

# The size of indigenous Venda cattle during the Late Iron Age in South Africa

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## Highlights

- Cattle from Mutokolwe, a Late Iron Age site in South Africa, had a shoulder height of between 106.90 and 129.49 cm.
- This is similar to other indigenous, unimproved cattle from central, eastern and southern Africa.
- The cattle from Nyanga, although small, fall within the variation of other indigenous cattle.

## Abstract

Very little data exist on shoulder heights of cattle from archaeological contexts in eastern, central and southern Africa, in no small part due to the virtual absence of complete long bones. We report on complete metapodia of cattle from Mutokolwe, a Late Iron Age site in South Africa that was occupied by Venda-speakers. The shoulder height of cattle from Mutokolwe ranges between 106.90 and 129.49 cm indicating the presence of a small breed of cattle. We present shoulder heights for a number of cattle breeds from eastern, central and southern Africa to show that indigenous, unimproved cattle from this region are often small in stature, well within the range for that recorded at Mutokolwe. Dwarf cattle have previously been reported from Nyanga in eastern Zimbabwe dating from the Late Iron Age. The size of cattle at Nyanga, although small, is within the range of other indigenous cattle from the subcontinent.

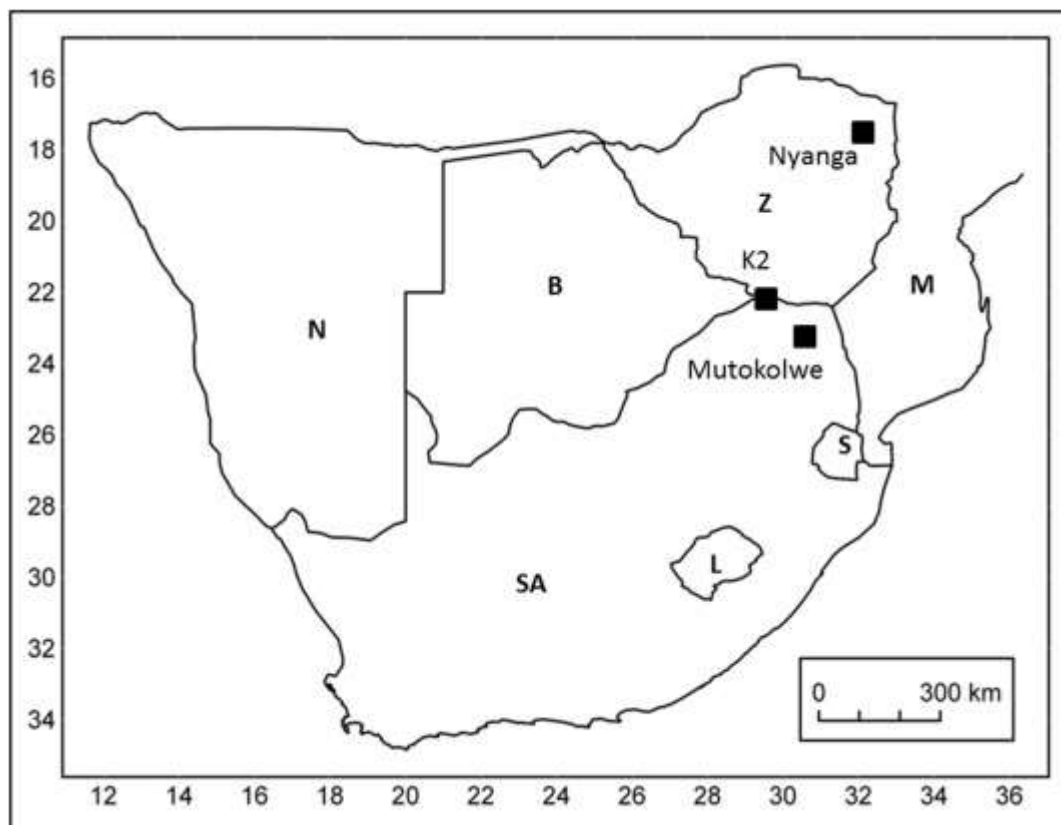
## Keywords

Cattle; Dwarf; Zebu; Sanga; *Bos Taurus*; Iron Age; Mutokolwe; Nyanga; K2; Shoulder (withers) height

## 1. Introduction

Research on local indigenous livestock is a continuing theme in South Africa (e.g. Judson, 1994; Ramsay et al., 2000). A variety of livestock breeds exist that played a major role in the social, cultural and economic history of the region (Ramsay et al., 2000) since they first appeared in southern Africa more than two millennia ago (Pleurdeau et al., 2012; Robbins et

al., 2008). Successive waves of migration of pastoralists and farmers from more northerly regions in Africa ever since resulted in hardy breeds adapted to a variety of biomes where droughts, disease, poisonous plants, nutritional shortages and parasites are common (e.g. Epstein, 1971; Ramsay et al., 2000; Vahrmeijer, 1981) (Fig. 1).



**Fig. 1.** Location of Mutokolwe, K2 and Nyanga in southern Africa. The countries of southern Africa are listed: SA = South Africa, L = Lesotho, S = Swaziland, M = Mozambique, Z = Zimbabwe, B = Botswana, N = Namibia.

Livestock found in archaeological deposits during the last two and a half millennia has received considerable attention from zooarchaeologists (e.g. Antonites et al., 2016, Badenhorst, 2002, Badenhorst, 2006, Badenhorst, 2010, Badenhorst, 2011, Badenhorst, 2015, Badenhorst, 2017, Badenhorst, 2018, Badenhorst, 2019, Fraser and Badenhorst, 2014, Plug, 1996, Plug and Voigt, 1985, Voigt, 1983, Voigt and Von den Driesch, 1984). However, results of cattle (*Bos taurus*) shoulder heights from archaeological remains from the African continent are extremely rare. Most cases that have been reported are from the northern parts of the continent including Sudan (Chaix, 2011), Rwanda (Van Grunderbeek et al., 1983) and Ghana (Gautier, 1987). The prevalence of cattle stature data based on complete long bones in the northern parts of Africa may be, in part at least, due to different discard practices (Arnold and Lyons, 2011) which are uncommon towards the south of the continent.

Apart from social and economic aspects, far less remains known about the stature of livestock in southern Africa during the past two millennia (but see Badenhorst and Plug, 2003, Plug and Badenhorst, 2002). This is largely due to the almost complete absence of

complete long bones to measure shoulder heights (Badenhorst and Plug, 2011). In addition, a great deal of measurements of individual fragmented bones from different Iron Age sites were taken, but that data have not yet been compiled. Nevertheless, if measurements of livestock are reported however, it is from taken on fragmented remains (e.g. De Wet-Bronner, 1997; Voigt, 1983). In this paper, we present the shoulder heights of cattle from a settlement called Mutokolwe, occupied by Venda-speakers during the Late Iron Age, which enable us to make direct comparisons with recent data of cattle shoulder heights.

## **2. Background**

During the Holocene, southern Africa was inhabited by hunter-gatherers, the ancestors of modern-day San or Bushmen people. Sheep and cattle appear in the northern parts of Namibia and Botswana more than 2000 years ago (Pleurdeau et al., 2012; Robbins et al., 2008). During the first millennium AD, the first Iron Age farmers arrived in the region, bringing with them cattle, sheep, goats, chickens and dogs. Iron Age farmers lived in settled villages, they cultivated plants, and manufactured metal objects and ceramic pots. By the Late Iron Age (1300 CE–1820s), ancestors of Nguni, Sotho-Tswana and Venda speakers, the main linguistic groups in South Africa today, arrived in the region (Mitchell and Whitelaw, 2005).

Today, Venda-speakers live north of the Soutpansberg Mountains in South Africa (Loubser, 1989:54). The arrival in South Africa of the main Venda clan, the Singo, dates to about 1750 CE, and this led early ethnographers to assume that this represents the earliest arrival of all Venda-speakers in South Africa (Hanisch, 1994). Based on archaeological ceramic evidence, it is now generally accepted that the Venda arrived by the AD 1500s before the arrival of the Singo ruling clan (Huffman, 2007, Huffman, 2012; Loubser, 1989).

## **3. Cattle during the Iron Age**

Faunal assemblages from Late Iron Age sites in southern Africa are usually dominated by cattle remains (Badenhorst, 2011; Fraser and Badenhorst, 2014), unlike the Early and Middle Iron Ages when caprines generally outnumber cattle (Badenhorst, 2015, Badenhorst, 2018). Ethnographic descriptions, early traveller reports and other historical documentation show that cattle were central to the economic, social and political life of farmers (e.g. Schapera, 1953). It is likely that many of the practices involving cattle date back to a large part of the Late Iron Age (Badenhorst, 2019).

Faunal assemblages from Iron Age farming sites are often heavily fragmented (Badenhorst and Plug, 2011), and information on the size and characteristics of cattle are still limited. Skull profiles indicate that Sanga cattle have been present in the region since the Early Iron Age (Plug, 1996). Fragments of long bone articulations and phalanges suggest that some cattle from the Iron Age were sometimes large and robust (Plug, 1996). In contrast, cattle remains from Nyanga in eastern Zimbabwe dating to the Late Iron Age were small, possibly of a dwarf variety. Based on the measurements of post-cranial remains, cattle from Nyanga had a shoulder height of between 0.9 and 1 m (Plug et al., 1997; Plug and Badenhorst, 2002). Using selected measurements of post-crania, De Wet-Bronner (1997) suggested that cattle increase in size over time at three Late Iron Age sites occupied by Venda-speakers.

Voigt (1983) reported a complete metacarpal from K2, a site dating from the Middle Iron Age (900–1300 CE), and concluded that this specimen suggest cattle were of similar size than modern, unimproved cattle breeds in South Africa. However, no shoulder height calculations were provided.

#### **4. Mutokolwe**

Mutokolwe (often called Mutokolwe B) is located along the Soutpansberg Mountains in South Africa (Magoma, 2014). The Tshiendeulu-Kwevho, part of the Venda-speaking group, claimed they built Mutokolwe, and their descendants still protect the site (Loubser, 1989:5). The site may have been occupied by a senior chief with approximately 1000 to 2000 people residing in and around this capital (Huffman, 2007; Huffman and Hanisch, 1987). Excavations revealed typical structures found on sites occupied by Venda-speakers, including an audience chamber, a beer drinking hut, a cooking hut, and an office. A large midden was excavated (Fish, 2000). All fauna were retrieved from the midden called Trench I, measuring 3 × 4 m, using arbitrary layers of 10 cm, reaching a maximum depth of 2 m. The deposits were screened through a two millimetre mesh (Fish, 2000). The site dates to between 1450 CE and 1550 CE, and Khami pottery, spindle whorls, copper and iron bangles, shell, ivory bangle fragments and glass and land snail beads were recovered (Fish, 2000). The fauna is dominated by cattle, followed by caprines, with little evidence for hunting (Magoma, 2014). The faunal assemblage from Mutokolwe is most unique with no less than eight complete metacarpals and five complete metatarsals of cattle present, the highest number of complete long bones of cattle ever recovered from the entire Iron Age in southern Africa. The high representation of complete long bones may signal feasting of cattle at the site (Magoma et al., 2018).

#### **5. Results**

Using the formula of Nobis (1954), we used the proximal breadth and greatest length of the metapodia (Von den Driesch, 1976) to determine the sex of the metapodia from Mutokolwe (Table 1). Both sexes are present, with more females represented in the sample. No metatarsals of males are present.

**Table 1**  
Sex determination of the metapodia from Mutokolwe.

Layer	Side	Proximal breadth (mm)	Greatest length (mm)	Index (BP/GL × 100)	Sex
<b>Metacarpals</b>					
5	Right	53.72	172.26	31.19	Male
6	Right	49.43	178.77	27.65	Female
7	Left	50.56	181.42	27.87	Female
7	Left	55.02	186.94	29.43	Possibly female
8	Left	50.75	177.26	28.63	Female
10	Left	60.30	183.20	32.91	Male
11	Left	48.00	183.19	26.20	Female
14	Right	54.20	178.95	30.29	Possibly male
<b>Metatarsals</b>					
3	Right	39.00	218.00	17.89	Female
5	Right	46.40	225.00	20.62	Female
11	Right	41.57	230.00	18.07	Female
13	Right	44.95	211.00	21.30	Female
13	Right	43.67	206.00	21.20	Female

We calculated shoulder heights for cattle from Mutokolwe based on the factors of Boessneck (1956), Zalkin (1960), Fock (1966) and Matolcsi (1970) (summary in Von den Driesch and Boessneck, 1974). The cattle from Mutokolwe ranged between 106.90 and 129.49 cm in size (Table 2). Bulls ranged between 107.49 and 122.93 cm in size, and cows between 106.90 and 129.49 cm. The shoulder heights calculated from the metatarsals are larger than those of the metacarpals (also see Table 3), suggesting that breeds from southern Africa had longer hind legs compared to modern European breeds (also Von den Driesch and Boessneck, 1974).

**Table 2**  
Cattle shoulder height calculations from Mutokolwe.

Greatest length (mm)	Boessneck, 1956	Zalkin, 1960	Fock, 1966	Matolcsi, 1970	Shoulder height range (mm)
<b>Metacarpals</b>					
172.26 ♂	6.71	6.24	6.25	6.33	1074.90–1155.86
183.20 ♂	6.71	6.24	6.25	6.33	1143.17–1229.27
178.95 ♂	6.71	6.24	6.25	6.33	1116.65–1200.75
178.77 ♀	6.31	5.98	6	6.05	1069.04–1128.04
181.42 ♀	6.31	5.98	6	6.05	1084.89–1144.76
186.94 ♀	6.31	5.98	6	6.05	1117.90–1179.59
177.26 ♀	6.31	5.98	6	6.05	1060.01–1118.51
183.19 ♀	6.31	5.98	6	6.05	1095.48–1155.93
Metacarpal range (cm)					106.90–122.93
<b>Metatarsals</b>					
218.00 ♀	5.63	5.34	5.35	5.28	1151.04–1227.34
225.00 ♀	5.63	5.34	5.35	5.28	1188.00–1266.75
230.00 ♀	5.63	5.34	5.35	5.28	1214.40–1294.90
211.00 ♀	5.63	5.34	5.35	5.28	1114.08–1187.93
206.00 ♀	5.63	5.34	5.35	5.28	1087.68–1159.78
Metatarsal range (cm)					108.77–129.49

Voigt (1983:193) lists greatest length measurements of cattle metapodia for K2, as well as for a Pedi cow and Nguni cow housed in the collections of the Ditsong National Museum of Natural History in South Africa. We calculated the shoulder heights for these three individuals (Table 3). The shoulder height range of cattle at Mutokolwe (106.90–129.49 cm) is similar to the cattle specimen from K2 (117.81–132.19 cm), the Pedi cow (125.58–136.25 cm) and the Nguni cow (112.42–124.42 cm).

Shoulder height data of unimproved cattle breeds from eastern, central and southern Africa (Joshi et al., 1957) show that a number of breeds (excluding oxen) fall within the range of 98 and 144 cm (Table 4). While the list of cattle breeds is not necessarily complete, it does indicate that small stature cattle are the norm in the subcontinent, rather than the exception.

Crossbreeding has had a huge impact on the size of indigenous cattle in Africa. For example, the shoulder heights of Afrikaner cattle (Table 4) are from unimproved individuals, ranging between 111 and 143 cm. In more recent times, due to selective breeding, bulls measure 149.4 cm, cows at 140.3 cm, and oxen at 152.7 cm (Epstein, 1971:478).

The proposed shoulder height of cattle from Nyanga, a Late Iron Age site in Zimbabwe, is based on measurements of fragmented post-cranial remains (Plug et al., 1997; Plug and Badenhorst, 2002). Using the cattle from Mutokolwe as a proxy, it is possible to test the proposed shoulder height of cattle at Nyanga. The most common measurements taken of cattle remains in both faunal assemblages is the lateral greatest length of astragali. Using

**Table 3**

Cattle shoulder heights obtained from measured metapodia (Voigt, 1983:193).

Specimen and accession number	Element	Greatest length (mm)	Factors (Table 2)	Shoulder height range (mm)
K2	Metacarpal	197.00	5.98–6.71	1178.06–1321.87
Pedi ♀, AZ 1	Metacarpal (R)	210.00	5.98–6.31	1255.80–1325.10
Pedi ♀, AZ 1	Metatarsal (R)	242.00	5.28–5.63	1277.76–1362.46
Nguni ♀, AZ 21	Metacarpal (R)	188.00	5.98–6.31	1124.24–1186.28
Nguni ♀, AZ 21	Metatarsal (R)	221.0	5.28–5.63	1166.88–1244.23

**Table 4**

Shoulder height of various cattle breeds in southern, central and eastern Africa (from Joshi et al., 1957, all mature, unless otherwise indicated).

Breed	Occurrence	Average shoulder height (cm)				Remarks
		Males	Females	Oxen	Unknown	
Nilotic	South Sudan	122	108	131		
Nilotic	South Sudan	127	125	151		
Nilotic	South Sudan	138	110	136		
Boran	Ethiopia		120.65	139.7		
Jiddu	Somalia	115.57	117.86			
Ankole	Uganda, Tanzania, Rwanda, Burundi, Democratic Republic of the Congo (DRC)	144.7	118			
Nioka	DRC				116.12	
Lugware	DRC	107	104–105			
Lugware	DRC			119		
Nandi	Kenya, Uganda, Tanzania	119.89	112.78	111.76		
Boran	Tanzania	119.63–131.57	115.32–123.70			
Tanzania Short-horned Zebu	Tanzania				98.73	'Tribal' cattle 2.5–3 year olds
Tanzania Short-horned Zebu	Tanzania				118.90	'Range' cattle 4–5 year olds
Tanzania Short-horned Zebu	Tanzania	109.63	104.14–106.22	111.25		
Tanzania Short-horned Zebu	Tanzania	105.66				3–4 years old steers
Barotse	Zambia			132		
Angoni	Zambia	124.4	119			
Nguni	South Africa, Swaziland, southern Mozambique	133	122			
Afrikaner	South Africa	131–142	111–134	114–143		
Madagascar Zebu	Madagascar	125	119	135		
Ranges (cm)		105.66–144.7	104–134	111.25–151	98.73–118.90	



the average size of astragali in the two assemblages (Table 5) indicate that the specimens from Nyanga are 8% smaller than those from Mutokolwe. The shoulder height range for cattle is 106.90 and 129.49 cm at Mutokolwe. A reduction of 8% suggests that the average shoulder height of cattle at Nyanga is between 98.35 and 119.13 cm. This is slightly larger than the previously proposed shoulder height of cattle at Nyanga of 0.9 to 1 m (Plug et al., 1997; Plug and Badenhorst, 2002). Using the formula of Zalkin (1970) to calculate the shoulder height of cattle at Nyanga using astragali (shoulder height =  $18.30 \times$  astragalus medial length, and using the average of 52.1 cm [ $n = 8$ , standard deviation 3.9] in Plug and Badenhorst, 2002), indicates a slightly smaller stature of 95.34 cm. The limitation of using short elements to calculate shoulder heights of cattle aside (Von den Driesch and Boessneck, 1974), the cattle from Nyanga was clearly small in stature, but within range of breeds from southern eastern and central Africa (Table 4).

Table 5. GLI measurements of astragali from Nyanga and Mutokolwe (Magoma, 2014; Plug and Badenhorst, 2002). Measurements in mm.

**Table 5**

GLI measurements of astragali from Nyanga and Mutokolwe (Magoma, 2014; Plug and Badenhorst, 2002). Measurements in mm.

Sample	N	Average	Standard deviation	Minimum	Maximum
Nyanga	7	56.9	5.4	45.5	62.6
Mutokolwe	7	61.72	4.59	55.84	67.90

## 6. Discussion

The size of domestic animals is determined by various factors, of which breed, environmental conditions and sexual dimorphism are some of the most important (e.g. Reitz and Wing, 2008). The small size of the cattle at Mutokolwe is in part likely due to breed. Early descriptions of the Venda and their culture noted that their cattle were small in size with long horns and a straight back (Stayt, 1931:38, Wilson and Thompson, 1971:173) and similar to those kept by Shona-speakers from Zimbabwe, as well as those of the Toka from the middle Zambezi (Wilson, 1969, also Epstein, 1971, Mansvelt and Skinner, 1962).

All indigenous, unimproved cattle found in southern Africa are of the Sanga variety (Voigt, 1983:57). Typical Sanga cattle are slender with long legs, long to very long horns pointing outward and upward, a cervico-thoracic hump, straight inter-cornual ridges, flat foreheads, prominent orbits and long faces (Felius, 1985:157, Grigson, 2000:39). This variety of cattle ranges in sizes from small (e.g. Mashona breed) to large (e.g. Barotse breed) (Epstein, 1971). Sanga cattle originated from the Horn of Africa through interbreeding between humped zebu cattle from Arabia and India and native hump-less taurine cattle (Epstein, 1971:338, Loftus and Cunningham, 2000:252). This interbreeding seems to have occurred by about 1600 BCE (Felius, 1985:157). The presence of bifid vertebrae (but see Plug, 1996:516 *pace* Magnavita, 2006), the shape of skulls and horns, as well as humped clay figurines led Voigt (1983) to suggest that the cattle from Middle Iron Age sites in the Limpopo Valley, where K2 is located, were of the Sanga variety.



Another important factor determining the size of domestic animals is environmental conditions (grazing, water, etc.). A study of shoulder heights of cattle kept by Venda-speakers revealed the influence of the local environment. Oxen from sweet-veld grazing areas have a shoulder height of 139 cm, while cows ranged between 124.3 and 126.2 cm. On the other hand, oxen from mixed-veld grazing measured between 130 and 136 cm, while cows measured 121 cm. Cows from sour-veld measured between 117.2 and 118.9 cm (Mansvelt and Skinner, 1962:5–7). Mutokolwe is located in the sour-veld (Acocks, 1953) lending support to the slightly smaller stature of the cattle from the site. The increase in cattle sizes over time in the same region (De Wet-Bronner, 1994, De Wet-Bronner, 1995a, De Wet-Bronner, 1995b, De Wet-Bronner, 1997) could also relate to cattle originating from different local environments and the introduction of larger breeds.

However, it is not only the local environment that is important. In many farming societies of southern Africa, subjects had to pay tribute to the chief in the form of cattle. Failure to pay royalty to a neighbouring chief often led to hostilities (Stayt, 1931) and this could have included not only the destruction of a capital, but also the execution of a chief (Kirkaldy and Wirz, 2000). Petty chiefs and headmen were also required to pay tribute to the chief, and these also included cattle (Van Warmelo, 1940). Households were also required to present a new chief with cattle (Stayt, 1931). Paid tribute could have resulted in different sized cattle arriving at Mutokolwe from different environmental settings, and this could have contributed to the different sized-cattle in the sample.

Considering the general small size of many cattle breeds from eastern, central and southern Africa, as well as the revised shoulder heights, the cattle from Nyanga are likely a Sanga variety of cattle breed (*pace* Plug et al., 1997, Plug and Badenhorst, 2002). Early descriptions from present-day Zimbabwe refers to a type of small cattle in the eastern parts of the country where Nyanga is located (e.g. Moffat, 1856:96). Moreover, many breeds of East African zebu cattle are small, with some individuals standing less than 1 m at the shoulder, such as the Nkedi cattle (Rege et al., 2001). Small breeds are also found in West Africa today (Deshler, 1963). Some small breeds, like those in West Africa, are immune to nagana, which infects many parts of Sub-Saharan Africa today (Vermeer, 1982).

The complete metapodia from Mutokolwe allowed us to consider the shoulder height of cattle during the Late Iron Age of southern Africa. It is well possible that the sizes of cattle differed at other Iron Age sites in the region over the course of nearly two thousand years, owing to the variety of breeds and environments present.

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