THE ORIGIN OF INDIGENOUS CATTLE BREEDS OF AFRICA

Phillip E. Strydom

Animal Nutrition and Animal Products Institute, ARC, Private Bag X2, Irene, 0062, South Africa

Their origin

The establishment of cattle breeds which are now indigenous to Africa is believed by historians to be very closely associated with man, his development, migration and specific behaviour from 6 000 years BC (Payne & Hodges, 1997). It is accepted that cattle arrived on the continent through three main migration routes from Asia (Figure 1). Longhorn cattle are believed to be the first cattle to be domesticated from the wild *Bos primigenius primigenius* (wild aurochs) in Western Asia (the origin of cattle domestication) (Epstein, 1971 & Pocock, 1919 as cited by Payne & Hodges, 1997). They appeared in Africa around 5000 BC. Shorthorn cattle originated in the same area as longhorn cattle by selection within the longhorn-type cattle some 1500 years after the first domestication of longhorn cattle and were introduced into Africa approximately 2 500 BC (Payne & Hodges, 1997). Domestication of the wild urus (*Bos primigenius namadicus*) in Western Asia was probably also part of the origin of domesticated cattle. Both longhorn and shorthorn cattle were of taurine type (humpless) and are often classified as *Bos taurus longifrons* and *Bos taurus brachyceros*, respectively (Oliver, 1983). The third group of cattle introduced into Africa were the humped Zebu cattle about 1 500 BC with larger introductions around 670 BC. Zebu cattle first appeared in Western Asia about 1500 years after the domestication of shorthorn cattle. It is unknown whether specialised strains of wild aurochs or Asian urus that were already adapted to hot, dry environments, or crossbreeding of domesticated animals, or selection by man in existing domestic herds resulted in Zebu cattle (Rege *et al.* 1996). Two major types of Zebu cattle (*Bos indicus*) are known, viz. neck humped (cervico-thoracic) and shoulder humped (thoracic) types.

Longhorn and shorthorn cattle types were mostly introduced into Egypt followed by introductions via the Horn of Africa into North-eastern Africa (Ethiopia). There is, however, also evidence of copycat domestication of cattle in Africa, specifically shorthorn cattle, at basically the same time in East Africa as it occurred in Asia (Payne & Hodges, 1997). Some longhorn types were also introduced into North Africa via Spain. Time and place of introduction, changes in climatic environment, changing incidence of disease, types of animal husbandry and interaction between types of peoples determined their movement, subsequent interbreeding with one another and present genetic status. This interbreeding of humpless and humped cattle gave rise to the various kinds of indigenous cattle encountered today in east, central and southern Africa. Payne (1964) proposed that the term Sanga should be given to all African indigenous cattle that resulted from a mixture between the three cattle types mentioned above. Morphologically, Sanga cattle are classed according to the position of their hump (cervico or cervico-thoracic) and their horns (lateral-horned, longhorned, medium-horned, shorthorned)(Payne & Hodges, 1997). Payne (1964) also divided Sanga cattle into early or aboriginal types and modern types (the latter still in process of formation). Available evidence suggests that the African Sanga first evolved in Northeast and East Africa over a period of time (2000 to 400 BC) (Figure 1), as their three ancestral cattle types entered the region in a certain time sequence as mentioned before. The people of those regions were mostly pasturalists, agriculturists and hunter-gatherers of the Stone Age era and were Cushitic (Hamitic type language from the former land of Cush) or Sudanic speaking while some influence from the north (Nilots) and Sahara were also evident. Besides cattle (long and shorthorn types from the north (Nile, Egypt) and north-west (Sahara), both Cushitic-speaking people and Semitic people also introduced longhorn, shorthorn and Zebu cattle over a number of years into the region (Ethiopia, Tanzania, Kenya) from Arabia. South of this region, no cattle breeding existed and the human population was mainly Bushmen that were hunter-gatherers. Crossbreeding of the different cattle types has continued for several millennia. It was probably a slow and intermittent process that occurred in different localities at different times involving different mixtures of cattle types and culminated in tribal groups migrating with their cattle.

Migration

The first migration southwards was probably that of Sudanic- or Cushitic-speaking tribes (probably the later Koisan people of southern Africa that originated from interbreeding of bushmen and Cushitic/Sudanic people) and their cattle were longhorned Sanga types (*c.* 500 BC; Figure 1). As Zebu (indicine) cattle were only present in small numbers, these longhorned types had little indicine blood. Oliver (1983) reported that Koisan cattle are believed to be mixtures of Hamitic longhorn and lateral-horned Zebu. They were followed by iron-working Bantu peoples that first entered East Africa from the west as agriculturists (grain planting; *c.* 500 BC). By their dynamic nature, they acquired skills for animal husbandry very quickly and migrated southwards (*c.* year zero) herding first longhorned and later shorthorned Sanga-type cattle, as well as Zebu cattle during later migrations (Payne & Hodges, 1997). Migration by Bantu tribes took place along the eastern side of central and southern Africa (around Lake Nyasa) and then also spread westwards towards Angola. They were present in Malawi and Zimbabwe by 300 AD and increased in numbers in this region between 500 and 1 000 AD while further migrations southwards into southern Africa took place. Since Stone Age Koisan people (related to Sudanic East African language) migrated southwards before the Bantu tribes, it is believed that longhorn-type Sanga, such as the Afrikaner was introduced in the Cape (southwestern regions of Africa) first by these tribes. The Coisan crossed Zambia and Botswana in a southwestern direction, crossing the Limpopo River, they turned westwards and again southwards when they reached the West Coast of Africa. They crossed the Orange River around 400 AD and settled in the western and southern region of southern Africa. Bantu people migrated into South Africa around 800 to 1000 AD. Unlike the Koisan whose cattle would have been of one type (longhorn Sanga) due to them being the first migrators, the different Bantu people undoubtedly herded different types of Sanga cattle of different origin. Due to tribal movement, continuous warfare and raiding there must have been further mixing of cattle types and replacement of one type by another by the Bantu people.

Genetic background

A study comparing gene frequencies of several protein polymorphisms between African, European and Indian breeds indicated that Sanga breeds had more in common with taurine than with indicus breeds (Manwell & Baker, 1980). All of the breeds belonged to the genus Bos and showed a high degree of commonality of randomly selected genes, regardless of gene flow or convergent evolution. Frisch et al. (1997) using four DNA markers, protein polymorphisms and karyotype confirmed this. According to the latter study, southern African Sanga breeds have a submetracentric Y chromosome typical of *Bos taurus*, in contrast to the Boran, an East African Zebu, showing a acrocentric Y chromosome similar to the karyotype of *Bos indicus*. Furthermore, frequencies of four DNA markers and several protein polymorphisms also showed that southern African Sangas (in this study the Tuli) have more in common with taurine breeds than indicine, while East African Zebus are admixtures of African taurine and Asian indicine. In support of these findings, Meyer (1984) reported that several southern African Sanga breeds have a unique haemoglobin variant HbI, the typical indicine variants HbC and albumin C are absent from Sanga and taurine breeds and that α-lactalbumin A was absent in taurine breeds and present in Sanga and Zebu.

The specific diversity resulting from very specific events taking place during the introduction of cattle into the different regions in Africa, suggest a new terminology for the African cattle. Meyer (1984) first proposed a classification of the Sanga as *Bos taurus indicus*, suggesting both indicine and taurine ancestors. However, based on the greater overlap between Sanga and taurine breeds than between Sanga and indicine breeds an alternative suggestion of *Bos taurus africanus* was proposed. Frisch *et al.* (1997) suggested that southern African Sangas (Afrikaner, Nguni, Pedi) be classified as *Bos taurus sudafricanus* to distinguish them from other African taurine groups and to indicate that their ancestors were mostly of taurine origin. Likewise, the African Zebu (Boran and some Malawi Zebus), which has a thoracic hump should be classified as *Bos taurindicus africanus*, supporting the evidence (karyotype and protein polymorphism) that African Zebu are admixtures of both Asian indicine and African taurine breeds. Furthermore this will also distinguish them from common *Bos taurindicus*, such as the Santa Gertrudis, that resulted from normal taurine and indicine breed crosses. In this regard, the Bonsmara will probably also be classified as *Bos taurus sudafricanus*, being a composite of the Afrikaner (*Bos taurus sudafricanus)*, Hereford and Shorthorn (*Bos taurus*).

Normally, the Brahman (*Bos indicus*) is utilised as a dam as well as sire line to overcome the climatic challenges to which the *Bos taurus* breeds could not adapt, and also for its pronounced heterosis with non-indicus breeds. A lack of consistancy in meat tenderness resulting from high percentage Brahman seems to be one of the reasons for the loss of popularity of this breed in the USA and probably many other countries (Shackelford *et al.*, 1991). Specific qualities of Sanga cattle breeds, specifically under harsh tropical conditions, are well documented. They are known for high fertility (Nguni breed: Maule, 1973), low intercalf periods (Nguni: Scholtz, 1988), ease of calving (Sanga: Schoeman, 1989), cow efficiency (kg calf per kg cow)(Nguni: Schoeman, 1989), adapted to poor grazing conditions (Meissner & Roux, 1982) and have a high tick resistance (Nguni: Schoeman, 1989). Recent work also showed favourable meat quality characteristics (Strydom *et al.*, 2000; also see poster of Frylinck *et al.*, 2001).

References

Epstein, H. (1971). *The origin of the domestic animals of Africa. Volume 1.* Africana Publishing Corporation, New York.

Frisch, J. E., Drinkwater, R., Harrison, B. & Johnson, S. (1997). *Animal Genetics* **28**, 77.

Manwell, C. & Baker, C.M.A. (1980) *Animal Blood Groups Biochemical Genetics* **11**, 151.

Meyer, E.H.H. (1984). *Proc. 2nd World Congr.Sheep and Beef Cattle Breeding* April 1984, Pretoria, South Africa, 328.

Maule, J. P. (1973) *South African J. Anim. Sci.* **3**, 11.

Meissner, H. H. & Roux, C. Z. (1982) *South African J. Anim. Sci.* **12**, 347.

Oliver, J. (1983) *Zimbabwe J. Agric. Res.* **21**, 1.

Payne, W. J. A. (1964) *Empire J. Exp. Agric.* **32** (126), 97.

Payne, W.J.A. & Hodges, J. (1997) *Tropical cattle*, ed. Editorial Offices: Oxford OX2 OEL Osney Mead, p.1. Blackwell Science Ltd, Oxford.

Rege, J.E.O., Yapi-Gnaoré, C.V. & Tawah, C.L. (1996) *Proc. Second All Africa Congress on Animal Agriculture, 1-4 April 1996, Pretoria, South Africa*, 57.

Schoeman, S. J. (1989) *South African J. Anim. Sci.* **19**(2), 55.

Scholtz, M. M. (1988) *Proc. 3rd World Congress on Sheep and Beef Cattle Breeds* Paris, France **2**, 303.

Shackelford, S. D., Koohmaraie, M., Miller, M. F., Crouse, J. D. & Reagan, J. O. (1991) *J. Anim. Sci.* **69**, 171.

Strydom, P.E., Naudé, R.T, Scholtz, M.M & Van Wyk, J.B. (2000) *Meat Sci.* 55, 79-88.

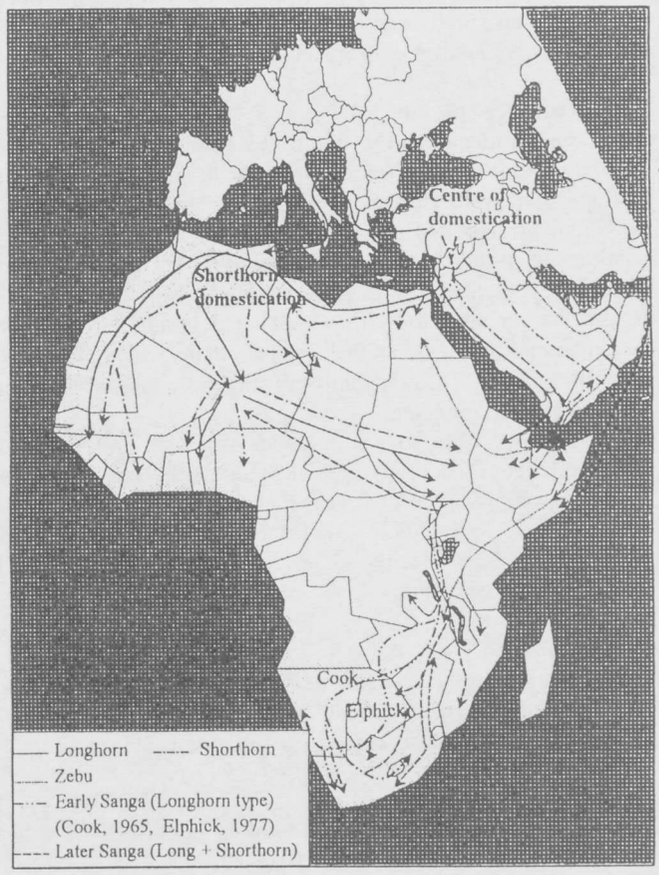

Figure 1: Possible migration routes of Sanga cattle and their progenitors as described by Payne (1964), Oliver (1983) and Payne & Hodges (1997)