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ORIGINAL PAPER

Hunting by Farmers in the Central Lowveld of South Africa: The Late Iron Age Fauna from Mluwati

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Abstract Mluwati is a Late Iron Age site in the central Lowveld of South Africa. Historically, this region is known to host several fatal diseases for humans and livestock, including malaria and nagana. Mluwati was excavated in 2002 as part of rescue excavations during the construction of a lodge. The faunal assemblage from Mluwati contains a variety of mammals, notably larger ungulates such as blue wildebeest, impala, and plains zebra. The giant African land snail and tortoise remains are also common. The fauna from Mluwati is similar to that of other Early and Late Iron Age sites from the central Lowveld, where large ungulates were also hunted. The faunal assemblage from Mluwati is relatively large yet lacks any domestic animals. Faunal samples from the Early and Late Iron Ages in the central Lowveld indicate that there are several sites lacking livestock, which is not the result of small sample sizes. When samples do contain livestock, they are represented in lower numbers, and hunted animals dominate. Some of the common animals in all the faunal samples from the central Lowveld include plains zebra, blue wildebeest, impala, tortoise, and the giant African land snail. The area has been an attractive hunting ground for several centuries, where people may have been practicing seasonal sedentism.

Résumé Mluwati est un site de la fin de l'âge du fer dans le Lowveld central d'Afrique du Sud. Historiquement, cette région est connue pour héberger plusieurs maladies mortelles pour les humains et le bétail, y compris le paludisme et la nagana. Mluwati a été excavé en 2002 dans le cadre de fouilles de sauvetage lors de la construction d'une lodge. L'assemblage faunique de Mluwati contient une variété de mammifères, en particulier des ongulés plus grands tels que le gnou bleu, l'impala et le zèbre de plaine. Les restes du grand escargot terrestre africain et de la tortue sont également communs. La faune de Mluwati est semblable à celle d'autres sites de l'âge du fer précoce et tardif dans le Lowveld central, où des ongulés similaires étaient également chassés. L'assemblage faunique de Mluwati est relativement grand mais ne contient aucun animal domestique. Les échantillons fauniques des âges du fer précoce et tardif dans le Lowveld central indiquent qu'il existe plusieurs sites dépourvus de bétail, ce qui n'est pas le résultat d'un petit échantillon.

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"And wagons stick in the mud
The cattle – in this world his *all* –
Begin to sicken and die
Of red-water, lung sick, "melt" or gall
Tulip, fever or fly"
(Cartwright, 1971:34)

Introduction

Southern Africa hosts several settlements with material culture dating from the Iron Age (AD 200–1820s), but that lack any livestock (cattle, sheep, and goats) remains. Some of these settlements were rain-control locations (e.g. Brunton et al., 2013; Croll et al., 2023), while others were in regions that are thought to have been unsuitable for keeping livestock, such as the Lowveld of South Africa (Plug, 1988, 1989). It is also possible that sites lacking livestock represent lower-status settlements (Badenhorst et al., 2011a; Plug, 2000) or hunting locations of specialized hunters who obtained animal products (meat, fat, etc.) for trade (Badenhorst et al., 2011b) or long-distance provisioning (Grody, 2016; Plug, 1997a).

While livestock first appeared in the western half of southern Africa in association with Later Stone Age (LSA) communities some two millennia ago (Robbins et al., 2005, 2008; Vogel et al., 1997; Webley, 1992), the first farmers settled in the region during the earlier part of the following millennium. The Iron Age of southern Africa is divided into three phases, namely the Early, Middle, and Late Iron Age (Huffman, 2007). During the early to middle part of the first millennium AD (Early Iron Age [EIA], AD 200–900), the first farmers settled in southern Africa. They settled among and interacted with LSA hunter-gatherers (e.g., Jolly, 1996). These early farmers cultivated plants such as millet, sorghum, pulses, cowpeas, and cucurbits; kept livestock, notably cattle (*Bos taurus*), sheep (*Ovis aries*), and goats (*Capra hircus*); worked and produced metal objects; made ceramics of various kinds; and constructed wattle-and-daub huts that they often positioned on valley floors and next to rivers (Huffman, 2007; Mitchell, 2002). During the Middle Iron Age (MIA, AD 900–1300), socio-political developments in the Limpopo Valley brought farming communities into contact through trade networks with other societies on the coast of eastern Africa. The farmers from the Limpopo Valley and surrounding areas provided gold, ivory, skins, and other commodities in exchange for beads, porcelain, and cloth traded from lands as far away as Persia and China (Meyer, 1998). Zooarchaeological evidence indicates that caprines (sheep and goats collectively) outnumbered cattle at most EIA and MIA sites. EIA and MIA farming societies may have been practicing matrilineal or other non-patrilineal forms of descent based on the dominance of caprines and in the absence of large-scale evidence for intensive horticulture (Badenhorst, 2010; but see Huffman, 2010). Using large sample sizes, the only exceptions from the EIA and MIA where cattle outnumber caprines are Bosutswe (Toutswe, Taukome/Zhizo–Toutswe, Mapungubwe phases) and Nqoma in Botswana, as well as KwaGandaganda (Ndondondwane–Ntshekane, Ntshekane phases) and Mamba in KwaZulu-Natal (Badenhorst, 2008, 2011; 2017; Fraser & Badenhorst, 2014). During the Late Iron Age (LIA, AD 1300–1820s), ancestral Sotho-Tswana-, Nguni-, and Venda-speakers arrived and settled in southern Africa from East Africa. These farming groups are still the dominant farming groups in South Africa today. The state of Great Zimbabwe flourished during this time. Great Zimbabwe was built and used by Shona-speakers, who are related to Venda-speakers. Other states also developed during the LIA. Elaborate stone constructions appeared for the first time, and villages and towns were often located on hilltops, probably for defensive purposes. The layout of many settlements conforms to the Central Cattle Pattern during the LIA (Badenhorst, 2009; Huffman, 2007; Mitchell, 2002). Early accounts by travelers, historical information, and particularly intensive ethnographic investigations during the twentieth century provided a wealth of information on farming communities in southern Africa (e.g. Bruwer, 1956; Hammond-Tooke, 1974, 1981; Schapera, 1953). One aspect that is very apparent from these investigations is the pivotal role of cattle, which are associated, along with intensive horticulture, with patrilineal descent (Badenhorst, 2010). Great attachments were placed on cattle herds, and these animals played a major role in the social, political, and

economic life of farmers, including ancestral worship, marriage, and funerals. A man's wealth was measured according to the size of his cattle herd. Cattle were kept in a kraal (or byre) at night, and the kraal was an important place to perform ceremonies (e.g., Bruwer, 1956:120–121). The dominance of cattle and their role in all aspects of daily life are reflected in the high frequency of cattle remains in LIA faunal assemblages (Badenhorst, 2012; Magoma et al., 2018; Plug & Badenhorst, 2006). Hunting by Iron Age farmers was also of importance (Antonites, 2024; Badenhorst et al., 2016).

Faunal studies from Iron Age sites found in southern Africa have been ongoing for several decades (overviews in Badenhorst, 2008, 2011, 2017, 2018); Fraser & Badenhorst, 2014; Plug & Badenhorst, 2001). We recently studied the fauna from Mluwati, a LIA site located in the central Lowveld of South Africa. The central Lowveld stretches from the Shingwedzi River in the north to the border regions of Eswatini in the south and is bordered by the Drakensberg in the west of South Africa. While the fauna from this area has been relatively well-studied (Grody, 2016; Plug, 1988, 1989), advances in faunal quantification (Badenhorst, 2011, 2015, 2018) allow for more detailed comparisons with previous data. In this paper, we present the results of the faunal study from Mluwati and place the results within a broader, regional context (Fig. 1) using ethno-historical descriptions. We do not claim that there is a cultural link between these ethno-historical records and the people who lived at Mluwati or other nearby sites during the Iron Age (apart from those links established by Plug & Pistorius, 1999). For one, the descriptions are more detailed for the Tsonga-speakers compared to other groups in the Lowveld. Nevertheless, the use of these ethno-historical records provides some context for the faunal remains (cf. Plug & Badenhorst, 2009).

The Environmental and Cultural Setting of the Lowveld

The Lowveld of South Africa is a low-lying region on the granite flats encompassing the area in the north from the eastern Soutpansberg Mountains in the Limpopo Province of South Africa, bordered by the Drakensberg range in the west, and the Lebombo Mountains in the east, south to the Barberton Mountains. The area is, on average, 900 m in elevation, declining in elevation toward the east (Liebenberg, 1999:83). The climate of the Lowveld is tropical (Stevenson-Hamilton, 1934:11) with moderate, frost-free dry winters and very warm, humid summers. Rain falls between October and March as thunderstorms, averaging from 400 to 500 mm in the lower eastern part of the Lowveld to 1500 mm per annum in the higher elevations toward the Drakensberg (Liebenberg, 1999:83). The Lowveld is drained by several perennial rivers containing granite sands, including the Limpopo, Pafuri, Letaba, Olifants, Mandhlamari, Sabi, Crocodile, Nkomati, and Lomati. Several secondary streams, which do not run throughout the year but often have large stagnant pools, are also found in the area, including the Shingwedzi, Imbabate, Ngwanetzi, Manzemntondo, and Mbeamide rivers (Stevenson-Hamilton, 1934:9). The Lowveld falls in the savanna biome (Rutherford & Westfall, 1986:34), and plant cover consists of grass, thorn bushes, and thorn and mopane trees (Liebenberg, 1999:83). While originally an open country, bush encroachment turned large parts of the Lowveld into bush country in the last century (Wolhuter, 1967). The soil is generally poor, shallow, and unproductive (Stevenson-Hamilton, 1934:29).

In historic times, the survival of humans and livestock in the Lowveld was not easy. The area can experience severe droughts and flooding, and various diseases cause human, game, and livestock fatalities (Stevenson-Hamilton, 1939). During the rinderpest epidemic of 1896, game numbers declined in the Lowveld (Stevenson-Hamilton, 1934:72). By 1902, eland (*Taurotragus oryx*) disappeared altogether from the Lowveld, with very few buffalo (*Syncerus caffer*), kudu (*Tragelaphus strepsiceros*), and blue wildebeest (*Connochaetes taurinus*) present. However, at the time, good numbers of impala (*Aepyceros melampus*), sable (*Hippotragus niger*), roan (*Hippotragus equinus*), tsessebe (*Damaliscus lunatus*), and waterbuck (*Kobus ellipsiprymnus*), and considerable numbers of zebra (*Equus quagga*) were present in the Lowveld (Stevenson-Hamilton, 1957:216; Wolhuter, 1967:120). The area hosts malaria (Wolhuter, 1967), causing fatalities in humans, and horse sickness largely prevented horses and mules from usage in the area (Stevenson-Hamilton, 1934:16–19; Wolhuter, 1967; also Flygare, 1899).

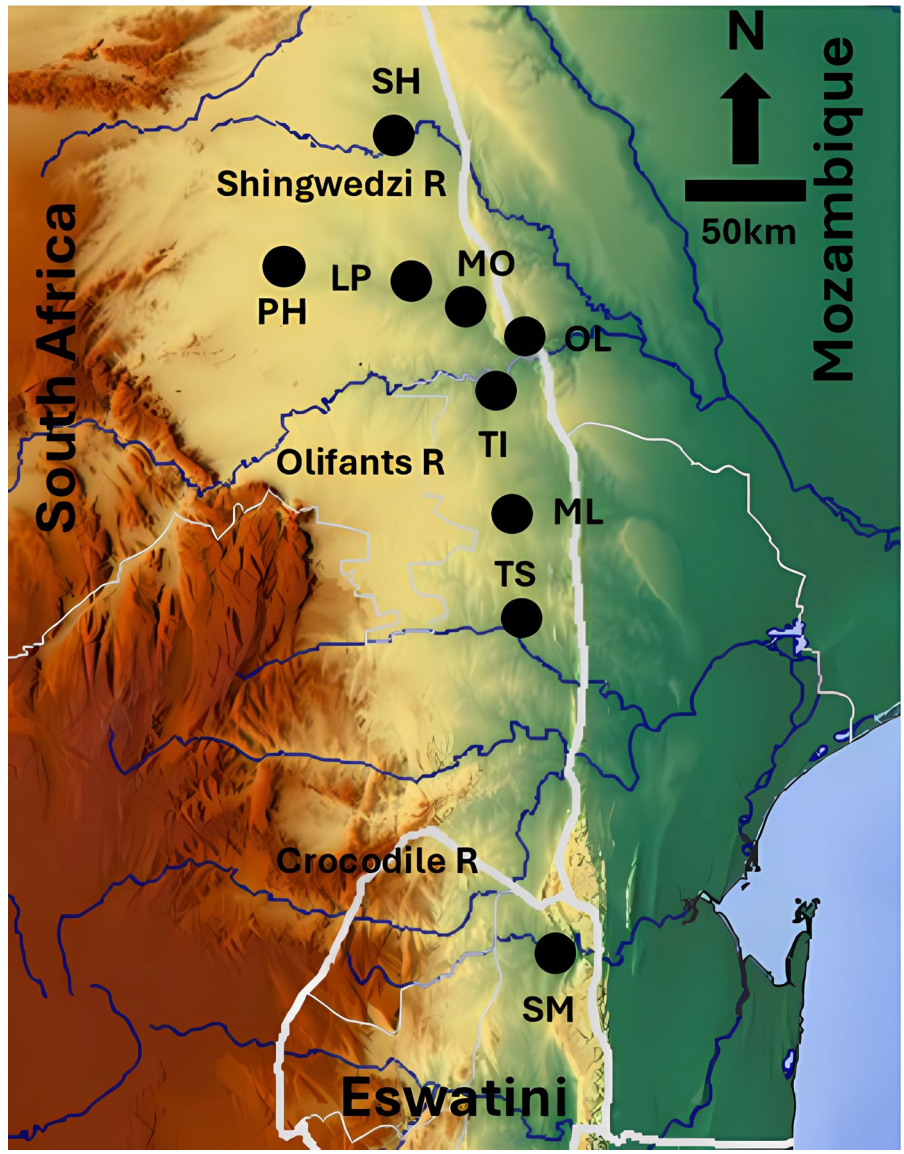

Fig. 1 Relief map and major rivers (Shingwedzi, Olifants, and Crocodile Rivers) of the central Lowveld, with sites mentioned in the text. SM = Simunye. SH = Sh14, Sh16, Sh27. LP = Le2, Le6, Le7, Ph1, Ph6, Ph9, Ma4, Ma38. MO = Mo8. TI = Ti3, Ti5, Ti6. OL = O120. TS = Tsh1, Sk17. PH = Shankara Hill, Sebatini Hill, Serotwe Hill, Mapotini Hill, Sonkoanini Hill, Hill X (Ghoenkop), Selongwe Hill, Mahululu Hill, Pjene Hill, Marupale Hill. ML = Mluwati

The most important disease that affected livestock in the Lowveld was nagana. This disease is caused by parasites (*Trypanosoma* sp.) that are transmitted by tsetse flies (*Glossina* sp.). Tsetse flies were common in the Lowveld and adjacent low-lying Mozambique, infecting both domestic and wild animals (Dos Santos Dias, 1962), but this disease disappeared after the rinderpest epidemic of 1896 (Morais, 1988:30; Punt, 1958:2; Stevenson-Hamilton, 1934:64; 1957:216) and the intense hunting of wild game in subsequent years, which acted as hosts (Morais, 1988:30). These trypanosomes live in the blood of game animals, which then infect domestic animals (Mönnig & Veldman, 1976:111). Animals such as warthogs (*Phacochoerus africanus*), bushpigs (*Potamochoerus larvatus*), duikers (*Sylvicapra grimmia*), nyalas (*Tragelaphus angasii*), kudus, and bushbucks (*Tragelaphus scriptus*) usually act as hosts (Boomker et al., 1986:185).

The climate of South Africa was warmer between AD 500 and 700 (Huffman, 2007), with drier periods in the summer rainfall area between AD 450 and 950 (Brook et al., 2015). During the Medieval Warm Epoch, from about AD 1000 to 1300, moisture (Brook et al., 2015) and temperatures increased (Tyson, 1987). During the Little Ice Age that followed, which lasted until the nineteenth century AD, the climate

was cold with dry conditions, with warm pulses (Ekblom et al., 2014; Huffman, 2007). During the late eighteenth century AD, particularly between 1790 and 1810, South Africa experienced wetter conditions, which were followed by drier than normal times between 1820 and 1840 (Huffman, 2007; Nicholson, 1981; Tyson, 1987). The drought of 1821 to 1824 was particularly severe (Milton, 1983). By 1725, the southern parts of (what is today) the Kruger National Park were free of tsetse. By 1838, however, the Lowveld from the Limpopo to the Komati rivers was infected by tsetse flies. Eyewitness accounts from this area indicate that farming settlements had livestock enclosures, although livestock was absent. This suggests that, in historical times, tsetse appeared in the Lowveld between 1725 and 1838 (Le Roux, 1977; Punt, 1958:2).

Despite the unfavorable conditions prevailing in the Lowveld during the past, the central part of the Lowveld in South Africa has attracted several groups of Bantu-speaking farmers, including Shangana-Tsonga-, Tsonga-, Swazi-, and Sotho-speakers (Bergh & Bergh, 1984:8; Meyer, 1986; Beyer, 1921; Schapera, 1953; Stevenson-Hamilton, 1934:191, 201). It is yet unknown how long these groups have been living in the Lowveld. Sotho-speaking groups have occupied the foothills of the Drakensberg in the Lowveld and are also found northward from the Sabi River (Stevenson-Hamilton, 1934:193). The Tsonga (also Thonga, Tonga) are found from St Lucia Bay in the KwaZulu-Natal province of South Africa to the Sabie River in the north in the Lowveld and into Mozambique (Junod, 1912:13). The Tsonga from southern Mozambique is linguistically related to the Shona of Zimbabwe (Murdock, 1959:374). Based on early Portuguese writings, the Tsonga were already present in the southern parts of modern Mozambique by at least AD 1544. Following the Difaqane (a period of unrest among Iron Age farmers, instigated by King Shaka of the Zulus) of the 1820 s, groups of Nguni speakers, including the Shangane, invaded areas occupied by the Tsonga, especially in Mozambique (Bergh & Bergh, 1984:8; Kriel & Hartman, 1991:7–8; Van Warmelo, 1953:55). Led by Soshangane (also known as Manukuza or Manukosi), who subjected and ruled over the Tsonga, and with time, the two groups mixed, and later, these groups entered and settled in the Lowveld (Bergh & Bergh, 1984:68; Bruwer, 1956:24; Rita-Ferreira, 1959:201; Van Warmelo, 1953:56). In some cases, some Tsonga-Shangana groups became subjects of Sotho- and Venda-speakers (Hartman, 1979; Stoffberg, 1982:44–45; Van Warmelo, 1953:56). The Tsonga, just like the neighboring Sothos and Swazis, follow a patrilineal form of descent in recent times (Murdock, 1959:28).

Various ethno-historical accounts from the last two centuries reflect on groups of Shangana-Tsonga from the Lowveld in South Africa and neighboring Mozambique without livestock and subsisting on plant cultivation and game hunting. According to Van Warmelo (1953:56), the Shangana-Tsonga were at one time living purely from crops, without possessing cattle (also Bruwer, 1956:25). According to Dicke (1931:142), the northern Tsonga did not possess cattle when they settled in modern South Africa, as most of Mozambique was infested by tsetse fly. It was only near the coast, particularly the Bilene district of Mozambique, that the Tsonga could keep cattle (Dicke, 1931:142). In all, these early accounts highlight the presence of nagana in the Lowveld in historic times, which prevented several groups from keeping livestock.

While the Lowveld was teeming with game animals during the nineteenth century (Stevenson-Hamilton 1905:355–356), most farming groups residing in the Lowveld at the time possessed goats and fat-tailed sheep, with an increasing number owning cattle (Stevenson-Hamilton, 1934:203). In recent times, the Tsonga kept cattle, goats, sheep, and chickens (*Gallus domesticus*). Goats, however, were the most numerous animals. Cattle may have been more common in the south of Mozambique before the Zulu invasion in the nineteenth century. In addition, their numbers have also been reduced by diseases (Junod, 1913:48). This ethno-historic information contrasts with the fauna from EIA and LIA sites in the Lowveld (as discussed below) and indicates that diseases severely affected domestic animals in the more recent past.

Mluwati

The Mluwati Concession is in the central Lowveld of South Africa in the Mpumalanga province, at the confluence of the perennial Mluwati and Nwaswitsontso rivers, about 40 km south-east of the Orpen Gate of the Kruger National Park (S24° 36′ 0.61″; E31° 37′

7.83″). The area consists of sedimentary sand and clay soils. The vegetation consists of dense riverbank vegetation dominated by large tamboti (*Spirostachys africana*), jackal-berry (*Diospyros mespiliformis*), leadwood (*Combretum imberbe*), and apple-leaf (*Lonchocarpus capassa*) trees. Mluwati falls within a mixed *Combretum* spp. (bushwillows) and *Terminalia sericea* (silver cluster-leaf) woodland landscape, with undulating uplands, ecotones, and bottomlands, ranging in altitude between 350 and 500 m. The area has a temperate climate, and annual rainfall varies between 550 and 600 mm. Frost occurs sporadically in the bottomlands. The vegetation in the area ranges from dense bush savanna on the uplands, open tree savanna in the bottomlands, and dense riverine vegetation on the banks of rivers and streams. On the ecotones, dense fringes of silver cluster-leaves occur, along with other woody trees. The geological substrate consists of granite and gneiss, with numerous dolerite intrusions. The habitat surrounding Mluwati is ideal for sables, with kudus, giraffes (*Giraffa camelopardalis*), buffalo, and elephants (*Loxodonta africana*) well represented. Zebras occur in smaller numbers, and blue wildebeest are restricted to the dolerite intrusions or brackish soils with sparse grass cover. Impalas are found along the water courses. Small game such as steenbok (*Raphicerus campestris*) and duikers is found throughout this habitat, and warthogs are common on the brackish bottomlands where water is available (Gertenbach, 1983).

During the construction of a lodge in 2001 at the Concession, Iron Age artefacts were exposed (Fig. 2). This led to rescue excavations by one of us (UK). The excavations revealed a small settlement, measuring about 15×15 m (225 m^2). The size of the settlement was established by an inspection of all the exposed foundations, as well as the surrounding area. No other archaeological deposits were found. The size of the site is small and would have housed a small number of people. The settlement lies within the flood area of both rivers. The site was covered by about 20 cm of sterile topsoil, consisting mainly of sand and decomposed vegetation with a dark, brownish-gray color. The upper sterile layer of 20 cm is followed by a 30–40 cm archaeological deposit. At a depth of about 60 cm, a sterile layer of river sand was encountered. The squares were excavated in arbitrary layers of 10 cm each (Küsel 2002).

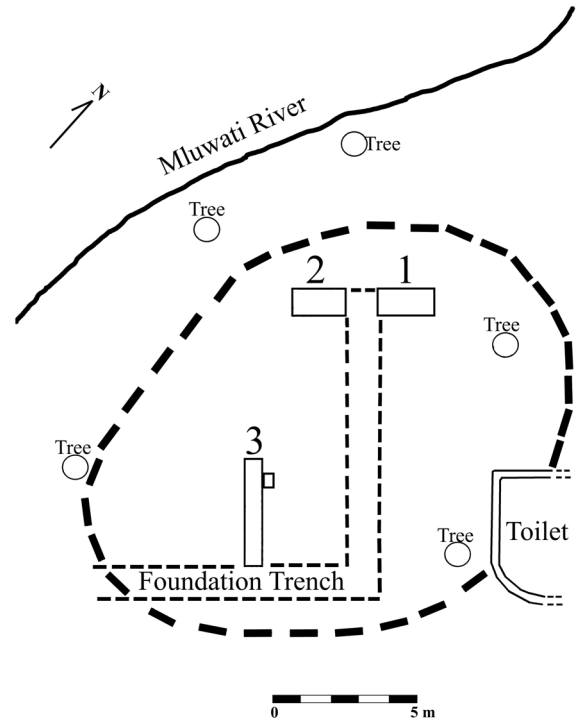

Fig. 2 Excavations at Mluwati (Küsel 2002)

Three areas were excavated. Squares 1 and 2 are both 1×2 m in size. Square 3 is larger and measures 0.5×4 m in size. The Rubble sample consisted of faunal remains collected during the initial exposure of the site during development and construction in square 3. Charcoal provided a radiocarbon date of 410±40 BP (Pta-8919), calibrated to AD 1456 (1487) 1521; 1576–1627 (Küsel 2002), placing the site in the LIA. In 2010, a human grave was exposed at Mluwati, but outside the confines of the site (Nienaber and Steyn accepted).

The pottery from Mluwati was assigned to the Shingwedzi or Pafuri industries (Küsel 2002; also see Meyer, 1986). Pottery from the Shingwedzi industry consists of small pots with narrow band decorations on the neck, and is also found at Sh14 and Sh16, both located in the Shingwedzi River area. These latter sites have no (or little) evidence for domestic animals, and date from about AD 1000 to the early nineteenth century (Meyer, 1986:233–234). The Pafuri industry is found in the Pafuri region of the Kruger National Park, with keel-shaped pottery with incised double band decoration. It has also been found at Kgopolwe

near Phalaborwa, dating from the early 1st millennium AD (Meyer, 1986:234–235).

Faunal Remains from Mluwati

Although all the squares with their layers were analyzed separately, the information of squares 1 and 2 was combined for this paper, since the remains were retrieved from the same midden. The site represented a single occupation phase (Küsel 2002), and therefore, all the layers from the different squares are combined here. All the faunal remains were identified at the Ditsong National Museum of Natural History (formerly Transvaal Museum) in Pretoria, South Africa, using the comparative skeletal collection. The method of identification follows Brain (1974) and Voigt (1983). According to this method, specimens with diagnostic features are identifiable, whereas fragments of skulls, ribs, enamel, and vertebrae are considered unidentifiable. The indeterminate Bovid size classes are those of Brain (1974). The fauna is quantified using two common methods, namely, the number of identified specimens (NISP) and the minimum number of individuals (MNI, Lyman, 2008). The total faunal assemblage consists of 4447 specimens, weighing 20,717.8 g (Table 1). Of these, 844 specimens (23%) were identified to taxa-level. Most specimens were retrieved from squares 1 and 2.

Several taxa were identified from the assemblage (Table 2), including black rhinoceros (*Diceros bicornis*), plains zebra, bushpig, warthog, giraffe, blue wildebeest, hartebeest (*Alcelaphus buselaphus*), common duiker, possibly oribi (cf. *Oribi oribi*), impala, possibly roan, sable, buffalo, possibly kudu, eland, southern reedbuck (*Redunca arundinum*), rodent, porcupine (*Hystrix africaeaustralis*), hare (*Lepus* sp.), tortoise, monitor (*Varanus* sp.), bullfrog (*Pyxcephalus adspersus*), giant African land snail (*Achatina* sp.), and freshwater mussels. The most common taxa in the assemblage include indeterminate Bov III, blue wildebeest, indeterminate Bov II, giant African land snail, tortoise, impala, and plains zebra. Most of the indeterminate Bov III specimens are likely from blue wildebeest, and most of the indeterminate Bov II remains are likely impala, since these are the most common species in those size ranges. Despite the large size of the assemblage (Badenhorst et al., 2022), no livestock remains were identified from Mluwati.

Table 1 The total faunal assemblage from Mluwati

Square	Identified specimens (NISP)	Unidentified specimens	Total
Square 1	302	1438	1740
Square 2	326	1629	1955
Square 3 (hut)	68	236	304
Rubble	148	300	448
Total	**844**	**3603**	**4447**
Mass (g)	10,140.0	10,577.8	20,717.8

The bovid skeletal part representations show that most elements are present for Bov II and IIIs (Table 3, Fig. 3). This indicates that the people at Mluwati brought back carcasses intact of these medium and large antelopes.

Of the total assemblage, 299 (7%) specimens were burnt. A variety of colors were identified, including pink, brown, black, gray, and white. The color of the burnt bones from the sample is related to the amount and intensity of the heat applied, the proximity of the heat source, and the absence, presence, or amount of flesh on the bone (Buikstra & Swegle, 1989). A total of 432 specimens (10%) had butchery damage. In addition, 24 (1%) specimens displayed carnivore chew marks, and eight (< 1%) rodent gnaw marks. The rodent gnaw marks were induced by a small rodent. The rodents from the assemblage were not particularly fresh but were of the same color as the rest of the specimens. Fifteen (< 1%) bone and shell fragments had insect-bored holes. In summary, the fauna from Mluwati indicates that no livestock were kept, and people focused on hunting medium and large game. They brought the carcasses back to Mluwati intact, where they were butchered.

Faunal Samples from the Central Lowveld

Just like Mluwati, several Iron Age sites in the central Lowveld lack any livestock (Plug, 1988, 1989; Plug & Pistorius, 1999). These include faunas from the EIA (Mo8, Ph9, Sh14) as well as the LIA (Muhululu Hill, Ti3, Ti5, Ti6, Mapotini Hill, Pjene Hill, and Ph1, Table 4). Some of the sites from the LIA can be linked to specific groups in the central Lowveld. Pjene Hill was occupied by Tsonga-speakers, whereas Muhululu Hill was settled by Sotho-speaking groups,

Table 2 Taxa identified from Mluwati (number of identified specimens, NISP/minimum number of individuals, MNI)

Taxa	Squares 1 and 2	Square 3	Rubble	Total NISP
Diceros bicornis (black rhinoceros)			3/1	**3**
Diceros/Giraffa (black rhinoceros/giraffe)			1/-	**1**
Rhinocerotidae/Hippopotamus (rhinoceros/hippopotamus)	1/-			**1**
Rhinoceros sp. (rhinoceros)	2/1			**2**
Equus quagga (plains zebra)	23/2	6/1	8/2	**37**
Phacochoerus aethiopicus (bushpig)	2/1			**2**
Potamochoerus porcus (warthog)	4/1			**4**
Suidae (non-domestic pig)	2/1			**2**
Giraffa camelopardalis (giraffe)	16/1			**16**
Connochaetes taurinus (blue wildebeest)	89/4	5/1	12/1	**106**
cf. *Connochaetes taurinus* (possibly blue wildebeest)	8/1		2/-	**10**
Connochaetes/Hippotragus sp. (wildebeest/roan/sable)	1/-			**1**
Alcelaphus sp. (hartebeest)	4/1	2/1		**6**
Sylvicapra grimmia (common duiker)	1/1			**1**
cf. *Ourebia ourebi* (possibly oribi)		1/1		**1**
Ourebia/Sylvicapra (oribi/duiker)		1/-		**1**
Aepyceros melampus (impala)	28/2	6/1	4/1	**38**
cf. *Aepyceros melampus* (possibly impala)	2/-	1/-	1/-	**4**
cf. *Hippotragus equinus* (possibly roan)	2/1			**2**
Hippotragus niger (sable)	2/1		6/1	**8**
cf. *Hippotragus niger* (possibly sable)			2/-	**2**
Hippotragus sp. (roan/sable)	2/1			**2**
Syncerus caffer (buffalo)	8/1	3/1		**11**
cf. *Syncerus caffer* (possibly buffalo)			1/1	**1**
cf. *Tragelaphus strepsiceros* (possibly kudu)		1/1		**1**
Taurotragus oryx (eland)	5/1			**5**
Redunca arundinum (southern reedbuck)	1/1			**1**
cf. *Redunca arundinum* (possibly southern reedbuck)	1/-			**1**
Redunca/Aepyceros (reedbuck/impala)			1/-	**1**
Bov I (small Bovidae)	2/-	3/1		**3**
Bov II (medium Bovidae)	42/3	9/-	9/-	**60**
Bov II non-domestic (medium Bovidae, non-domestic)	6/-		6/1	**12**
Bov III (large Bovidae)	274/2	8/-	38/2	**320**
Bov III non-domestic (large Bovidae, non-domestic)	16/1	2/-	8/3	**26**
Bov IV (very large Bovidae)	3/-	4/-		**7**
Hystrix africaeaustralis (porcupine)	1/1			**1**
Rodentia (rodent)		5/1		**5**
Lepus sp. (hare)	2/1			**2**
Mammal large	3/-		1/-	**4**
Kinixys sp. (hinged tortoise)			10/1	**10**
Tortoise	20/1	1/1	19/-	**40**
Varanus sp. (monitor)	14/1	1/1		**15**
Pyxicephalus adspersus (bullfrog)		9/1		**9**
Achatina sp. (giant African land snail)	38/3		11/1	**49**
Spathopsis sp. (freshwater mussel)	1/1			**1**

Table 2 (continued)

Taxa	Squares 1 and 2	Square 3	Rubble	Total NISP
Unionidae sp. (freshwater mussel)	2/1			**2**
Total NISP	**628**	**68**	**148**	**844**

who later came under the influence of the Tsonga (Plug & Pistorius, 1999).

The fauna from these sites without livestock shows some similarity with Mluwati (Table 5), with plains zebra, blue wildebeest, impala, tortoise, and the giant African land snail being common. Only a single site, Pjene Hill (LIA), has bird remains (chicken), whereas it is absent from Mluwati and the other assemblages, lacking livestock. However, many of the assemblages that lack livestock are very small in size. A recent study found that, for assemblages with only mammal remains, an NISP nearing or exceeding 1000 is sufficient to be representative of the original animal population (Badenhorst et al., 2022). This suggests that Mluwati can be considered relatively large, but that the samples from Muhululu Hill, Ti3, Ti5, Ti6, Mapotini Hill, Pjene Hill, and Ph1 are small. In all these cases, the lack of livestock may very possibly be related to the small sample sizes rather than the actual absence of these animals. However, at Mluwati (LIA), Mo8, Ph9 (EIA), and Sh14 (EIA, LIA), the sizes of the assemblages are more substantive (yet still relatively large to relatively small), and here, the lack of livestock is most likely due to their actual absence in the assemblage.

During both the EIA and LIA, many sites in the central Lowveld yielded remains of cattle and caprines, including Ma38, Le 7, Le 6, Tsh1, Sk17, Ma4, O120, Shankare Hill (EIA), Sh16, Ph6, Le2, Serotwe Hill, Sebatini, Shankare Hill, Sonkoanini Hill, Hill X (Ghoenkop), Selongwe Hill, and Sh27 and Marupale Hill (LIA, Table 6; Plug, 1989; Plug & Pistorius, 1999). Some samples are small (Badenhorst et al., 2022), notably Ma38, Ma4, Sh16, Shankare Hill, Ph6, Sebatini, Sonkoanini Hill, Sh27, and Selongwe Hill. For larger samples, livestock is poorly represented (compared to the remaining identified specimens, but excluding the mollusks and tortoise remains, which can inflate samples unduly due to fragmentation), numbering in all cases less than 6%. This suggests that herding was never an important economic activity in the central Lowveld during the Iron Age. Instead, people focused on hunting medium to large ungulates (also Grody, 2016:389). However, at two other sites, livestock is better represented, notably Tsh1 (35%, EIA) and Hill X (Ghoenkop, 25%, LIA). Hill X (Ghoenkop) is a recent metalworking site (Plug, 1989; Plug & Pistorius, 1999). In the case of Hill X (Ghoenkop), the focus on metalworking may imply that livestock was obtained through trade, or that people kept livestock to supply them with meat and other products as they pursued metalworking.

As indicated, at EIA and MIA sites in southern Africa, caprines generally outnumber cattle, except for Mamba, KwaGandaganda, Nqoma (EIA), and Bosutswe (MIA). During the LIA, cattle generally outnumbered caprines (Badenhorst, 2010, 2011; 2017; 2018; Fraser & Badenhorst, 2014). At the time when these patterns were established, samples with a combined NISP for cattle and caprines of less than 200 NISP were excluded. The cattle index was used to establish these patterns to measure the ratio between cattle and caprines in samples (Badenhorst, 2011). Using the larger samples (Table 6, but which is still below the 200 NISP threshold), cattle outnumber caprines at the following EIA sites: Le 7, Le 6, Sk17, and O120 (Table 7). This is also the case at Le 2, a LIA site.

No goats have been identified from sites in the central Lowveld (Grody, 2016; Plug, 1989), except at Simunye (Badenhorst & Plug, 2002) and Sonkoanini Hill, Hill X (Ghoenkop), Selongwe Hill, and Marupale Hill (Plug & Pistorius, 1999). Goats are more resistant to nagana (Badenhorst, 2002, 2018). The low occurrence of goats in the samples from the central Lowveld is most likely due to the difficulty in separating sheep and goat remains during analyses (Badenhorst, 2006).

For samples with and without livestock, plains zebra, blue wildebeest, impala, tortoise, and giant African land snail occur in most samples (Plug, 1989; Plug & Pistorius, 1999). Most samples from the EIA and LIA (Table 8) show that people focused on large

Table 3 Bovid skeletal part representation of Mlulwati (NISP)

Skeletal part	Bov I	Bov II	Bov III	Bov IV	Total
Axial skeleton					
Skull and mandibles	1	1	46		**48**
Teeth		9	41	2	**52**
Atlas			2		**2**
Axis		1	2	1	**4**
Upper limb					
Scapula		5	21	1	**27**
Humerus proximal		2	15		**17**
Humerus distal	1	4	18	1	**24**
Humerus shaft	1	4	23	1	**29**
Radius proximal	1	6	8		**15**
Radius distal		1	10		**11**
Radius shaft	2	7	24	1	**34**
Ulna		2	19	2	**23**
Pelvis		4	7	2	**13**
Femur proximal		3	9		**12**
Femur distal		2	23		**25**
Femur shaft		4	10		**14**
Tibia proximal			12	1	**13**
Tibia distal		7	4		**11**
Tibia shaft		10	32		**42**
Lower limbs					
Metacarpal proximal		1	6		**7**
Metacarpal distal		2			**2**
Metacarpal shaft	1	3	9	4	**17**
Metatarsal proximal			3		**3**
Metatarsal shaft	1	2	2	1	**6**
Metapodial proximal		2	1		**3**
Metapodial distal		4	2		**6**
Metapodial shaft		1	6		**7**
Carpals		3	24	3	**30**
Tarsals	1	8	30	2	**41**
Os malleolare			2		**2**
Sesamoid		1	33		**34**
Phalanx 1 proximal	1	6	5	1	**13**
Phalanx 1 distal	1	9	9		**19**
Phalanx 2 proximal		6	24	1	**31**
Phalanx 2 distal		6	29	1	**36**
Phalanx 3		7	17	1	**25**
Total	**11**	**133**	**528**	**26**	**698**
Percentage	**2%**	**19%**	**76%**	**4%**	**100%**

antelopes and equids (Bov IIIs and Equidae). In some cases, such as Ma4, Ol20 (EIA), and Selongwe Hill (LIA), people focused on medium-sized antelopes and Suids, with a special emphasis on impala hunting. The focus on medium and large ungulates may suggest some form of communal hunting (Plug, 1988), although other hunting techniques are able to capture large animals without the need for large hunting groups (see discussion below). At no site in the central Lowveld did people focus on hunting very large (dangerous) game animals such as buffaloes, eland, hippopotamuses, elephants, rhinoceros, or giraffes. However, given the size of large game, people may have rather camped at carcasses rather than transporting remains back to villages (Badenhorst et al., 2021). This would have resulted in low visibility or the complete absence of remains of this large game in faunal samples.

During the LIA, people at some sites with larger samples focused on hunting small bovids, notably at Serotwe Hill, Sonkoanini Hill, and Marupale Hill. The first two of these sites were metalworking sites of the Maseke-Malatji, where copper was produced. The latter site was associated with the Mhahlongane Changaan, who were noted elephant hunters with rifles in recent times. The Mhahlongane Changaan originated from groups moving away following the Zulu expansion of the late eighteenth century, joining groups of Tsonga (Plug & Pistorius, 1999).

Small game animals are rare in samples from the central Lowveld, as expressed in low values for the game index (Table 9). The game index measures the ratio between small-low-ranked prey against large, high-ranked prey (Bovids, Equids, Suids; see Badenhorst, 2015). Some small animals, such as rock hyraxes, would not have been encountered on the savannas of the central Lowveld.

Discussion and Conclusion

The faunal analysis of Mluwati and the regional comparison of sites in the central Lowveld established the following broad patterns:

1) There are EIA and LIA sites in the central Lowveld that lack any livestock remains, which is not the result of small sample sizes. The focus was on hunting.
2) There are EIA and LIA sites in the Lowveld with livestock. The focus was, however, on hunting, with livestock poorly represented.

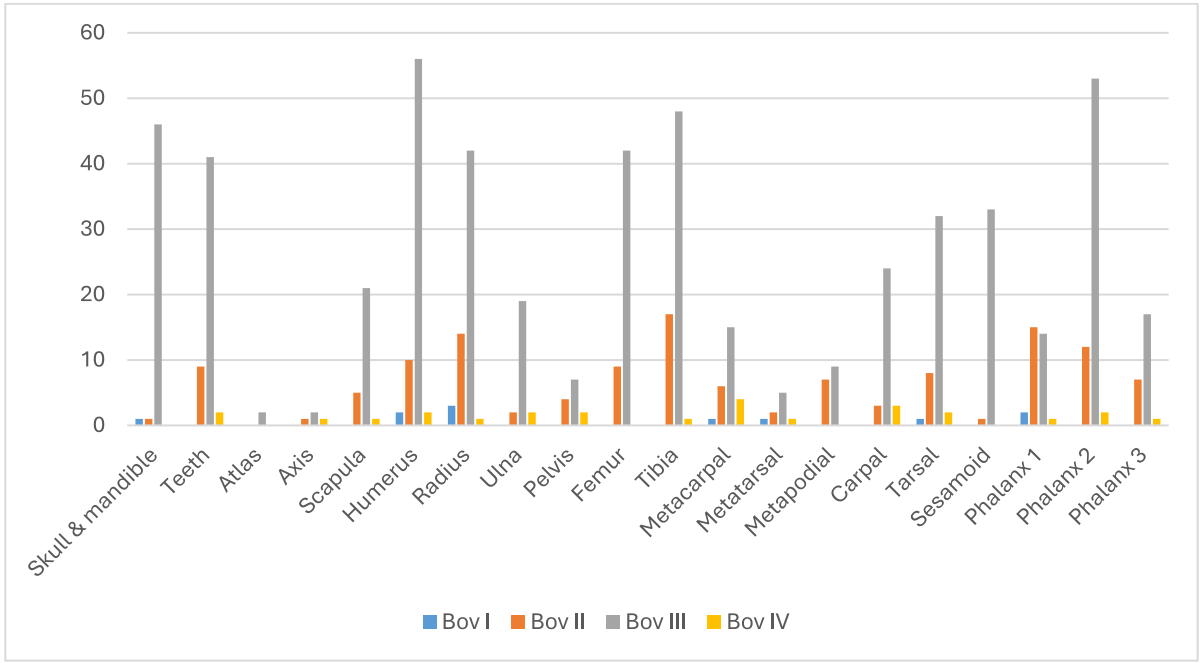

Fig. 3 Bovid skeletal part representation from Mluwati (NISP)

3) Despite (relatively) small sample sizes, cattle outnumber caprines at the following EIA sites: Le 6, Le 7, SK17, and Ol20.
4) Common animals in the samples from the region are plains zebra, blue wildebeest, impala, tortoise, and the giant African land snail. Overall, the focus was on hunting medium and large ungulates. Birds are almost completely absent from faunal samples, and small game animals are very rare.

Table 4 Sites in the central Lowveld without livestock (Meyer, 1986; Plug, 1989; Plug & Pistorius, 1999)

Site	Date	Period
Mo8	AD 300–600	EIA
Ph9	AD 800–900	EIA
Sh14	AD 800–900, AD 1200	EIA, LIA
Muhululu Hill (Sotho-speakers)	AD 1600–1800	LIA
Ti3	AD 1750–1850	LIA
Ti5	AD 1750–1900	LIA
Ti6	AD 1750–1850	LIA
Mapotini Hill	AD 1800	LIA
Pjene Hill (Tsonga-speakers)	AD 1800	LIA
Ph1	AD 1890	LIA

The various groups of people from the central Lowveld, namely the Tsonga, Shangane, Sothos, and Swazis, were all enthusiastic game hunters in recent times (Mönnig, 1967; Stevenson-Hamilton, 1934:215). Hunting was largely a male activity (Kriel & Hartman, 1991:56, Mönnig, 1967) and often done in hunting parties (Mönnig, 1967). The Tsonga even had specialized hunters, called *phisa*, who lived in their own villages, with their own special way of living and medicines to ensure success. For example, on the Nkomati River, some villages specialized in hunting hippopotami with spears and canoes (Junod, 1913:56–60). Sotho chiefs frequently organized hunting trips, and such events may have been more important in the past than livestock herding (Hammond-Tooke, 1981:9, 127). For the Swazis, big game animals not only trampled crops but were also the carriers of trypanosomiasis, which impacted the survival of livestock (Bonner, 2002:14).

Snares and packs of dogs were used to hunt animals in the Lowveld during historical times (e.g., Wolhuter, 1967). Some snares could hoist a large animal such as a buffalo by one leg, leaving the animal suspended, so that it to be disposed of easily. Other animals were caught using a snare devised from a ring of sticks, to which a heavy log was

Table 5 Sites from the central Lowveld without livestock (Plug, 1989; Plug & Pistorius, 1999NISP/MNI). MH = Mapotini Hill, MU = Muhululu Hill, P = Pjene Hill. These sites do not have stratigraphic units (Grody, 2016)

Taxa	Mo8	Ph9	Sh14	MU	Ti3	Ti5	Ti6	MH	P	Ph1
Homo sapiens (human)								1/1		
Crocuta crocuta (spotted hyena)	6/-									
Loxodonta africana (elephant)				1/1						
Rhinoceros sp. (indeterminate rhinoceros)	5/-									
Equus quagga (plains zebra)	37/-	27/-	18/-				12/-	3/1		1/-
Potamochoerus porcus (warthog)								9/1		
Giraffa camelopardalis (giraffe)	2/-				2/-					
Connochaetes taurinus (blue wildebeest)	46/-	36/-	7/-		1/-		4/-			
Damaliscus lunatus (tsessebe)			1/-							
Alcelaphus sp. (hartebeest)		1/-								
Raphicerus campestris (steenbok)										8/-
Aepyceros melampus (impala)	44/-	38/-	2/-	5/1		1/-	15/-	1/1		2/-
cf. *Hippotragus equinus* (possibly roan)									3/1	
Syncerus caffer (buffalo)	70/-		1/-			1/-				
cf. *Tragelaphus strepsiceros* (possibly kudu)	5/-									4/-
Bov I	2/-	4/-	6/-	1/1					1/1	1/-
Bov II	4/-		8/-					1/-		
Bov II non-domestic	12/-	11/-	19/-							
Bov III	5/-		43/-	9/2					1/1	
Bov III non-domestic	52/-	20/-					3/-			2/-
Bov IV	4/-		9/-							
Rodent small										3/-
Pronolagus sp. (hare)		3/-								
Mammal small								1/1		
Mammal large	2/-		1/-							
Gallus domesticus (chicken)									1/1	
Clarias gariepinus (African sharp-tooth catfish)	2/-		1/-							
Fish			1/-							4/-
Tortoise	56/-	39/-	20/-		2/-		1/-	6/2		17/-
Varanus sp. (monitor)		1/-	2/-							
Pyxicephalus adspersus (bullfrog)										11/-
Achatina sp. (giant African land snail)	12/-	14/-	92/-		4/-		6/-		2/1	16/-
Aspatharia sp. (freshwater mussel)								2/2		
Unionidae sp. (freshwater mussel)									1/1	
Total NISP	**367**	**194**	**231**	**16**	**9**	**2**	**41**	**28**	**9**	**69**

attached. Smaller animals were snared using falling log traps (Mönnig, 1967; Stevenson-Hamilton, 1938:48; Wolhuter, 1967). The Tsonga, for example, used pits to kill large game, which consisted of a hole dug into the ground, armed with spiked poles, and covered with branches (Junod, 1913:54; Kriel & Hartman, 1991:56). Such pits were widely used in the past beyond the central Lowveld to hunt large animals such as hippopotami and rhinoceros (Hall, 1977). Dogs were also used to assist in hunting in the Lowveld during historical times. Dogs pursued larger game, and animals such as waterbucks would subsequently seek out a pool of water, where they stood at bay, only to be disposed of with spears. Warthogs were chased into holes where dogs held them until they were killed (Stevenson-Hamilton,

Table 6 Iron Age sites with livestock in the central Lowveld (Badenhorst & Plug, 2002; Grody, 2016; Plug, 1989; Plug & Pistorius, 1999). Total NISP is from the total sample size, but excluding tortoise and mollusks. The sites do not have stratigraphic units (Grody, 2016)

Site	Age (AD)	Period	Sheep/goats NISP	Cattle NISP	Total NISP	% Livestock to NISP	Reference and notes
Ma38	470	EIA	4/-	-	**255**	2%	Plug, 1989. Small sample size
Le7	300–830	EIA	25/-	96/-	**2060**	6%	Plug, 1989
Le7a	300–700	EIA	13/-	8/-	**1424**	1%	Grody, 2016
Le7b	300–700	EIA	-	-	**189**	0%	Grody, 2016. Small sample size
Le6	300–700	EIA	-	27/-	**1063**	3%	Grody, 2016
Le6	500–800	EIA	8/-	96/-	**1819**	6%	Plug, 1989
Tsh1	510	EIA	626/-	-	**1801**	35%	Plug, 1989
Sk17	740	EIA	44/-	10/-	**1774**	3%	Plug, 1989
Ma4	800–900	EIA	3/-	25/-	**135**	21%	Plug, 1989. Small sample size
O120	850	EIA	-	48/-	**1254**	4%	Plug, 1989
Shankare Hill	900–1300	EIA	3/2	5/1	**31**	26%	Plug & Pistorius, 1999. Small sample size; metalworking site
Sh16	1200	LIA	8/-	-	**562**	1%	Plug, 1989. Small sample size
Ph6	1200–1400	LIA	2/-	-	**83**	2%	Plug, 1989. Small sample size
Le2	1500–1800	LIA	3/-	18/-	**769**	3%	Plug, 1989
Serotwe Hill	1600	LIA	16/3	0/0	**549**	3%	Plug & Pistorius, 1999. Metalworking site
Shankare Hill	1600–1800	LIA	17/3	32/3	**125**	39%	Plug & Pistorius, 1999. Small sample size; metalworking site
Sonkoanini Hill	1600–1800	LIA	6/2	2/2	**300**	3%	Plug & Pistorius, 1999. Small sample size; metalworking site
Hill X (Ghoenkop)	1600–1800	LIA	102/11	116/11	**872**	25%	Plug & Pistorius, 1999. Metalworking site
Selongwe Hill	1600–1800	LIA	16/5	12/2	**380**	7%	Plug & Pistorius, 1999. Small sample size; metalworking site
Simunye	1688–1811	LIA	9/3	45/6	**207**	26%	Badenhorst & Plug, 2002. Small sample size
Sebatini	1800	LIA	6/2	8/2	**63**	22%	Plug & Pistorius, 1999. Small sample size; metalworking site
Marupale Hill	1800	LIA	6/3	114/10	**336**	36%	Plug & Pistorius, 1999. Small sample size; metalworking site
Sh27	1830	LIA	5/-	-	**212**	2%	Plug, 1989. Small sample size

1938:48; Wolhuter, 1967). The Sotho used spears, axes, and knobbed clubs to hunt, and formerly, boys used bows and arrows for hunting birds (Mönnig, 1967).

Detailed information is known about the prey preferences of the Tsonga (but less so for other groups in the central Lowveld). In addition to big game hunting, the Tsonga are fond of a variety of meat. These include small antelopes, field mice (caught by boys using traps), carnivores, most kinds of birds (except hawks, vultures, crows, and storks), monitor lizards, tortoises, and mollusks (Junod,

Table 7 The Cattle Index values for sites in the central Lowveld. The cattle index measures the ratio of cattle and caprines in samples. Values above 0.5 indicate samples where cattle outnumber caprines (Badenhorst, 2011)

Site	Period	Cattle Index
Le7	EIA	0.80
Le 7a	EIA	0.38
Le 6	EIA	1
Le6	EIA	0.92
Tsh1	EIA	0
Sk17	EIA	0.71
O120	EIA	1
Le2	LIA	0.90
Serotwe Hill	LIA	0
Hill X (Ghoenkop)	LIA	0.53

1913:62–66, 315–317). However, snails are generally despised by the Tsonga (Junod, 1913:66). The Tsonga favored the horns of sable antelope and kudus as signal horns used for producing sound for music (Kirby, 1938). The Tsonga regard the meat of many carnivores as a delicacy, including lions and leopards. However, baboons, jackals, hunting dogs, and hyaenas, as well as carnivorous birds, are not consumed (Stevenson-Hamilton, 1934:201). The Shangana-Tsonga fished (Kriel & Hartman, 1991:56). The Tsonga fished using traps and woven baskets, and killed carps and barbells in drying lakes (Junod, 1913:68). The Sotho would simply collect some animals such as tortoises and frogs, and this activity was engaged in by both sexes (Mönnig, 1967). The (near) absence of birds in the samples from the central Lowveld is unlikely to be the result of taphonomic loss, as small, fragile tortoise bones are preserved, such as at Mluwati. Instead, the low frequency of birds likely reflects cultural and economic choices. People were hunting medium and large game, which provided higher meat yields and more efficient returns (see discussion below), rather than targeting small-bodied birds.

The presence of cattle and caprines in the faunal samples from the central Lowveld suggests that nagana was either absent in some areas or during some periods (Plug, 1989:118; 1997b) or was successfully managed by Iron Age farmers (Badenhorst, 2008). In recent times, goats have been the primary domestic animal among the Tsonga (Fig. 4; Junod, 1912, 1913), likely due to the presence of nagana (Badenhorst, 2002).

Apart from diseases such as nagana and malaria, the Lowveld suffers from a scarcity of water. Large parts of the region lack permanent springs, with many rivers diminishing in volume before running dry as they cross the Lowveld. Daily temperatures are also high (Wolhuter, 1967:65). Trevor (1905) once lived close to a Bantu-speaking village, and here, no rains have fallen in over 20 months. The soils derived from granite are poor, with little cultivation possible. On the other hand, the pastures are excellent, but livestock suffer in the summer months from the many endemic diseases. As a result, the Lowveld is generally devoid of livestock, except for small herds of goats and the occasional fat-tailed sheep among Bantu-speakers (Trevor, 1905). Predators such as lions, leopards, wild dogs, and hyaenas were plentiful in recent years, which doubtless caused severe problems for farmers with livestock, while baboon troops frequently raided crops. Stinging game flies are a nuisance in summer (Wolhuter, 1967).

Farmers could have mitigated the challenges of harsh living conditions in the central Lowveld by practicing seasonal sedentism (Kent, 1989). According to this model, communities remained in one location for a part of the year, typically during seasons of resource abundance. They then move when conditions change or become unfavorable (Kent, 1989). Seasonal sedentism may explain the variability in livestock proportions (absent or present) at the different sites in the central Lowveld.

Since the establishment of the Kruger National Park in the early twentieth century, census data reveal that the most common mammals are impala, buffalo, plains zebra, blue wildebeest, kudu, elephant, giraffe, waterbuck, warthog, sable, tsessebe, eland, and roan (Davis, 1939; Maré, 1949; Roberts, 1937). These animals, especially the ungulates, are also found in faunal samples from the central Lowveld (Plug, 1989; Plug & Pistorius, 1999), with animals such as impala, zebra, and blue wildebeest being particularly common. These ungulates, along with the other common taxa listed above, are also common in LSA samples in the central Lowveld, namely, Sk4 and Pr34 (Plug, 1989), but less so at historical sites such as Steinaecker's Horse and Pilgrim's Rest, which was occupied (in the main) by Europeans (Badenhorst et al., 2002; Plug & Van Wyk-Rowe, 1994).

Table 8 NISPs of game size groups from sites in the central Lowveld. The highest percentages for each site are in bold. Livestock were excluded from the calculations. For Bov II and III calculations in the table, all indeterminate Bov II and Bov IIIs were excluded, since these specimens could be from livestock. However, indeterminate Bov II non-domestic and indeterminate Bov III non-domestic numbers are included in the table. From Plug (1989), Plug and Pistorius (1999), Badenhorst and Plug (2002), and Grody (2016). The sites do not have stratigraphic units (Grody, 2016)

Site	Large game	Bov IV	Bov III + plain zebras	Bov II + suids	Bov I
Early Iron Age					
Ma38	0 (0%)	4 (2%)	193 **(84%)**	29 (13%)	5 (2%)
Mo8	9 (3%)	74 (26%)	140 **(50%)**	56 (20%)	2 (1%)
Le 7	30 (3%)	185 (16%)	680 **(58%)**	217 (19%)	51 (4%)
Le 7a (Grody, 2016)	51 (7%)	248 (33%)	**389 (51%)**	32 (4%)	39 (5%)
Le 7b (Grody, 2016)	8 (8%)	16 (17%)	**65 (67%)**	6 (6%)	2 (2%)
Le 6 (Plug)	81 (8%)	223 (21%)	570 **(53%)**	179 (17%)	19 (2%)
Le 6 (Grody, 2016)	47 (11%)	168 (38%)	**180 (41%)**	42 (10%)	3 (1%)
Tsh1	35 (6%)	6 (1%)	**390 (72%)**	69 (13%)	40 (7%)
Sk17	38 (3%)	223 (15%)	**721 (48%)**	498 (33%)	13 (1%)
Ph9	0 (0%)	0 (0%)	**84 (61%)**	49 (36%)	4 (3%)
Ma4	0 (0%)	1 (1%)	36 (34%)	**67 (64%)**	1 (1%)
O120	22 (2%)	35 (4%)	357 (35%)	**549 (54%)**	47 (5%)
Shankare Hill	1 (5%)	1 (5%)	3 (14%)	6 (29%)	**10 (48%)**
Sh14	1 (2%)	10 (16%)	**26 (41%)**	21 (33%)	6 (9%)
Late Iron Age					
Sh16	64 (14%)	23 (5%)	**292 (65%)**	53 (12%)	15 (3%)
Ph6	0 (0%)	2 (3%)	**49 (62%)**	26 (33%)	2 (3%)
Mluwati	27 (9%)	14 (4%)	**201 (64%)**	65 (21%)	8 (3%)
Ti3	**2 (67%)**	0 (0%)	1 (33%)	0 (0%)	0 (0%)
Ti5	0 (0%)	**1 (50%)**	0 (0%)	**1 (50%)**	0 (0%)
Ti6	0 (0%)	0 (0%)	**19 (56%)**	15 (44%)	0 (0%)
Le 2	4 (1%)	14 (3%)	**397 (83%)**	44 (9%)	20 (4%)
Serotwe Hill	0 (0%)	51 (21%)	37 (15%)	40 (17%)	**112 (47%)**
Shankare Hill	1 (2%)	15 (30%)	**17 (34%)**	3 (6%)	14 (28%)
Sonkoanini Hill	4 (3%)	0 (0%)	26 (18%)	43 (30%)	**69 (49%)**
Hill X (Ghoenkop)	3 (1%)	7 (2%)	**118 (39%)**	111 (37%)	62 (21%)
Selongwe Hill	3 (2%)	0 (0%)	26 (18%)	**61 (43%)**	52 (37%)
Muhululu Hill	1 (14%)	0 (0%)	0 (0%)	**5 (71%)**	1 (14%)
Sebatini	0 (0%)	1 (3%)	**9 (28%)**	9 (28%)	13 (41%)
Marupale Hill	2 (3%)	7 (9%)	23 (30%)	19 (25%)	**26 (34%)**
Simunye	1 (13%)	0 (0%)	1 (13%)	1 (13%)	**5 (63%)**
Sh27	5 (5%)	19 (18%)	**41 (39%)**	28 (27%)	11 (11%)
Pjene Hill	0 (0%)	0 (0%)	**3 (75%)**	0 (0%)	1 (25%)
Ph1	0 (0%)	0 (0%)	7 (39%)	2 (11%)	**9 (50%)**

The focus on hunting medium and large game in the central Lowveld during the Iron and Later Stone Age is not only linked to their abundance in the area. Optimal foraging theory suggests that hunters typically make rational economic decisions to hunt animals that yield the greatest return for the smallest effort (Badenhorst & Driver, 2009; Driver & Badenhorst, 2017; Lyman, 2003; Smith, 1983; Winterhalder, 1981). In many situations, hunting large mammals is the best choice for an optimal forager, and there are often further incentives, such as the ability for self-advancement through food sharing and through the prestige that comes from killing a large animal (Driver & Badenhorst, 2017; Hawkes & Bliege Bird, 2002; Kensinger, 1989). The common ungulates in the samples all contain plenty of meat. Adult impala weigh between 69 and 36 kg (Brain, 1974), adult blue wildebeest between 214 and 249 kg (Young et al., 1969), and plains zebra between 290 and 340 kg (Stuart & Stuart, 1990). Blue wildebeest

Table 9 The Game Index for larger samples, using NISP

Site	Low-ranked prey	High-ranked prey	Game Index
Le 7 (Plug)	19	1133	**0.02**
Le 7a (Grody, 2016)	10	708	**0.01**
Le 6 (Plug)	16	991	**0.02**
Le 6 (Grody, 2016)	2	393	**0.01**
Tsh1	31	505	**0.01**
Sk17	16	1455	**0.01**
O120	126	988	**0.11**
Le 2	29	475	**0.01**
Serotwe Hill	52	240	**0.18**
Hill X (Ghoenkop)	49	298	**0.14**

congregates in large herds after the first rains and prefers drinking from pans, even if water is available in rivers (Maré, 1949). In the Lowveld, pans contain water for some weeks after rains (Trevor, 1905) and may have been where blue wildebeest were hunted.

Nearly all the faunal samples in the central Lowveld contain the giant African land snail (Plug, 1989). These snails aestivate and often burrow into soft archaeological deposits (Plug, 1990) and may thus be natural intrusions in some cases (Kohtamäki & Badenhorst, 2017). Junod (1913:66) mentions that the Tsonga, for example, despised snails, but ate mollusks (Junod, 1913:62–66, 315–317), assuming the latter is referring to freshwater mollusks. Elsewhere in Africa, the giant African land snail is consumed (Mead, 1961).

The faunal assemblage from Mluwati contributes important evidence to the broader understanding of subsistence strategies among Iron Age farming communities in the central Lowveld of South Africa. The absence of livestock, despite a relatively large sample size, supports the interpretation that various environmental constraints limited animal husbandry in this area. This pattern is not unique to Mluwati, and several EIA and MIA sites in the central Lowveld lack livestock remains. While livestock is present at other farming sites in the area, they are generally poorly represented. This suggests that, while livestock may have been kept in some areas or during certain periods, it was not a dominant component of the subsistence economy. Farmers could also have been practicing seasonal sedentism, moving between resource-rich areas as conditions demanded. Across the central Lowveld, faunal assemblages are

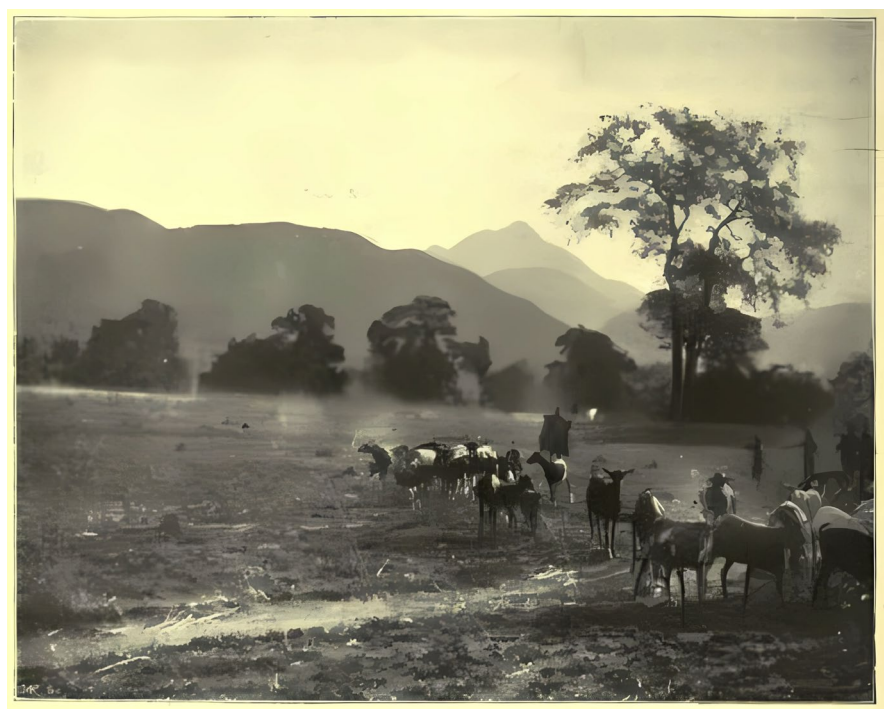

Fig. 4 "Boys herding goats on the Shiluvane plain (in the background, the Mamotswiri mountain)." From: Junod (1912:62). Public domain. Image source: Wikimedia Commons, https://commons.wikimedia.org/wiki/File:HJ-1-P62.png

dominated by medium to large wild ungulates, particularly plains zebra, blue wildebeest, and impala.

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Declarations

Competing Interest The author declares no competing interests.

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