

A DISCUSSION OF THE TWO BREEDS "SANGA" AND "AFRIKANER" IN TERMS OF ORIGIN AND CONFORMATIONAL AS WELL AS GENETIC FEATURES

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Zusammenfassung

Die einheimischen Rinderrassen Afrikas stammen wahrscheinlich von vier Hauptrassen ab. Zwei dieser Rassen, nämlich das alte Hamitische Langhornrind und das etwas kleinere, kurzhornige Brachycerosrind waren höckerlos und sehr *Bos taurus*-ähnlich. Die anderen beiden Rassen waren Zebu-ähnlich, wovon bei den Langhornigen der Höcker unmittelbar vor dem Widerrist und bei den Kurzhornigen der Höcker auf dem Widerrist ausgebildet war.

Früheren Untersuchungen zufolge nahm man an, daß das Vieh der alten Hottentotten, welches der Vorfahre des heutigen Afrikanerrindes ist, direkte Nachkommen der langhornigen Zeburasse waren. Diese Annahme verlieh dem Afrikaner den Status einer reinen *Bos indicus* Rasse. Neue Erkenntnisse ergaben jedoch, daß das Afrikanerrind Teil der großen Sangagruppe ist, nämlich eine Kreuzung von *Bos taurus* und *Bos indicus*.

In diesem Artikel werden osteologische- und andere Unterschiede im Körperbau zwischen dem Sanga- und Afrikanerrind beschrieben. Die konvexe Form der Stirn und des Zwischenhornkammes wie auch die stark entwickelte Wamme des Afrikanerrindes lassen eine nahe Verwandtschaft mit dem langhornigen Zeburind für möglich erscheinen. Obwohl diese äußeren Merkmale bei Sangarindern nicht vorhanden sind, deuten archäologische Funde, morphologische Eigenschaften des männlichen Geschlechtschromosoms und weitere genetische Merkmale auf eine gemeinsame Herkunft beider Rassen. Man vermutet daher, daß das Afrikaner- so wie das Sangarind

aus Kreuzungen zwischen *Bos indicus*- und *Bos taurus*-Typen hervorgegangen ist.

Summary

Indigenous African cattle are considered to have derived from four different parent breeds. These include two humpless types of *Bos taurus* appearance, namely the ancient Hamitic Longhorn and the somewhat smaller, shorthorned *Bos taurus brachyceros*. Further, there are the cervico-thoracic-humped, Longhorned Zebu as well as the thoracic-humped Shorthorned Zebu.

Formerly it was believed that Hottentot cattle, the ancestors of modern Afrikaner stock, were directly descendant from the Longhorned Zebu. This gave them the status of a pure *Bos indicus* breed. More recently however, the Afrikaner breed was stated to be part of the great Sanga group (*Bos indicus* x *Bos taurus*). Osteological and conformational differences between Sanga and Afrikaner cattle are discussed. The convex head profile and poll and the bigger dewlap of modern Afrikaner cattle, in contrast to the straight profile and less developed dewlap of the Sanga, seem to indicate a close relationship between the former breed and Longhorned Zebu cattle. However, according to archaeological investigations, morphological characteristics of male y-chromosomes and other genetic markers, Sanga and Afrikaner cattle both appear to have derived from a cross of *Bos indicus* and *Bos taurus*.

Introduction

In contrast to Afrikaner cattle, the first of which were registered in 1907, Sangas were kept solely in the hands of Native tribes. These cattle have only been admitted to registration as late as 1983. Away from veterinary care, the Sanga had to survive enzootic diseases and periodic droughts until recent times, allowing nature to rule the fate of the breed.

Early investigations concerning origins of Afrikaner and Sanga cattle were based mainly on conformational evidence and, while certain correspondences were found, marked differences remained behind to prove the status of independent origins. Archaeology could provide some more information. Horn cores of both, Sanga and Afrikaner type cattle were found in the northern Transvaal, dated to 900 - 1100 A.D. thus indicating the presence of both types at the same time on the same site (Voigt, 1983). Since the discovery of genetic markers, initially used to solve parentage problems in the breeding of sheep, much information has become available about indigenous southern African cattle breeds and their relationships to parent stocks in Asia, Africa and Europe.

Parent stocks of African cattle

Generally four different parent breeds of African cattle can be distinguished. Their time of arrival and migration routes being indicated by Figure 1.

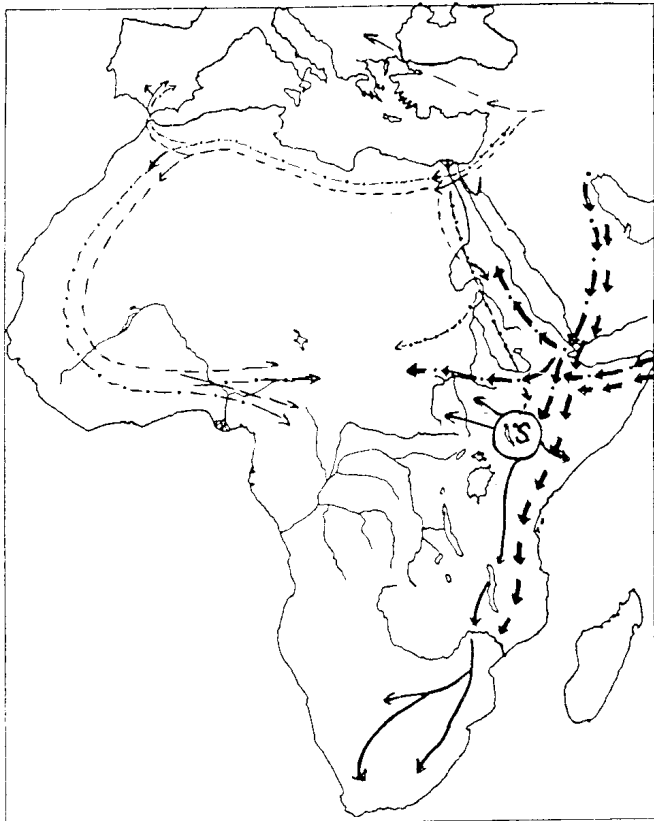


Fig. 1: Migration routes of different cattle breeds of Africa.

- Hamitic Longhorn; arrival in Africa: Around 4000 B.C.
- - - Humpless Shorthorn; arrival in Africa: Around 2500 B.C.
- Longhorned Zebu; arrival in Africa: Around 2000 B.C.
- Ⓢ Centre of evolution of Sanga cattle around 2000 B.C.
- Migration routes of Sanga cattle.
- Shorthorned Zebu; arrival in Africa: Around 700 A.D.

- (i) The Hamitic Longhorns (*Bos taurus longifrons*), which are believed to have descended from the Asiatic Urus (*Bos primigenius namadicus Falconer*), were brought to Africa through the Isthmus of Suez during the time of Protodynastic Egypt, i.e. 4000 B.C.
- (ii) The Humpless Shorthorns (*Bos taurus brachyceros*) which are the ancestors of most modern dairy breeds, are depicted in Egyptian tombs of the Vth Dynasty and onwards. They were related to the early Asiatic Urus too and began to enter Africa by the way of the Isthmus of Suez towards the middle of the 3rd millenium B.C.
- (iii) Zebu cattle (*Bos indicus*): The term "zebu" whether it derives from the Portuguese *giba* or from the Tibetan *zaba*, refers to the humped character of these animals (Mason & Maule, 1960).

Considering the Asiatic urus as common ancestor, this character must have been acquired somewhere in the arid steppe region of modern Afghanistan and Pakistan and then, in respons to peculiar environmental limitations, developed into a cervico-thoracic- and a thoracic-humped type (Epstein, 1971).

The cervico-thoracic-humped, Longhorned Zebus reached Africa at about 2000 B.C. over the straights

of Bab el Mandeb from where they dispersed to the north, east and south. In contrast to this, the fourth breed, the thoracic-humped, Shorthorned Zebus arrived at the Horn of Africa relatively recently with an expanding Persian power at about 700 A.D. Because of its exceptional adaptability to tropical environments, this breed expanded with a phenominal speed and replaced many of the Sanga-like animals north of the Zambezi river within marginally more than 300 years.

Except of the musculo-faty hump of the Shorthorned Zebus in contrast to the more muscular cervico-thoracic hump of the Longhorned Zebus, these two types are conformationally as well as osteologically very similar.

Classification of Sanga and Afrikaner cattle

Many investigations concerning the descent and origin of Afrikaner cattle are available. Those discussing the same about the Sanga breeds however are less numerous.

Historically it is known that modern Afrikaner cattle have derived mainly from indigenous stock, owned by the Cape Hottentots during the time of Jan van Riebeeck. Theories concerning possible contributions of the Portuguese Alentejo, Indian Zebu cattle, late imported East African stock or European Friesian and Red Devon cattle are discussed and generally refuted in literature (Epstein, 1971). It seems reasonable therefore to accept that this red breed indeed, to the great majority descended from Hottentot owned stock.

Formerly it was believed, mainly on conformational and osteological evidence that Hottentot cattle were directly descendant from the Longhorned Zebu, (Epstein, 1933)

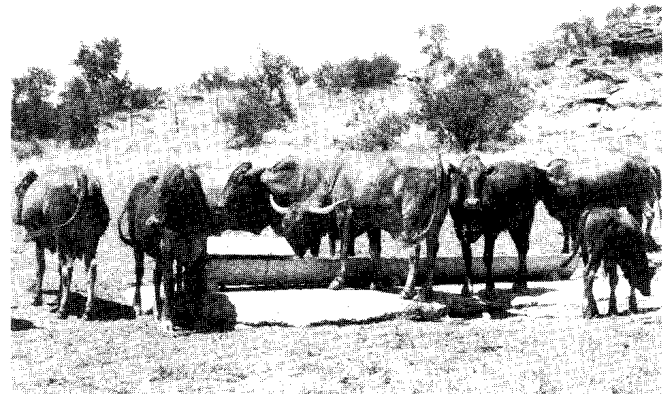


Foto 1: Afrikanerkoeie met kalwers

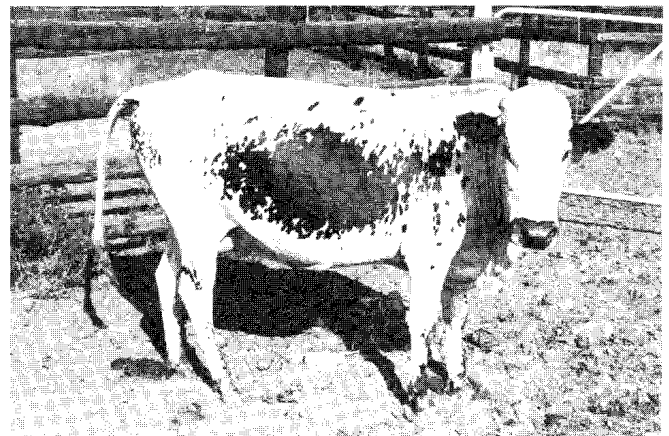


Foto 2: Volwasse Sangakoeie

which gave them the traditional status of a pure *Bos indicus* breed and so Curson and Thornton (1936) write: "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".

In contrast to this, the term Sanga has been used to describe all lyre-horned, cervico-thoracic-humped cattle which form a chain down the east of Africa from the Southern Sudan (Nilotic), through the region of the great lakes (Ankole), Zambia, Zimbabwe, Botswana and into the Republic of South Africa (Nguni).

Whether these cattle have derived from a mixture of the Longhorned Zebu (*Bos indicus*) x Hamitic Longhorn (*Bos taurus*), as suggested by Curson and Thornton (1936) and Bisschop (1937) or from a mixture of Longhorned as well as Shorthorned Zebus x Hamitic Longhorn, as suggested by Epstein (1971) is not clear yet. However, it is known that Sanga cattle first developed in the area of the great lakes of Africa at about 2000 B.C. Therefore and since only very few or no Shorthorned Zebus were brought to Africa by that time, the first theory is accepted here.

Mason and Maule (1960) were the first to classify the Afrikaner as part of the great Sanga group (*Bos indicus* x *Bos taurus*) and it is described as an improved breed with a cervico-thoracic hump, small to moderate in size and with long horns.

The question of the convex poll and head profile, as well as the oval cross-section of the horns of Afrikaner cattle, in contrast to the straight and very broad face, straight poll and more round horns of Sanga cattle however remained unanswered yet.

Conformational and osteological similarities and differences between Afrikaner - and Sanga cattle

The first breed standards of excellence, passed at a meeting of the Afrikaner cattle Breeder's Society in 1912, describe the head of the animal as comparatively long and lean with a large forehead and a neatly rounded and slightly raised poll. The horns are described as "spreading wide apart, directing first slightly downward and backward, then bending gracefully upward and at maturity pointing slightly backward". An oval cross-section was preferred. A well defined hump, set closely to the shoulder was mentioned, while a large dewlap and loose navel skin was also preferred (Opperman, 1962).

In contrast to this, the head profile of modern Sangas is described by Armstrong and Masenola (1985) to be longitudinally straight but slightly dished laterally. The horns, round in cross-section, are crescent shaped in bulls and characteristically lyre-shaped in females, though polled animals do occur. The dewlap is smaller than that of Afrikaner cattle, while the hump is also cervico-thoracically situated and muscular in structure.

The humps of both breeds, the Afrikaner as well as the Sanga are of a muscular composition and cervico-thoracic in situation, thus making no contribution to any breed differences.

Osteologically, the bifidity of the spinous processes of the caudal thoracic vertebrae of Afrikaner cattle was used to prove its true Zebu nature (Epstein, 1933). This does however not distinguish the Sanga and Afrikaner form

each other and since individual humpless *Bos taurus* bulls have been reported to exhibit the cleft (Epstein, 1971), even less importance is given to this feature.

The convex head profile and poll of modern Afrikaner cattle seems to provide ample evidence of a direct descent from the ancient Longhorned Zebu. Since no specimens of Sanga cattle, which show a similar skull formation are described in literature, some argumentation around this feature may be justified. However paintings and photos of Hottentot cattle indicate that they had straight head profiles longitudinally which were sometimes slightly dished laterally (Epstein, 1971). The same holds true for a photo, represented by Bonsma and Joubert (1952), showing a large Afrikaner bull in 1905, before the introduction of the standards of excellence in 1912.

The bigger dewlap of Afrikaner cattle, in contrast to those of present day Sanga breeds may provide some distinguishing character between the two breeds under discussion. Since early Sanga cattle in Southern Africa have entirely been in the hands of eastern Iron Age Bantu-speakers, while Afrikaner progenitors were herded by western Hottentot tribes, some conformational difference between the two bloodlines may easily have developed. Even Sanga breeds like the Pedi, Nguni, Nkone, Kavango, Ovambo, Caprivi and Kaokoveld are distinguished from each other, which suggests that the Afrikaner breed too, could have developed its own characteristic conformational features.

As pointed out in the Afrikaner breed standards of excellence of 1912, the somewhat bigger dewlap of some parent animals has even been selected for, thus providing enough uniform genetic material for large dewlaps in modern breed representatives.

According to Hundleby (1986), coat colour and horn configuration of cattle played an important role in tribal custom. Since colour is very easy to alter by artificial selection, it provides no evidence on the relationships or independence between Afrikaner and Sanga cattle.

Concerning horn configuration, different types of Afrikaner cattle were earlier distinguished. Examples are the "bakkop" "kappiekop" and "weglê" horns (Bonsma & Joubert, 1952). Some of these types were more favoured than others and it seems that not only certain conformational features, but also the characteristic horn configuration of modern Afrikaners have achieved their uniformity by artificial selection since 1912.

ARCHAEOLOGICAL EVIDENCE

Mainly two different types of horn-cores were found at Mapungubwe, an Iron Age site in the northern Transvaal, dated to about 900 - 1100 A.D. Horn-cores, similar to those of modern Afrikaner cattle, others, resembling Sanga horns and a very short one, suggesting a short-horned breed are present in the assemblage. It is noted that all Mapungubwe horn-cores have oval-cross sections and appear to have grown straight out from the side of the skull and then turning upwards (Voigt, 1983).

With respect to Mapungubwe skull remains Voigt (1983) further states that according to their straight frontal profiles, all these specimens come from Sanga type animals, including a polled one with its strongly convex profile. The possibility for the presence of Afrikaner cattle among the Mapungubwe herds however, was not excluded.

It seems that a great bovine gene pool must have existed at Mapungubwe between 900 and 1100 A.D. The question to answer is whether these cattle represented a number of breeds brought together by, for example, raiding expeditions or bartering, or is it possible that original Sanga herds just consisted of a variety of types, dependent on the amount of genes, each individual has inherited from the parent material.

As pointed out earlier, it was believed that Hottentots (Khoikhoi) brought Afrikaner progenitors with them from the Horn of Africa down the west coast. On the eastern side it was suggested that Sanga cattle, possessed by Iron Age Bantuspeakers, made their way down to the south. However, since sheep seem to have been introduced into the Cape marginally more than 2000 years ago, while cattle only arrived there at 1600 to 1500 before present (Klein, 1986), the Cape Khoi might have bartered their cattle from eastern Iron Age people who are known to have possessed some cattle in about 350 A.D. (Voigt & Plug, 1984).

Eventually, there might have been a larger component of *Bos indicus* in the parent stock of western cattle. However, this problem can at present only be proved by investigations of genetic markers such as haemoglobin characteristics, the structure of the male sex chromosomes (y-chromosome) and the presence or absence of certain blood- and milk proteins.

Genetic Markers

Haemoglobin, the oxygen - carrying component of blood consists of a complex protein part, globin and the haeme part which by way of iron - oxygen bonds is responsible for the transportational function. According to Osterhoff (1975) the haeme part is a relatively constant structure, while the globin varies considerably between species and also within a species, thus giving rise to different types of haemoglobin, i.e. Hb-A, Hb-B, Hb-C etc. in different types of cattle.

Hb-A has its highest frequency in cattle breeds which have evolved in the lower parts of northern Europe, where it is often carried in the homozygotic form, i.e. both genes responsible for the inheritance of the Hb-type are Hb-A alleles (Meyer, 1984). Hb-B on the other side is regarded to indicate an Asiatic ancestry, while Hb-C would be characteristically of African cattle. It is also stated that with a few exceptions, the further the *Bos indicus* types migrated away from India to the West and South, the lower is the frequency of the Hb-B allele. A fourth type, Hb-D was found in the Malawian Zebu, expressed in heterozygous form as Hb-A/Hb-D in two animals and as Hb-C/Hb-D in one animal (Osterhoff, 1975).

As research technology advances, more Hb-types are identified. According to Meyer (1984) Hb-C was also observed in *Bos indicus* Zebu breeds like the Brahman and therefore, the different Hb-C of Sanga cattle was renamed Hb-I and has so far only been observed in African breeds, including the Afrikaner.

With respect to y-chromosome morphology of indigenous Southern African cattle breeds, Meyer (1984) found that they correspond well to those of European *Bos taurus* breeds. In contrast to the y-chromosome of *Bos indicus* which is acrocentric, those of *Bos taurus*, Sanga and Afrikaner males are all submetacentric (Fig. 2).

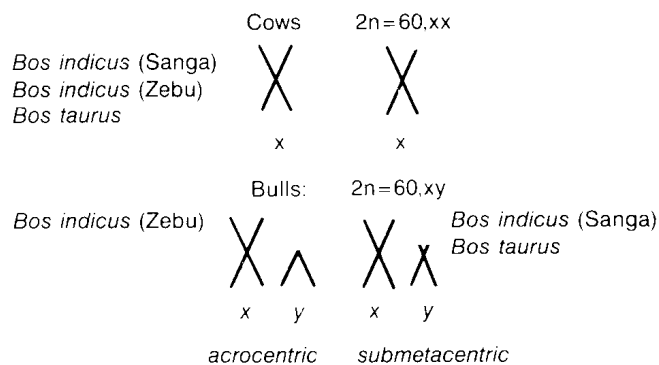


Fig 2: The sex chromosomes of *Bos indicus* (Sanga), *B. indicus* (zebu) and *B. taurus* cattle (Meyer, 1984).

Concerning these results as well as those obtained on genetic markers like blood-and milk proteins, Meyer (1984) writes:

"The present use of species (instead of sub-species) names of *B. taurus* and *B. indicus* in spite of the fact that they interbreed with fertile offspring . . . , is totally incorrect in terms of accepted classical principles of biological nomenclature. Therefore, an appropriate sub-species classification should be used, e.g.:

- (i) *Bos taurus* becomes *Bos taurus taurus*
- (ii) *Bos indicus* becomes *Bos taurus indicus*

. . . For cattle breeds in Africa . . . a more descriptive terminology (e.g. *Bos taurus africanus*) might be considered."

Conclusion

The evolution of Sanga breeds has to be considered a long process which may have begun with the first crossings of cervico-thoracic-humped or thoracic-humped Zebu cattle with ancient Hamitic Longhorns at the Horn of Africa some 3000 to 3500 years ago.

Osteologically, the convex poll and head profile of the Afrikaner, in contrast to the straight profiles of the Sanga indicate a somewhat closer relationship between the former breed and Longhorned Zebu cattle. The possibility that the Hottentots could originally have acquired cattle with more Zebu genes than were present in the genetic make up of Bantu-owned animals is strongly considered. However, the characteristic horn shape of Afrikaner cattle, the bigger dewlap, as well as the Zebu-like head are selected for since the earliest introduction of breed standards of excellence in 1912. This supports Ramsy's opinion (1986, personal communication) that conformational differences between Afrikaner and Sanga cattle are achieved mainly by artificial selection.

The submetacentric morphology of the y-chromosome, which was usually associated with European *Bos taurus* breeds and which was recently confirmed to be present in the Afrikaner, Drakensberger, Bonsmara and Nguni, indicate that both, the Sanga and the Hottentot sub-types appear to have a male ancestor in common with European *Bos taurus* cattle.

An entirely new possibility regarding the origin of Sanga cattle has been pointed out by Hundleby (1986), who writes that these cattle might have evolved independently of other breeds on the African continent. This is due to rock paintings dated to 8000 before present, which were discovered in Lybia and the Sahara desert, depicting Sanga-like longhorned cattle.

Until more information about these findings is made available, the former *Bos taurus* x *Bos indicus* cross model is accepted and the new approach, using sub-species instead of species in the classification of cattle is supported in this paper, i.e.:

- (i) *Bos taurus* becomes *Bos taurus taurus*
- (ii) *Bos indicus* becomes *Bos taurus indicus*
- (iii) Indigenous African breeds become *Bos taurus africanus*

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