught* breeds being the Amrit Mahal and the Khillari.

The Medium *draught* breeds being the Dangi.

Purely *milk* breeds being the Sindhi.

Dual purpose breeds being the Gir, Kankrej and Thar Parkar.

Introduction. The breed takes its name from the District Thar Parkar in which it is bred. From the outward conformation of the animal and from the history of the breeders, it is fairly certain that this breed has sprung from the Kankrej. The Sindhi breeders of Badin some generations ago settled in Radhanpur State and then later migrated to Badin, and it is more than possible they took with them this fine breed of Kankrej cattle. The Mahomedan breeder has no scruples as to milking cattle, milk being his first object in keeping cattle. Unlike the Kankrej of Gujerat, the Thar Parkar is a first class milk animal. The Thar Parkar was brought into prominence during the Great War when milch cattle were required for the army in Mesopotamia. On an average it did better in Mesopotamia than the famous Sindhi and has proved itself at many of the military farms as a good dairy animal.

Natural Habitat.—The home of the Thar Parkar is in the Thar Parkar District of South Sind, where only scanty and rough grasses grow which is so peculiar to this district. The soil responds quickly to even light showers of rain. The district is extremely hot in the summer and fairly cold in the winter, the nights being cool throughout the year. The tract being very difficult to get at and transport facilities being very poor, there has been little chance of any foreign breed getting into the tract and it has, therefore, kept fairly pure.

Breeders.—The breeding of this breed is in the hands of a professional Mahomedan breeder, who, like the breeder of the Sindhi breed, locates his temporary home, where water is available. He is particular about the sire that heads his herd.

Types.—There are two types of this breed, one inclined to put on more flesh than the other, in colour and outward conformation there being little or no difference. The types to be had at Mithi, Dipla and Nagar Parkar where the water is brackish are not so good as those bred in other parts and these are inclined to be more angular than those bred in other areas.

Availability.—The breed, although bred extensively, seldom finds its way far from its natural home, this being due to the nature of the country. Purchases can be made at the following villages which are railway stations:—

Badin, Dhoro Naro, Jida Gudam and Shadipali.

An annual fair is held at Badin in November, where a good number of breeders assemble with their cattle. A small herd is maintained at Pihai, where bulls will be available in the near future. The Imperial Department of Agriculture have a fine herd in Karnal in the Punjab.

Prices.—The prices of the male range between Rs. 200 to 250, the cow about Rs. 150 to 200, and a good pair of bullocks being valued at about Rs. 300 to 400.

As a Draught and Milch Animal.—The size, hardiness and general conformation and the milking qualities make this breed one of the most useful in India. It is now being recommended by the Imperial Department as the breed to be used to improve all other breeds in the country. It has proved its usefulness as an economical dairy animal in Mesopotamia and all over India. At one time it was known as a grey Sindhi and was confounded with the Sindhi, until the Great War when they did so well, the matter was investigated and it was found that it was a breed, bred in a special locality. In Karachi it is often spoken of as the "Cutchi" and is used extensively for road draught. The great difficulty is in purchasing good specimens as the greater portion of breeding is carried on in the interior miles away from the railway.

The Thar Parkar as a dual purpose animal is second to none in India.

Description.—A fair sized animal with good care will grow to a large size, the cow weighing from 850 lb. to 950 lb. and bull from 950 lb. to 1,200 lb.

Colour.—Typically a grey with dark or black points, the fore-quarters and hind-quarters being almost black. The colour in the female like all greys gets deeper in the winter and in-calf, after calving getting lighter in colour.

Head.—The head is well carried, small with a distinct dish in the centre, medium muzzle, nostrils broad, eyes small but bright, the horns are irregular, large and small horns being found, ears medium to large and pendulous.

Fore-quarters.—Neck: fine, well set on, with thin fine medium dewlap. Fore-quarters, square, strong and withers light, hump of medium size.

Hind-quarters.—Fairly wide, long, fairly level, rump long and muscular in the male; fine, broad in the female.

Udder.—Wide, long, tucked up, small, but very shapely with good teats well set apart, milk veins prominent and tortuous.

Hair and Skin.—Hair very fine and the skin is thin, fine and pliable.

Style. Alert, vigorous and bold.

As has been mentioned, a fine dual purpose animal suitable to any part of India. It has the makings of a first class dairy animal and the males really good draught animals".

Although descriptions of other breeds of Shorthorn Zebu cattle, *e.g.* along the Arabian coast, are not available, yet considering the extent of trade between the East Coast of Africa and Bombay over many centuries it would not be surprising that cattle of the Thar Parkar were originally introduced into what are to-day Kenya and Tanganyika. What is indeed surprising is that the African cattle have after so many centuries retained in general their original conformation! The influence, however, of inter-breeding with Sanga cattle is manifest in many districts.

It is worth noting that McCall (1930) imported Krishna Valley bulls from India in order to improve the Tanganyika Zebu, but according to Hornby (1933) "an unexpected setback . . . is the discovery that the grade offspring are extraordinarily intractable, and we are now inclined to think that the greater docility of the average Tanganyika Zebu is a very valuable attribute which outweighs any small advantage which the Krishna Valley may have in conformation or milk supply" (p. 72).

White cattle with pigmented skins occur not only in India, but also in Tanganyika, north of the Central Railway (Singida cattle), and Nigeria (White Fulani cattle). While in these cases the African cattle are of Zebu type (thoracic hump) the question of their origin from India and their relationship is possible. The White Zulu cattle (Nyoniapumuli cattle) on the other hand are of a different type (as is the Fjällras of Sweden), and in this case it is not a question of the Zulu cattle originating in the East and of relationship, but of the *origin of the type of coloration*, namely, white coat with pigmented skin. More will be said about this matter in the reference to Sweden.

*Palestine**⁽⁵³⁾.

The undermentioned breeds of cattle are found in Palestine:—

- (a) Small local cow—Arab breed.
- (b) Jaulan breed.
- (c) Beyrouth or Lebanese breed.
- (d) Damascus breed.

(a) *Arab Breed.*

General.—This breed is neither a dairy, beef or working animal, due to poor feeding and housing conditions and to no attempt at selection or use of mature bulls. This breed has one good quality, however, in that it is exceptionally hardy and is very resistant to disease.

<i>Conformation:</i>	Height at withers	...	...	...	...	108	cm.
	Height at back	...	...	...	...	107	„
	Height at croup	...	...	...	...	111	„
	Breadth of chest	...	...	...	...	30	„
	Depth of chest	...	...	...	...	56	„

⁽⁵³⁾ Details kindly furnished by J. M. Smith, Esq., O.B.E., C.V.O., Palestine (his letter V/8/2/20 of 8.3.35).

Colour.—The usual colour is black and white but red cattle with white markings are also found.

Weight.—Average live weight is 200-250 Kg.

Milking Qualities.—The annual milk yield ranges between 400 and 800 litres with 4 to 5 per cent. butter-fat.

(b) *Jaulan Breed.*

General.—This breed originated from Jaulan (Syria) and is superior to the Arab, being of a more robust build, the cows giving more milk and the oxen better for draught work. Like the Arab, the breed is also resistant to disease.

Conformation:—

Height of withers	114 cm.
Height of back	114 ,,
Height of croup	115 ,,
Height of tail-head	117 ,,
Breadth of chest	32 ,,
Depth of chest	57 ,,
Circumference of ribs	155 ,,

Colour.—Red and fawn is usual but black is not exceptional.

Weight.—Live weight varies between 350 to 450 Kg.

Milking Qualities.—Under their home conditions cows yield from 700 to 1,200 litres.

(c) *Beyrouth Breed.*

General.—This breed originated in the Lebanon and were bred mostly by small holders in the villages of the Lebanon, especially around Beyrouth. This breed is larger than the Jaulan and has been imported into Palestine because of its milking, draught and disease-resisting qualities.

Conformation:—

Height of withers	125 cm.
Height of back	124 ,,
Height of croup	127 ,,
Height of tail head	129 ,,
Breadth of chest	88 ,,
Depth of chest	65 ,,
Circumference of ribs	174 ,,

Colour.—Red and fawn is usual but black is not exceptional.

Weight.—Live weight varies between 350 to 450 Kg.

Milking Qualities.—Under usual pasture conditions the yield is between 1,000 to 1,500 litres. When hand-fed with concentrated food the yield goes up as high as 4,000 litres.

(d) *Damascus Breed.*

General.—This breed originated in Syria, principally around Damascus, and was imported into Palestine because of its high milking qualities. The breed is inclined to be leggy, not very solidly built and is not so resistant to disease as the other breeds. It is primarily a milk breed and is not of much value for beef and draught purposes .

Conformation:—

Height of withers	140	cm.
Height of back	139	„
Height of croup	144	„
Breadth of chest	37	„
Depth of chest	69	„
Circumference of ribs	179	„

Colour.—Black or red.

Weight.—The average live weight is 470 Kg.

Milking Qualities.—The average yield is 3,000 litres but selected cows give as high as 5,000 litres.

Thanks to the photographs sent by the Chief Veterinary Officer, it is clear that the cattle of Palestine are of *Brachyceros* stock.

Norway.

Of chief interest in Norway and Sweden are the white cattle which one of us (R. W. T.) believed might be related to the white cattle of Africa. Subsequent investigation, however, indicates that the cattle are of entirely different types, but this does not rule out the possibility of the white colour and pigmented skin having in each case been derived from the same source, presumably in Asia.

Professor H. Isaachsen of the Royal Agricultural College, Aas, Norway, not only kindly replied (27th February, 1932) to our Questionnaire, but also furnished two publications, “*Landbruksboken*” and “*Husdybruket*” describing the Norwegian breeds, of which there are six, each occupying a well defined part of the country.

He states that there is “no breed of the type generally called white . . . we have—as in Northern Sweden, Northern and Eastern Finland and Northern Russia—what we call ‘*sidet*’ (sided) colour type *i.e.* the sides are black, red or grey. The back has a broad white line from the head (generally the line begins a little back of the neck) down to the tassel of the tail. The under part of the body from the head or neck is white. These coloured sides are of various sizes until there are only small patches which finally in some cattle are absent; and the animals are then all white, but with pigmented ears, and generally pigmented muzzle. The white cattle in this country are accordingly white, because they are decoloured from the ‘*sidet*’ type, or to put the matter in another way, the white cattle have only white markings! As a type our cattle have no eye rings or black teats, but there might be some animals possessing these dark points.

We have no animals with black skins covered with white hair. Sometimes, however, about one inch outside the coloured sides of the ‘*sidet*’ type, the skin under the white coat is pigmented. Ears, hoofs, etc., are pigmented, dark or less dark according to the main colour of the animal. . . . The muzzle is either pigmented or flesh coloured”.

In Norway no attempt has been made to create a breed from the white cattle.

Sweden.

The Swedish authorities kindly replied to the Questionnaire and provided copies of the publications "Svenska husdjurraser" by Sven Sixtensson and "Agriculture and Fisheries in Sweden", published by the Swedish Board of Agriculture.

In Sweden, according to Professor Isaachsen, the Fjällras or Fjreldras polled mountain breed (see Figs. 84 and 85) represents the "sidet" type just referred to. The coloured parts may be black, red or grey, but apparently through selection chiefly white animals with black points are preferred. There are two other breeds, namely Swedish red and white breed and the Swedish lowland or Fries breed.

*Great Britain.**

We were naturally interested in the so-called wild white cattle of Great Britain for the advancement of which in 1918 was formed the Park Cattle Society. Much useful information was obtained through the Office of the High Commissioner, Trafalgar Square, London, from Sir Claud Alexander, who has probably the largest herd in the United Kingdom.

Bohrmann (1924) has contributed an article on Park Cattle, but it suffices to state at present that there are two varieties, polled and horned, and that only the points, *e.g.* muzzle, feet and ears are pigmented—not the entire body as sometimes seen in African white cattle.

Discussion on "White" Cattle.

With the above details available, it is now fitting that we should consider the position in Africa. First of all the colour pattern referred to as "sidet" by the Norwegians is seen throughout Africa in native cattle types with the exception of the Afrikander. According to Mr. F. N. Bonsma (personal communication of 20.5.36) who is investigating the genetics of Afrikander coloration the range varies from dark red, through blood red, light red, golden yellow, light yellow to white.

As described by Professor Isaachsen, the coloured side markings in South Africa also may be absent in which case the cattle are white, although the skin is not necessarily pigmented. The pigmentation varies from a uniform distribution to merely black points, *e.g.* teats, ears, muzzle and feet. In many cases on the body a flea-bitten appearance is seen. In Zululand the term "sidet" or sided is replaced by the word "Nkone" and a beast may therefore be either a black or red "Nkone". If there is no marked colour, *e.g.* just a few grey hairs (speckled) or where the animal is "decolored" or white, it is said to be a "nyoniaipumuli". This term, however, probably arose [according to letter 13/327(2) of 5.10.35 from Director of Native Agriculture to Director of Veterinary Services] from the fact that such cattle were confiscated by the Zulu chief Cetewayo, since "nyoniaipumuli" means "the bird that does not rest". Although there seems to be a relationship between "nkone" and "nyoniaipumuli" coloration, only the former pattern appeals

to the native, being recognised as a dominant colour and popular as far back as the days of Dingaan. It was this colour that was selected by Curson when visiting Zululand in December, 1935, with a view to purchasing Zulu cattle for a herd that has now been established at the Veterinary Research Laboratories, Onderstepoort.

As is evident in the Afrikander, white need not necessarily be associated with a prior "sidet" pattern, but may exist independently.

*Jamaica and Trinidad.**

Since in the Report on Cattle Breeding in the above islands Hammond (1932) describes certain matters of interest also to veterinarians in Africa, attention is drawn to the fact that in Jamaica four problems were investigated. These were:—

- (a) The characters of the native stock and their capabilities of improvement by selection.
- (b) The changes occurring in European breeds after their introduction.
- (c) The characters and suitability of the Indian (Zebu) breeds, and
- (d) Methods of cross-breeding adopted.

In regard to (b) he states "there could be no doubt that degenerative changes were occurring. These appeared to be associated . . . with the feeding conditions", and "There could be little doubt that European stock . . . gradually lost their type under these conditions and required continual importations to maintain their form and constitution. The causes for the degenerative changes probably consist of a combination of factors, among which may be mentioned the following in order of importance:

- (1) Sub-lethal infections of tick fever (*B. bigeminum*).
- (2) Lack of concentrated feeds and too much roughage.
- (3) Unwise selection of bulls.
- (4) Inbreeding, and
- (5) Disadvantage of long thick coat.

When it is explained that the native stock of the West Indies was imported originally from Europe and has in the course of a few centuries become adapted to tropical conditions, we in Africa should realise how much more fortunate we are in possessing cattle types which have not only existed on this Continent for thousands of years, but which have actually been evolved in Africa.

Brazil.

Thanks to the courtesy of the officials of the Department of Agriculture, Brazil, a reply to the Questionnaire was received through the Department of External Affairs, Pretoria, which in turn had communicated with the British Embassy at Rio de Janeiro.

Of particular interest to the African cattle owner is the fact that in South America, especially in Brazil, are Crioulo cattle which possess a skull not unlike that of the Hamitic Longhorn type, while the horns resemble very closely the upright lyre-shaped horns of many Sanga cattle.

The cattle of Brazil were derived about the middle of the 16th century (1534) from chiefly Portugal and, as explained by Curson and Epstein (1934), Hamitic Longhorn stock was responsible not only for cattle of similar type, existing to-day in the Iberian Peninsula, but also partly (*i.e.* with the Lateral-horned Zebu or Afrikander) for the Sanga type best represented in South Africa.

In general conformation, however, there is a striking difference between the Crioulo and the lyre-horned Sanga, namely in the presence of a cervico-thoracic muscular hump which the Sanga acquired from its Afrikander progenitor. No photographs were available from Brazil in regard to the Crioulo, but the following facts contained in the reply from Rio de Janeiro are worth extracting:—"Of the several types or breeds (in Brazil) there are some which excel either by their qualities or by their numerical or geographical distribution, *e.g.* Caracu, Mocha, Crioulo and Curraleira. The Caracu and Mocha are carefully selected and bred by the Federal Government of the Sao Paulo State. The Crioulo type exists scattered all over the country from north to south. It is being preserved in many of the states in the hinterland outside the sphere of the exotic breeds which have been imported. The Curraleira type still includes an appreciable number of cattle. The other types evolved *locally* are now only of historical importance. In fact their numbers are gradually diminishing and there is an increasing tendency towards their entire disappearance owing to cross-breeding with European breeds and *Bos indicus*, *i.e.* Shorthorned Zebu".

The other types just referred to are the descendants of cattle introduced centuries ago by the Portuguese from Portugal, Portuguese Guinea, and India, and which in the course of time have degenerated.

Of the cattle whose improvement is fostered by the State the Mocha is of interest to African workers, for it is stated by the Brazilian authorities to be a "variacao espontanea do tipo crioulo". Da Costa (1933), however, believes that the yellow polled Mocha cattle are of African origin, having been exported to Brazil from Portuguese West Africa in the early days of the settlement. As he explains, a consignment would include polled cattle just as it would to-day.

Argentine.

The officials of the Argentine Department of Agriculture went to considerable trouble to furnish information regarding the cattle of their country, but in the present article use will be made only of the data bearing on Crioulo cattle. The many photographs accompanying their communication are not only interesting but useful. As before, correspondence was carried out through the Department of External Affairs and the British Embassy at Buenos Aires.

The following extracts concerning Crioulo cattle are of particular interest.

“ *The Colonial Argentine Cattle.*—On the arrival of the Spaniards in the La Plata territories in the 16th century the following species did not yet exist: bovines, equines, goats, sheep and swine. These domesticated animals were introduced by the first Spanish conquistadores.

Originally the black Argentine “ criollo ” were the descendants of the cattle which were brought by Colón to the Antilles and which were afterwards brought to Peru where they multiplied in an amazing manner. In 1543 General Francisco Aguirre introduced some black cattle from Chile and Lower Peru into Northern Argentine.

The progeny of these were introduced in the littoral; the first lot consisting of seven cows and a bull was brought along by the expedition of Sanabria which landed on the coast of Brazil. It was transported to the bank of the Paraná, opposite the Rio Monday whence it was embarked on a raft, which was run up the Paraná as far as its confluence with the Rio Paraguay at Asunción where it was landed in 1554.

This first settlement of black cattle was shipped in the port of San Lucas by the pioneer planter of the Rio de la Plata, Don Juan de Sanabria. These animals belonged to the Andalusian breed and were the origin of the present-day riches of Paraguay and of the Rio de la Plata.

In 1573 there was introduced in Santa Fé by Don Juan de Garay another lot of black cattle, from the herd brought by General Cáceres from the estancias of the pioneer of the Rio de la Plata, Don Juan Ortiz de Zárate.

The Black ‘ Criollo ’ Breed descended from the Andalusians .

The black cattle brought by the pioneers of the Rio de la Plata belong to the Andalusian or Iberian breed of Sanson. Its zootechnical characteristics are as follows: osseous system greatly developed, large head and large horns, heavily built and very moderate eater. Its hide is variegated, coloured light, light brown or dark. It gives very little milk, but is useful as a producer of meat and for work.

Zootechnical Characteristics of the Black ‘ Criollo ’ Cattle.

From the Andalusian cattle described above are descended the black ‘ criollo ’ cattle which present a few variations as regards their zootechnical characteristics resulting from the variety of circumstances, which have contributed to produce the ‘ criollo ’ variety which during the long colonial period has been one of the principal sources of wealth of the country by its production of meat and leather.

The zootechnical characteristics of the black Argentine 'criollo' cattle are as follows: adapts itself easily and breeds well. Its free life on the open plains during many centuries has given it characteristics of its own; it has massive bones (inherent in animals which travel great distances); and owing to its life exposed to all the inclemencies of the weather its pelt is extraordinarily thick. It is of great rusticity and breeds and grows well on poor soil; it is even found in the hills and in the woods. It matures and fattens late, circumstances which detract from its economic value. The black 'criollo' attains its maximum development after seven or eight years. It is principally used as a slaughter beast, its meat is considered very palatable, but it is also used for work and to produce milk, although the daily yield is seldom more than 5 litres.

Present-day Types of Black 'Criollo' Cattle.

The 'criollo' cattle are still largely bred in many of the provinces where there is little change in the grazing or where it improves but slowly. It has been observed as a general rule that the 'criollo' cattle are slower in their development in proportion as the pasture improves. In the provinces in which the grazing is very poor, the 'criollo' is rickety and has diminished in height.

The pure 'criollos' and the quarterbreeds which are used for canned meat and extract of meat are called 'tipo saladero' and 'tipo matadero' and yield on an average (clean meat): young bull 150 kilos or say 37 per cent.; cow 123 kilos or say 34 per cent. The weight of these animals on the hoof is as follows: young bulls 427 kilos and cows 357 kilos.

The 'criollo' cattle thrive well both on the plains and on the highlands, on the slopes of the hills, in shrub-country and in the forests. They are hardy and can thrive on but little food.

Since immemorial times they have been born and bred in country infected with ticks and they have acquired immunity from the bovine malaria known as 'tristeza' (melancholy). In the provinces of Santa Fé, Entre Ríos, Corrientes, Córdoba and Salta and in the territories of the Cháco, Formosa and Misiones, where ticks transmit Anaplasmosis and Piroplasmosis, the 'criollo' cattle keep perfectly healthy whereas the imported European breeds die in great numbers".

The conformation of Crioulo cattle is seen in Figs. 86 and 87.

LITERATURE (37).

- BOHRMANN, A. H. L. (1924). *Park Cattle. Milk Recording.*
 HAMMOND, J. (1932). *Report on cattle-breeding in Jamaica and Trinidad.*
 Empire Marketing Board 58. His Majesty's Stationery Office, London.
 HIRSCH, S. (—). *Stock breeding and dairying in Syria.*
 HOROWITZ, E. J. (—). *Breeds of cattle in Palestine.*
 WALLACE, R. (1907). *Farm live stock of Great Britain.* Oliver and Boyd,
 4th Edit.

MISCELLANEOUS. Leaflets of 1926. Breeds of cattle in the Bombay Presidency. Dept. of Agr., Bombay.

- I. The Kankrej Breed of Gujerat.
- II. The Gir Breed of Cattle.
- III. The Sindhi or Red Karachi Cattle.
- IV. The Krishna Valley Breed.
- V. The Khillari Breed of Cattle.
- VI. The Thar Parkar Breed.

CHAPTER IV.

GENERAL CONCLUSION.

Since the Questionnaire dealt essentially with African cattle and only incidentally with cattle in certain countries outside Africa, it seems advisable to conclude by referring firstly to the position within Africa and secondly to the position without Africa.

(a) AFRICAN CATTLE.

(1) While the replies to the Questionnaire provide a proportion of the data presented, it is manifest that the scope of the investigation was extended chiefly by including territories not originally circularised. In the vast majority of cases it was the veterinary officials who furnished the particulars required⁽⁵⁴⁾.

(2) Owing to the interval which has elapsed between the issue of the Questionnaire and the completion of this compilation, much light has been thrown upon the subject of African Cattle Husbandry generally, *e.g.* origin, conformation and classification. This recent information accordingly rules out certain questions which were asked in 1931. A striking example is the territorial distribution of cattle types, a description of which was given in a paper at the 1935 (September) meeting of the South African Veterinary Medical Association [see *Jl. S.A. Vet. Med. Assn.* VII (1) 1936].

(3) It was realised that the incorporation of information bearing on environmental features and production would be unsatisfactory. Not only were the replies in some instances silent in this respect, but in others, the details were exceedingly meagre.

(4) Accordingly it was felt that it would be best to concentrate upon a description of the cattle types and their distribution, but where some feature referred to in the previous paragraph had received special attention, *e.g.* milk production by Anderson in Kenya, it was included.

⁽⁵⁴⁾ Although entirely outside the scope of this investigation, it is noteworthy from the replies that the veterinarians trained in Latin-speaking countries possess generally a more profound knowledge of Animal Husbandry (at least from an academic aspect) than those educated in English-speaking countries. Recent alterations in the curriculum of the British veterinary colleges in regard to this point are significant.

(5) Of the several methods possible to describe the distribution of the several types, it was decided to take the logical, namely the territories occurring along the various migration routes in their chronological order.

(6) Where territories have been omitted, *e.g.* Italian and Spanish colonies, this is due to the absence of details, although in most cases it is possible to deduce the state of affairs.

(7) There is little doubt but that originally all cattle, except the ancient Hamitic Longhorn of Egypt, came from Asia. All migrations passed through North-East Africa, chiefly Egypt, except the Shorthorned Zebu which was also introduced along the east coast of Africa as far South as the Zambesi River.

(8) The probable migration paths *to* and *in* Africa and the likely periods this occurred are shown in Map I.

(9) The present approximate distribution is shown in Map II, due allowance having been made for *Glossina* and desert regions, *e.g.* Sahara desert.

(10) Of still greater importance would be a map indicating the approximate numerical distribution of cattle such as appearing in Bosman's *Cattle Farming in South Africa*⁽⁵⁵⁾. In this case a dot represents 1,000 head of cattle in his Map I.

(11) Apart from the distribution having been indicated in Map II, the position has been summarised at the end of the description of each migration, *e.g.* pp. 644-645 and 672-674.

(12) Although only of secondary consideration the information presented in the contribution may be helpful to anthropologists. Dart (1933) states that "There is no more vital aspect of anthropology than the study of domestic animals". It is therefore hoped from an anthropological aspect that the evidence afforded by the migration routes and present distribution will be at least as valuable as that derived from other branches of science, particularly the study of human types including cranial measurements, blood groups, languages, customs, utensils, etc.

(13) A striking fact is that the French authorities possess excellent text-books on the livestock of their colonies, whereas such information concerning British territories is scattered throughout annual reports.

(14) Investigation is required regarding the distribution of cattle types in West Africa and upon such matters as degeneration of horns (unassociated with grading up with *Brachyceros*) as described along the littoral of French Dahomey and in the Transkei, Union of South Africa (Thompson, 1932), genetics of coloration, hump, etc.

(15) It is noteworthy that no veterinary department exists in either Gambia or Sierra Leone.

⁽⁵⁵⁾ Being South African Agricultural Series, No. 10, and published by the Central News Agency in 1932.

(16) This survey indicates that in addition to the three parent stocks (Hamitic Longhorn, Brachyceros and Lateral-horned Zebu) and the three derived types (Shorthorned Zebu, Sanga and Lyre-horned Zebu), there are possibly two other distinct derived types. These are both in West Africa and result from the intermixture of Brachyceros and Hamitic Longhorn in the one case (Mandingo), and Brachyceros and the thoracic humped Zebu in the other.

(17) Finally, the photographs reproduced constitute the most comprehensive set yet published.

(b) EXTRA-AFRICAN CATTLE.

Although the original intention of the Questionnaire was to investigate the relationship of certain African and extra-African cattle, based on conformation or coloration, recent independent observations, chiefly by Epstein, rule out the necessity of proceeding in this direction. As a matter of interest, however, a résumé has been given of the position in the countries concerned.

APPENDIX.

Cattle populations of the various African territories⁽⁵⁶⁾:—

	Territory.	Approximate No. of Cattle.	Authority.
French North Africa	Egypt.....	776,000	Le Plae (1933).
	Tunis.....	502,000	"
	Algeria.....	937,000	"
	Morocco.....	2,092,000	"
French West Africa	Upper Volta.....	(1,576,000)	"
	Mauritania.....		
	Niger.....	(1,138,000)	"
	Sudan.....		
	Senegal.....	(393,000)	"
	Guinea.....	—	
	Ivory Coast.....	—	
	Dahomey.....	—	
TOTAL for French West Africa.....	3,352,512	French Minister, Pretoria. Letter of 13.5.36 (for 1934).	
French Equatorial Africa	Gambia.....	—	
	Sierra Leone.....	—	
	Gold Coast.....	192,000	<i>Ann. Vety. Rpt.</i> , 1934-35.
	Nigeria.....	2,675,961	<i>Ann. Vety. Rpt.</i> , 1933.
	Portuguese Guinea....	62,000	Da Costa (1932).
	Chad.....	1,451,000	Le Plae (1933).
	Cameroons.....	645,000	"
	Gabon.....	4,000	"
	Middle Congo.....		
	Ubangi Shari.....		
	Abyssinia.....	15,000,000 (?)	<i>Encyclopaedia Britannica.</i>
	Anglo-Egyptian Sudan	1,300,000	Le Plae (1933).
	Uganda.....	2,151,000	<i>Ann. Vety. Rpt.</i> , 1934.
	Kenya.....	5,191,000	Le Plae (1933).
	Tanganyika.....	5,170,162	<i>Ann. Vety. Rpt.</i> , 1930.
	Belgian Congo.....	1,300,000	Le Plae (1933).
	Angola.....	1,500,000	Da Costa (1933).
	Northern Rhodesia...	522,693	<i>Ann. Vety. Rpt.</i> , 1934.
	Nyasaland.....	190,381	
	South-West Africa Protectorate	854,899	Letter " 3.7.36 " from S.V.O., Windhoek (for 1935).
Bechuanaland Protectorate	1,300,000	Letter of 18.6.36 from C.V.O., Mafeking (for 1934).	
Basutoland.....	350,000	—	
Swaziland.....	450,000	—	
Southern Rhodesia....	2,716,762	<i>Ann. Vety. Rpt.</i> , 1934.	
Mozambique.....	519,149	Botelho (1933).	
Union of South Africa	9,986,630	Min. of 9.7.36 from Director of Census (figures for 31.8.34).	

(57)

⁽⁵⁶⁾ In addition to the blanks below, no details are available with regard to territories not included in the Appendix, e.g. Spanish Morocco, Rio de Oro Spanish Guinea, Liberia, Libya, Eritrea, and both British and Italian Somaliland.

⁽⁵⁷⁾ See footnote 17.

ILLUSTRATIONS.*

EGYPT.

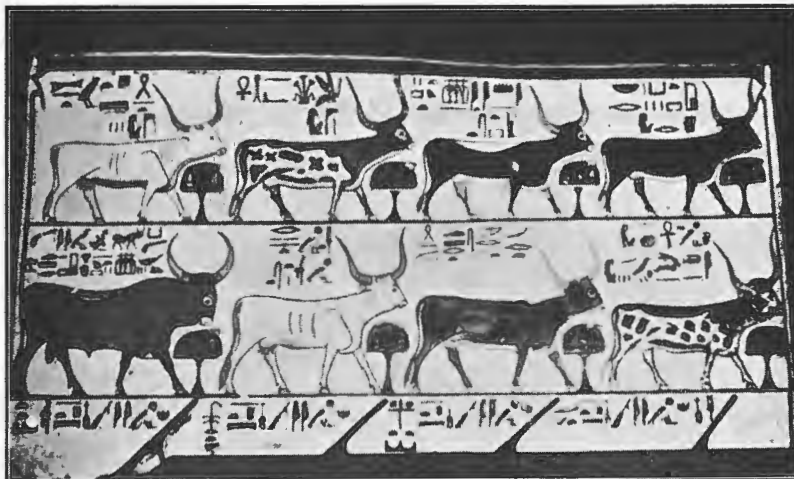


Fig. 1.* Original Hamitic Longhorn cattle.

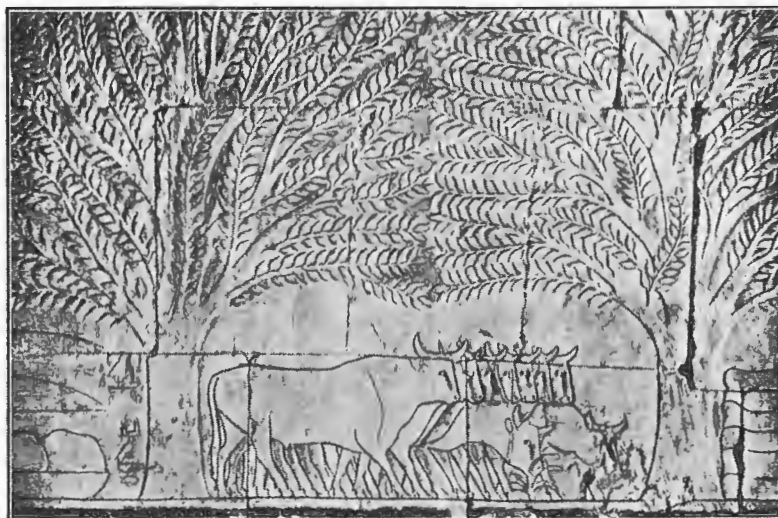


Fig. 2.* Ancient cattle of Brachyceros type.

* Photographs received along with replies to Questionnaire. The source (either photographer or sender) in other cases is indicated by name.

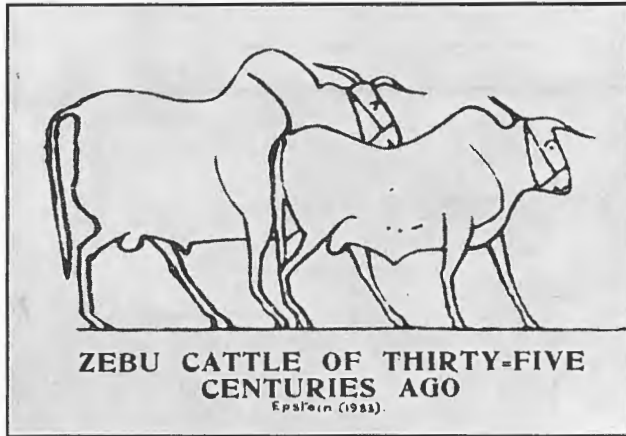


Fig. 3. The original Longhorned Zebu (now Afrikander). (Stegmann v. Pritzwald, 1924.)

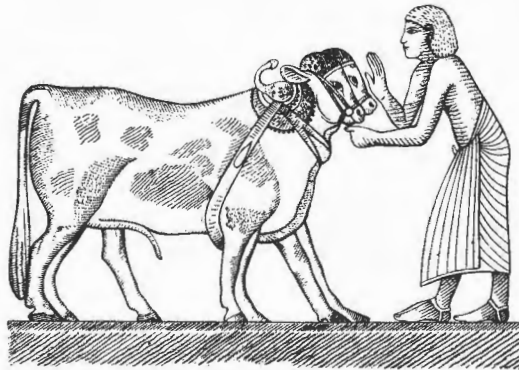


Fig. 4. A polled bull of ancient Egypt. (Kronacher, 1921.)



Fig. 5.* Damietta bull, Lower Egypt.



Fig. 6.* Damietta cow, Lower Egypt.

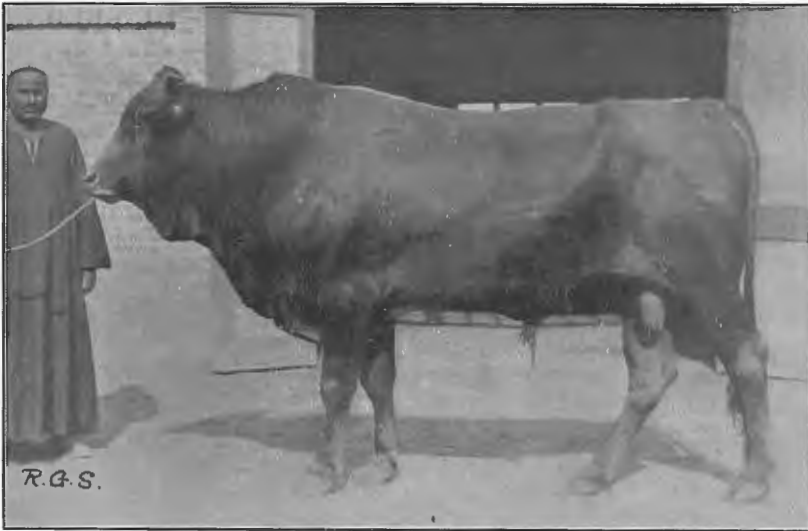


Fig. 7.* Baladi bull, Lower Egypt.



Fig. 8.* Baladi cow, Lower Egypt.

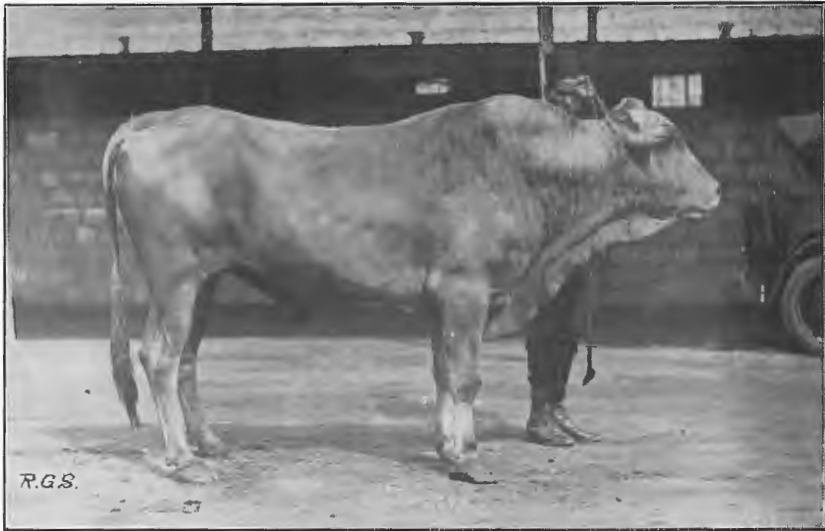


Fig. 9.* Saiidi bull, Upper Egypt.



Fig. 10.* Saiidi cow, Upper Egypt.

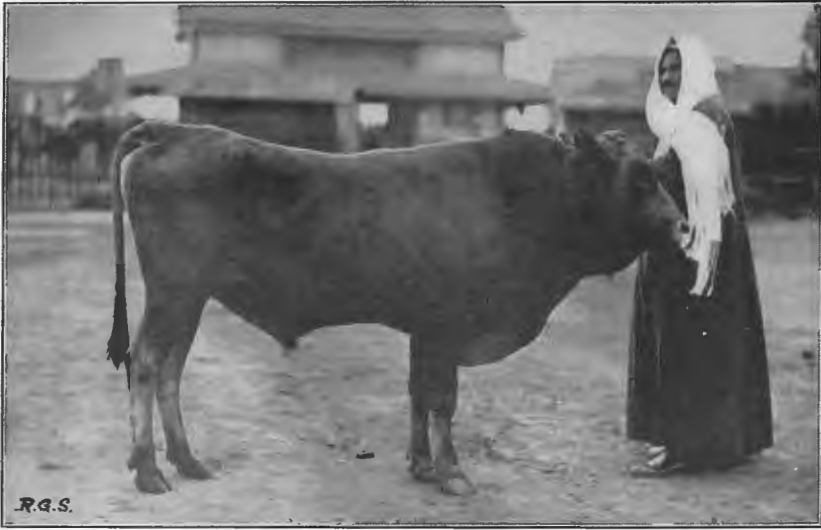


Fig. 11.* Marriouti bull of the desert.



Fig. 12.* Marriouti cow of the desert.

FRENCH NORTH AFRICA.



Fig. 13. Tunisian bull [Saint-Hilaire, H. G. (1919), Plate XIX].



Fig. 14. Tunisian cow [Saint-Hilaire, H. G. (1919), Plate XIX].



Fig. 15.* Algerian Cheurfa bull (Service de l'Élevage du Constantine).



Fig. 16. Algerian Guelma bull [Saint Hilaire, H G. (1919), Plate XVIII].



Fig. 17.* Algerian Guelma cow (Service de l'Elevage du Constantine).



Fig. 18. Moroccan bull [Saint-Hilaire, H. G. (1919), Plate XXI].



Fig. 19. Moroccan cow [Saint-Hilaire, H. G. (1919), Plate XXI].

FRENCH WEST AFRICA.(²)



Fig. 20. The Peulhe or Gobra Zebu (Lyre-horned Zebu). Notice the thoracic hump and lyre-shaped horns. The appearance strongly suggests Hamitic Longhorn influence. (Pierre, Plate X.)

(²) As *Brachyceros* cattle are shown in Figs. 13-19, there is no need to illustrate the type as occurring in West Africa. See Epstein (1934), Pierre (1906), and Henderson (1929).



Fig. 21. The Moorish or Gabaruyé Zebu (Lyre-horned), possessing the same general features of the Peulhe Zebu. (Pierre, Plate X.)

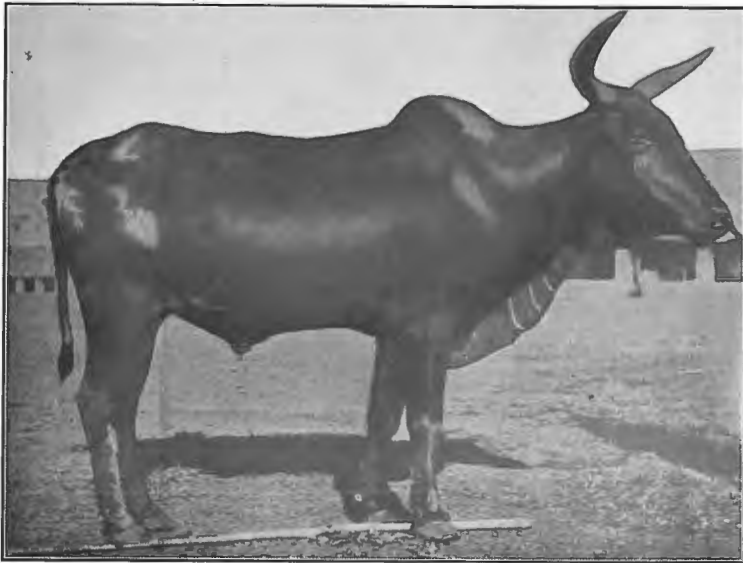


Fig. 22. The Nigerian or Foulbé Zebu. The Hamitic Longhorn features are less evident than in Figs. 20 and 21. (Pierre, Plate XI.)



Fig. 23. The Fogha Zebu, apparently the sub-type showing most markedly the characteristics generally recognised as those of the Short-horned Zebu. (Pierre, Plate XIV.)



Fig. 24. A Bambara or Mandé bull, described by Pierre as resulting from the Zebu-Brachyceros cross but apparently a representative of the Sanga type. (Pierre, Plate XIII.) Notice the cervico-thoracic hump.

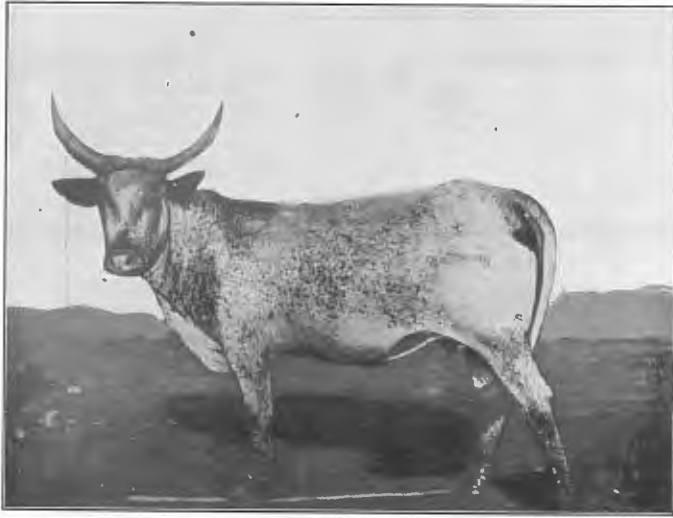


Fig. 25. A Bambara or Mandé cow. Notice the cervico-thoracic hump of the Sanga. (Pierre, Plate XIII.)

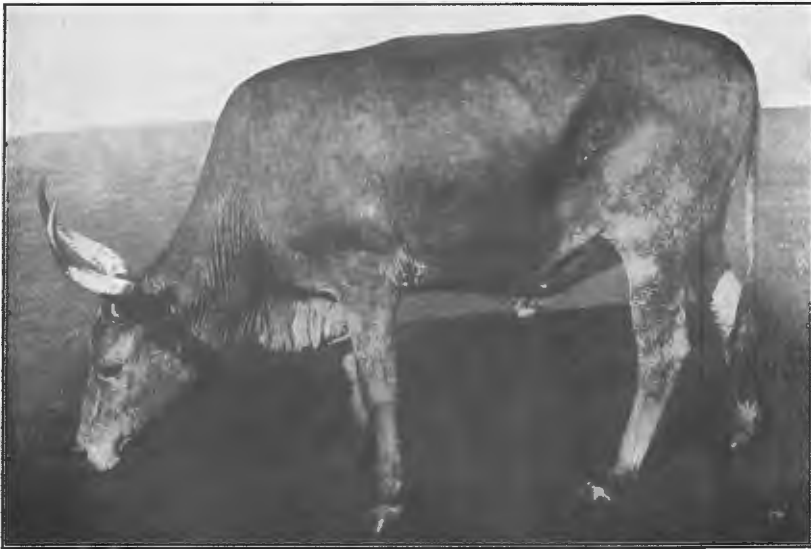


Fig. 26. A Djakoré or Senegalese ox which resembles very closely many Sanga cattle, e.g. Bechuana. Through the head being lowered the cervico-thoracic hump is not evident. (Pierre considers this a cross between the Zebu and Brachyceros). (Pierre, Plate XIV.)

LIBERIA.



Fig. 27. A Mandingo cow of West Africa (Fig. 323, Johnston). This figure suggests a beast of Hamitic Longhorn origin, *i.e.* assuming there is no hump.

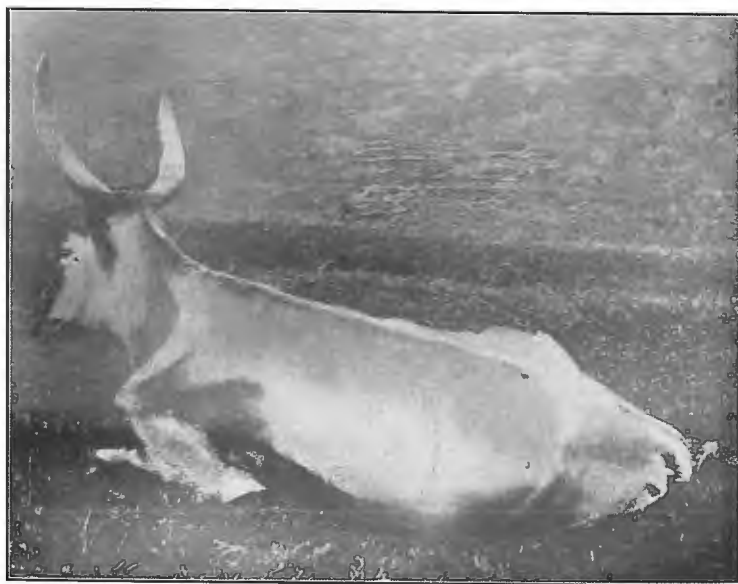


Fig. 28. Another view of a Mandingo cow, Liberia (Fig. 326, Johnston). The horns are long and lyre-shaped and there is no hump.

GOLD COAST.



Fig. 29. Zebu bull, Gold Coast. Horns are not typical either of Lateral-horned or Shorthorned Zebu. (*Annual Report, Veterinary Department 1929-30. Gold Coast.*)



Fig. 30. A calf resulting from the cross between a Shorthorned Zebu bull and Brachyceros cow. Notice the hump, the situation and nature of which it is difficult to determine from the illustration. (*Annual Report, Veterinary Department, 1929-30. Gold Coast.*)

NIGERIA.

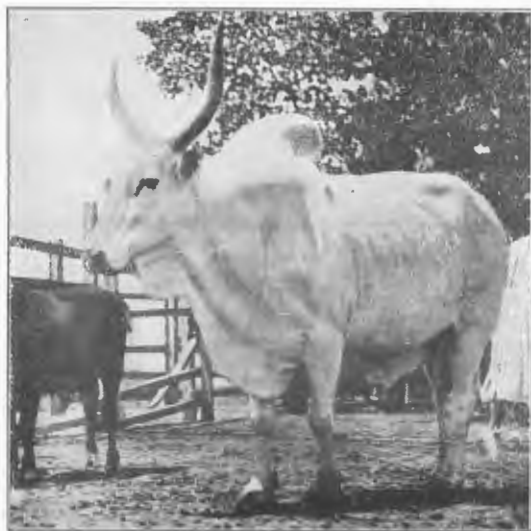


Fig. 31. The Lyre-horned Zebu of Nigeria. Notice the thoracic and musculo-fatty hump, lyre-shaped horns and well-marked dewlap. (*Annual Report, Veterinary Department, 1926.*)



Fig. 32. A White Fulani (Lyre-horned Zebu) bull photographed at Maidontoro near Vom on 12.1.1927. (Dr. P. J. du Toit.)



Fig. 33. Lyre-horned (Red Fulani) Zebu cattle photographed on road from Hadeija to Kano on 18.1.1927. (Dr. P. J. du Toit.)



Fig. 34 * Lyre-horned Zebu, Sokoto-type, Nigeria.

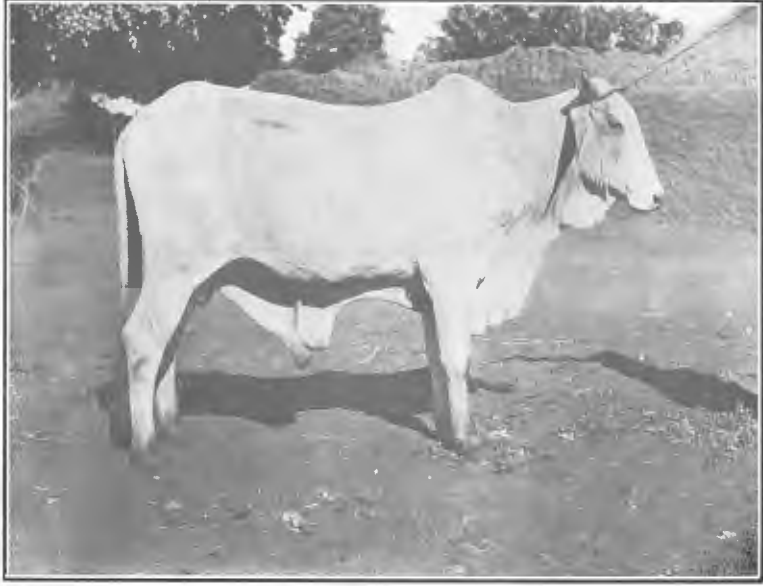


Fig. 35.* Shorthorned Zebu bull.

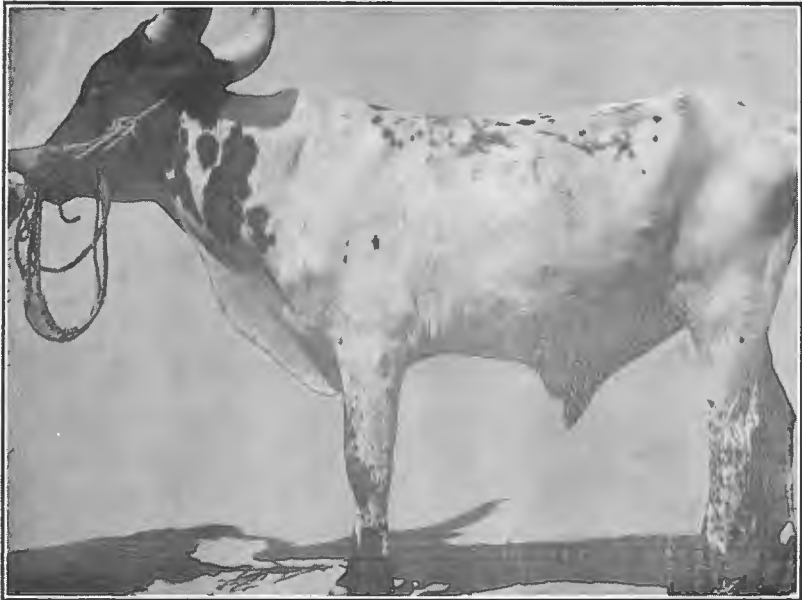


Fig. 36.* Sanga ox, found near Lake Chad.

UGANDA.



Fig. 37.* Red Ankole cattle at Koja Experimental Farm.



Fig. 38.* Typical Unyororo cattle of Sanga type at Koja Experiment Farm.



Fig. 39.* A typical Shorthorned Zebu bull from Eastern Province.



Fig. 40.* A typical Shorthorned Zebu cow from Eastern Province.

KENYA.



Fig. 41.* Nandi bull, red.



Fig. 42.* Nandi cow.



Fig. 43. North Masai bull from Laikipia. (J. R. Hudson, M.R.C.V.S.)



Fig. 44.* Masai cow.

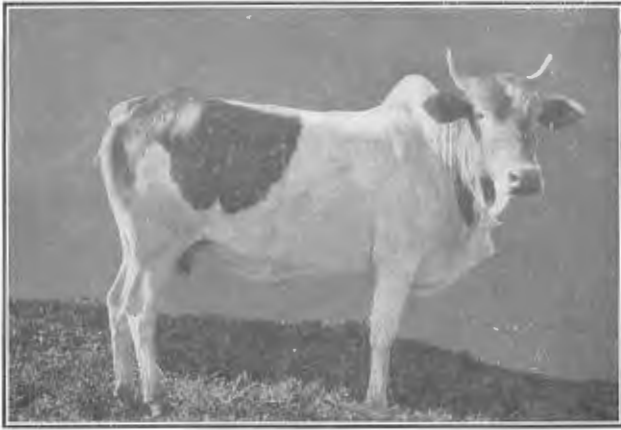


Fig. 45.* Akamba cow.

BELGIAN CONGO.

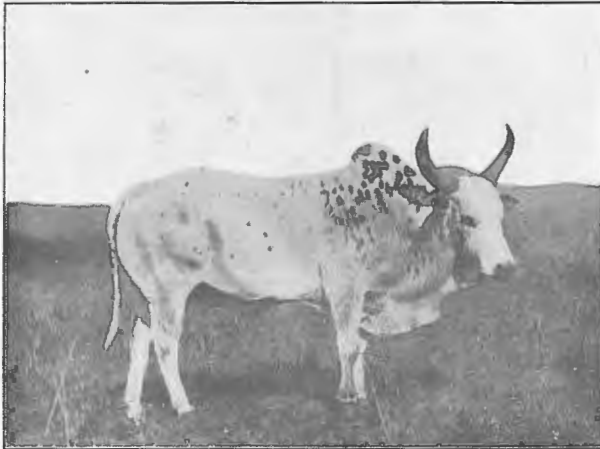


Fig. 46. Wadai-Dinka bull. Taken from Le Plae's *Organisation et Exploitation des Elevages au Congo Belge* (1933), Fig. 32, p. 91.



Fig. 47. Wadai-Dinka bull. Taken from the same source, Fig. 33, p. 91. Note in each case the short broad forehead and the cervico-thoracic hump.



Fig. 48. A Lugwaret bull taken from Le Plae's work, being Fig. 40, p. 99. Observe thoracic hump.



Fig. 49. Cow of Sanga type from Chief Blukwa's herd (west of Lake Albert), Le Plae, Fig. 26, p. 82. - Apart from the dewlap, which is well developed due to Shorthorned Zebu influence, the cow is no different in conformation to Sanga cattle in South Africa.



Fig. 50. Kivu (Sanga) bull, polled. From Carlier's paper "L'Élevage au Kivu" (*Bull. Agric. du Congo Belge*, Sept., 1912, Fig. 516, p. 753).



Fig. 51. Kivu (Sanga) cow, polled. From same source, Fig. 515, p. 753.



Fig. 52. Kivu (Sanga) bull, with medium horns. Although of Sanga type there is an admixture of Shorthorned Zebu judging from profile. From Carlier's paper in the December, 1912, issue of the *Bull. Agric. du Congo Belge*, Fig. 528.



Fig. 53. Kivu (Sanga) cow, with medium horns. From *Bull. Agr. du Congo Belge*, Dec., 1912, Fig. 529.

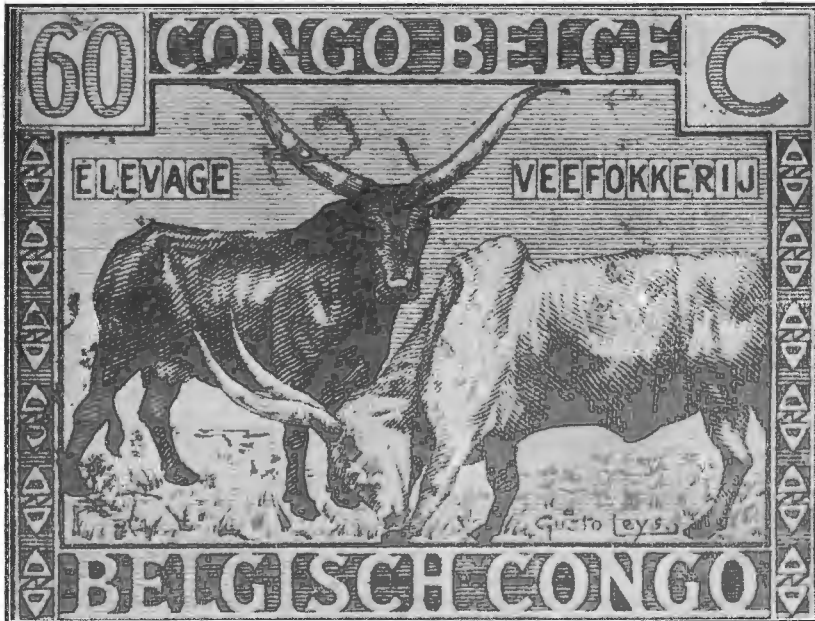


Fig. 54. Cattle from Ruanda-Urundi of Sanga type. Photo of 60 c. red postage stamp of Belgian Congo issued 1926. Note giant horns. It will be observed that the hump of the beast on the right is prominent, but this is not the case in Sanga cattle when grazing. This appearance of the hump is seen only in Zebus with a thoracic hump.



Fig. 55. Another view of Ruanda-Urundi cattle, the so-called sacred cattle "du troupeau des Nyembos du roi du Ruanda". From Fig. 1 frontispiece of Le Plae's work.

TANGANYIKA.



Fig. 56. Ankole (Sanga) bull from Bukoba. Top of shoulder, 52 in.; girth, 68 in.; weight, 850 lb. (F. J. McCall, M.R.C.V.S. *Ann. Rpt. for 1926.*)



Fig. 57. Ankole (Sanga) cow and calf under good management. (H. E. Hornby, F.R.C.V.S.—his L/48/7 of 2.8.35.)



Fig. 58. Shorthorned Zebu (Golden Dun Mkalama) bull, Pugu Road, 2 years.
Behind shoulder, 48½ in.; girth, 65 in.; weight, 600 lb. (F. J.
McCall, M.R.C.V.S. *Ann. Rpt. for 1926.*)

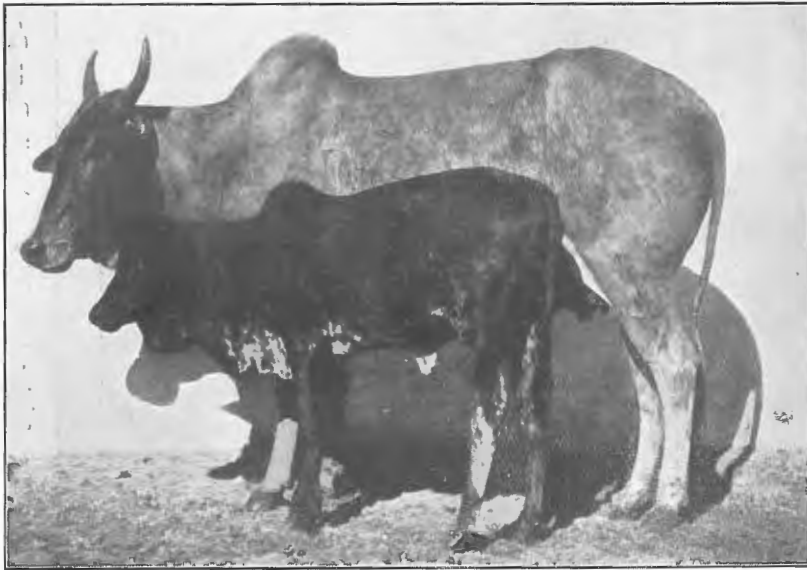


Fig. 59. Shorthorned Zebu (Masai Ugogo) cow and calf, Pugu Road. Height at top of hump, 46 in.; height behind hump, 42 in.; girth, 61½ in. (F. J. McCall, M.R.C.V.S. *Id.*)

NORTHERN RHODESIA.⁽³⁾



Fig. 60. Barotse (Sanga) oxen from Zambesi Valley. Note cervico-thoracic hump as well as giant horns. (H. S. Purchase, M.R.C.V.S.)



Fig. 61. Baila (Sanga) cow from Mazabuka. Note sturdy build. (R. A. S. McDonald, M.R.C.V.S.)

⁽³⁾ For cattle of Bechuana sub-type see Figs. 67-70.



Fig. 62. Shorthorned Zebu (Angoni) cow from Fort Jameson. Note lyre-horns which are not common in East Africa as compared with West Africa. (K. T. Nilsen, B.V.Sc.)

NYASALAND.



Fig. 63. Shorthorned Zebu cow from Ncheu. (S. G. Wilson, M.R.C.V.S.)

SOUTH WEST AFRICA PROTECTORATE.



Fig. 64.* Ovambo (Sanga) bull.



Fig. 65.* Ovambo (Sanga) cows.



Fig. 66. Ovambo (Sanga) cows. (T. Meyer.)

BECHUANALAND PROTECTORATE.



Fig. 67. Bechuana-Batawana (Sanga) bull, near Maun. (H. H. Curson.)



Fig. 68. Bechuana-Batawna-(Sanga) cow, red roan, west of Taoge River, near Namaseri. Horns are of Ankole type. (H. H. Curson.)



Fig. 69. Bechuana-Batawana-(Sanga) ox with horns directed laterally as in Afrikander. From tip to tip along horns and across head 10 feet. From tip to tip across 8 ft. 6 in. (*Star*, Johannesburg, 8.6.1935.)



Fig. 70. Bechuana-Batawana-(Sanga) oxen and bull. (Miss Wilman, McGregor Museum, Kimberley.)



Fig. 71. Ngamiland export trade to Northern Rhodesia. Batawana cattle being taken across Zambesi River at Kazungulu, February, 1931. (H. H. Curson.)

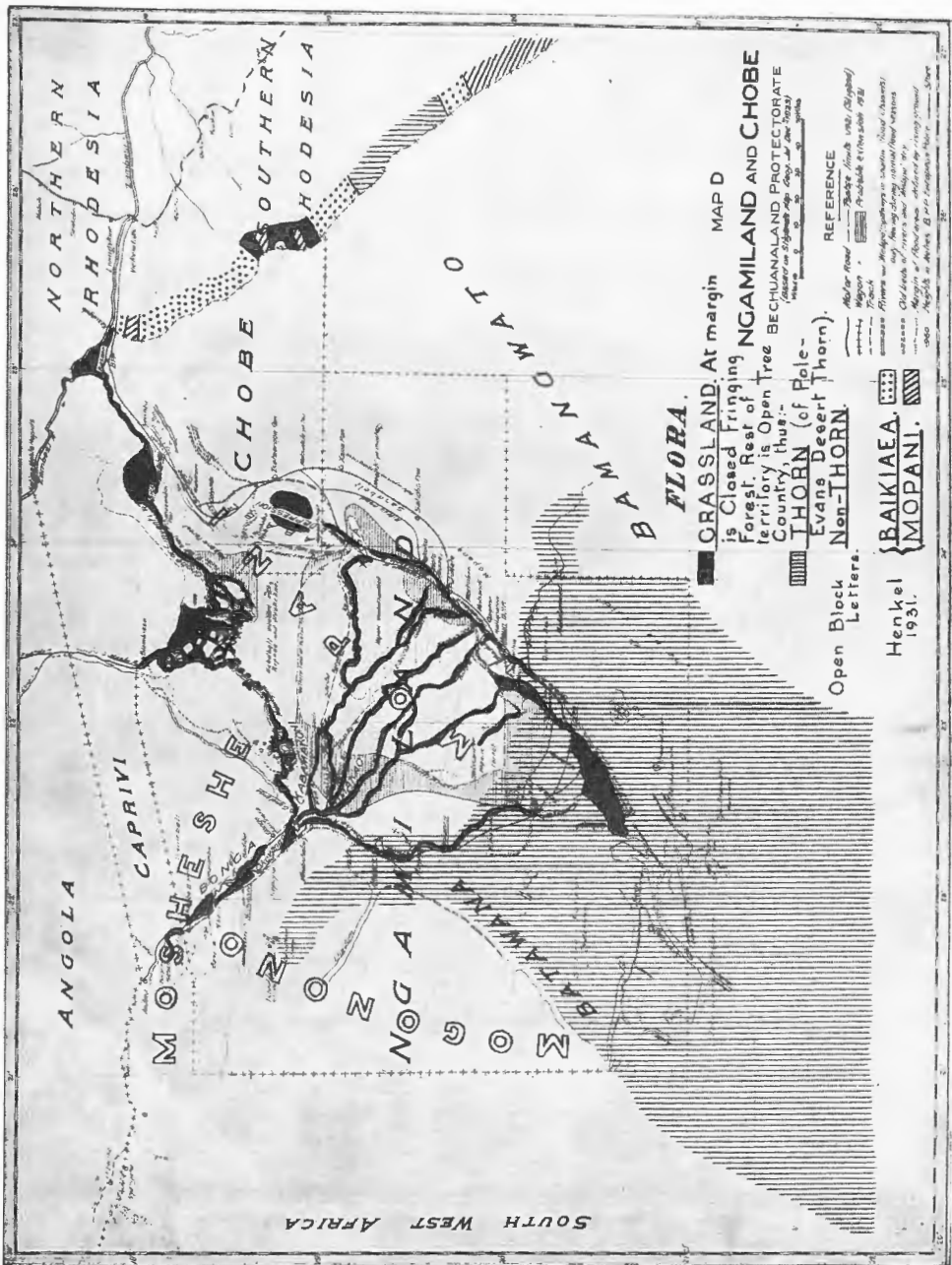


Fig. 72. Map of Ngamiland and Chobe Districts of Bechuanaland Protectorate.

SOUTHERN RHODESIA.



Fig. 73. Makalanga (Sanga) bull and ox, Buhera District. (J. H. Badenhorst.)



Fig. 74. Makalanga (Sanga) cow, black, taken at Mr. Goosen's farm near Messina, Transvaal, Easter, 1930. (E. H. Curson.)

MOZAMBIQUE.



Fig. 75. Sanga bull from Magude, near Lourenco Marques. (Dr. C. Sheppard Cruz). Dr. Sheppard Cruz makes the following comment: "Note compact body and short and thick limbs, hump absolutely similar to that of the bulls of the Italian Faenza breed, which belongs also to the *Bos taurus asiaticus*, that is to say, not so pendulous and detached as that of the Zebu bull or that of the Afrikander bull; its dewlap of medium size, and quite different to that of the Afrikander or Zebu; its profile relatively rectilinear (in all the breeds masculinity tends to make the front line more convex, even in animals with a rectilinear profile); the horns are the same type as those of the cow, but shorter and thicker. The cranium is square and the face short."



Fig. 76. Sanga cow from Magude, near Lourenco Marques. (Dr. C. Sheppard Cruz). The classification followed in this paper is not necessarily accepted by others, e.g. Dr. Sheppard Cruz's remarks on this photo are "doubtless a specimen of the *Bos taurus asiaticus* or *Bos desertorum* (Fitzinger) or "Stepperind (Brehm)". The forehead is flat and the profile is actually concave.

UNION OF SOUTH AFRICA.



Fig. 77. Afrikander (Lateral-horned Zebu) bull, D.O.B. 4327, Onderstepoort. (T. Meyer.)



Fig. 78. "Remus" Afrikaner cow. University of Pretoria. Age in August, 1929, nearly ten years. Unusually straight in back and somewhat straight in the hocks. (H. H. Curson.)



Fig. 79. Zulu (Sanga) bull from Somkele. (H. H. Curson.)



Fig. 80. Zulu (Sanga) cow. The white colour with pigmented skin is not uncommon. These cattle are known to the Zulus as "Nyoniaipumuli". (J. Papert.)



Fig. 81. Zulu (Sanga) bull. The striking colour is known as Black "Nkone". (T. Meyer.)



Fig. 82. Zulu (Sanga) cow. (T. Meyer.)

EXTRA AFRICAN CATTLE.

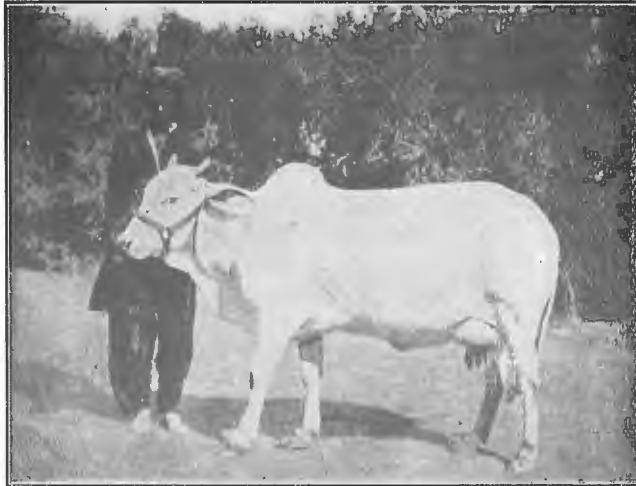


Fig. 83.* Cow of Thar Parkar breed found in South Sindh, Bombay. A good dual purpose beast and resembling the Shorthorned Zebu of East Africa in conformation.



Fig. 84.* Fjallras bull, Sweden. This polled mountain breed although of different type to the "Sidet" cattle of Africa (e.g. Zulu and Nigerian) has similar coloration characteristics.

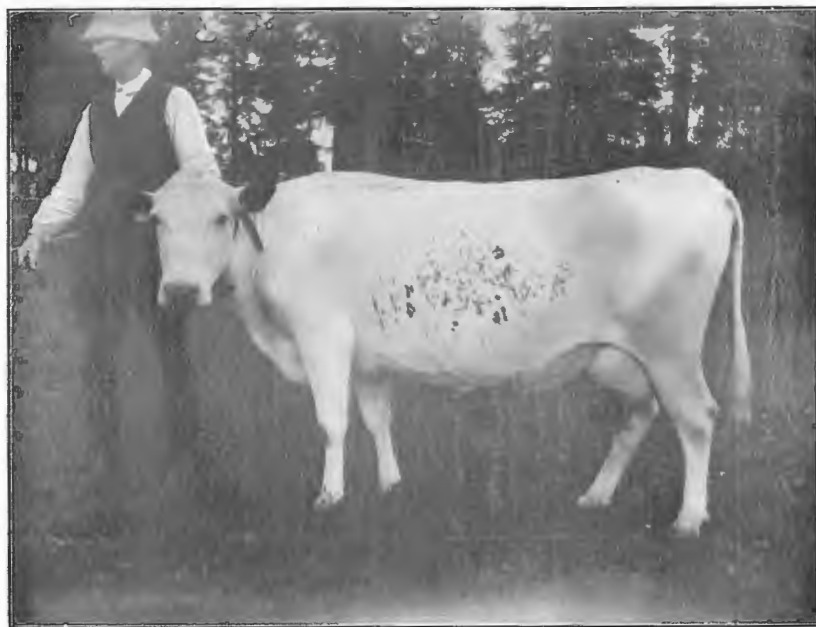


Fig. 85.* Fjallras cow, Sweden. Note the areas of pigmentation.



Fig. 86.* Crioulo ox, Argentine. The conformation especially of the skull resembles some of the Sanga sub-types of Africa. The explanation is that both are derived from the original Hamitic Long-horn stock of North Africa. The anterior hump generally seen in Sanga cattle is absent.



Fig. 87.* Another view of a Crioulo ox, Argentine.

MAPS.

PROBABLE MIGRATION ROUTES

(a) TO and (b) IN AFRICA

PRIOR TO 1652



Domestication of Hamitic Longhorn in Egypt c. 4000-3000 B.C.

Migrations to Africa,
(Approximate arrival)

Migrations in Africa,
(Probable commencement)

--- Brachyceros c. 2000 B.C.

1. Hamitic Longhorn c. 2000 B.C. ---

..... Lateral Horned Zebu
(Afriskander) c. 1000 B.C.

2. Brachyceros c. 1500 B.C. ---

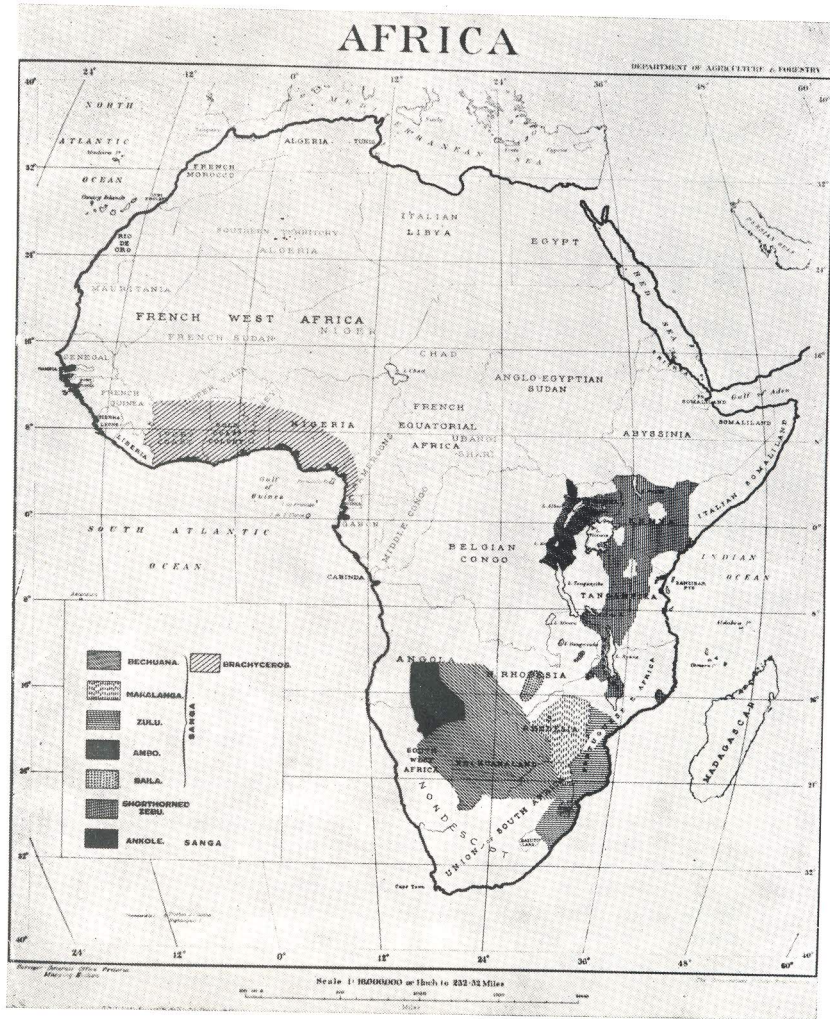
..... Shorthorned Zebu c. 100-1800 A.D.

3. Lateral Horned Zebu c. 500 B.C.

4 & 5. Sanga c. 1 B.C. ---

6. Shorthorned Zebu c. 500 A.D.

I. Probable migration routes (a) to and (b) in Africa prior to the European settlement at the Cape of Good Hope (1652).



II. Approximate distribution of cattle types in Africa.