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LIVESTOCK USE IN THE LIMPOPO VALLEY OF SOUTHERN AFRICA DURING THE IRON AGE

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ABSTRACT

Socio-political developments in the Limpopo Valley are of considerable interest to Iron Age archaeologists and some have suggested a pivotal role for cattle within this context, especially during the Middle Iron Age. In the past, many faunal assemblages from the region were quantified using the Minimum Number of Individuals (MNI) only. In this study, the Cattle Index, which measures the ratio of cattle to sheep/goats in a faunal assemblage, is applied to archaeofauna from the Limpopo Valley, as well as to other Iron Age samples for which only MNIs are available. The resulting Cattle Indices show that wealth was not based on cattle alone in the Limpopo Valley. Most faunal samples from the Early and Middle Iron Ages are dominated by sheep/goats. However, exceptions occur at KwaGandaganda, Mamba, Bosutswe and Nqoma. During the Late Iron Age, most assemblages are dominated by cattle. We consider potential reasons for the identified Early and Middle Iron Age exceptions, and also for variable livestock numbers in general.

INTRODUCTION

Recently, a Cattle Index was proposed (Badenhorst 2011) to measure the ratio of cattle and sheep/goats (or caprines, after the subfamily Caprinae) in faunal samples, making use of the most basic and widely used quantification method, the Number of Identified Specimens (NISP) (e.g. Grayson 1984; Badenhorst 2011). Many faunal assemblages dating from Iron Age sites (summaries in Plug & Voigt 1985; Plug 2000) could not be included in that study due to the fact that they had been quantified using only the MNI. In this paper, we investigate whether or not MNI may be used to calculate the Cattle Index. We then apply the Cattle Index to Iron Age faunal samples of which only MNIs are available to re-investigate broad faunal changes. We focus our attention on samples from the Limpopo Valley in particular.

The Iron Age of southern Africa is divided into the Early (~AD 200–900), Middle (~AD 900–1300) and Late Iron Ages (~AD 1300–1840s) (Huffman 2007). Zooarchaeological evidence unambiguously indicates that sheep/goats outnumber cattle at most Early and Middle Iron Age sites. The only exceptions with large samples of cattle are the Toutswe, Taukome/Zhizo-Toutswe, and Mapungubwe phases of Bosutswe, the Ndondondwane-Ntshekane and Ntshekane phases of KwaGandaganda, and Mamba. Despite this, the role of cattle in the socio-political developments at Middle Iron Age sites in the Limpopo Valley is often emphasised (e.g. Huffman 2007). During the Late Iron Age, cattle are the dominant domestic animal in faunal samples (Badenhorst 2008a, 2009a,b, 2010, 2011, 2012; but see Huffman 2007, 2010).

Debates on the importance of cattle during the Iron Age have centred around two opposing views. First, some have argued that despite the low numbers of cattle remains at Early and Middle Iron Age sites, they were still of social importance (e.g. Huffman 2007). On the other hand are those who have argued that low cattle numbers, compared to sheep/goats, indicate cultural changes over time (e.g. Badenhorst 2010, 2012).

THE CATTLE INDEX

Zooarchaeologists count faunal specimens to determine which taxa are abundant in a sample (e.g. O'Connor 2000: 54). NISP and MNI are two of the most common methods of quantification in zooarchaeology (e.g. Grayson 1984). NISP is the actual number of specimens from a particular taxon. MNI is the least number of individual animals from which the NISP originated per taxon. Although both NISP and MNI have unique strengths and weaknesses, MNI is particularly problematic (e.g. Grayson 1984; Plug & Plug 1990; O'Connor 2000; Lyman 2008; Reitz & Wing 2008). MNI is not an actual number (Perkins 1973: 369), like NISP, but the result of calculating the least or smallest number of animals represented in a sample (Plug & Plug 1990). MNI is not a measure of human activity or total consumption (Lie 1980: 24) since each specimen potentially may come from a different individual, unless it can be proven otherwise (Perkins 1973: 367). There is no consensus on how to calculate MNI, which makes comparisons between assemblages difficult (Klein & Cruz-Uribe 1984: 26–28). The scale at which MNI is calculated (e.g. individual layer, combined phase, entire sample) will result in vastly different MNIs (Casteel 1977: 126; Grayson 1984: 29; Plug & Plug 1990: 53). Rare taxa in a faunal sample tend to be over-represented by MNIs (Plug & Plug 1990: 53), and there is under-representation of taxa with higher bone counts (Casteel 1977: 126). Despite their shortcomings, there is a curvilinear relationship between NISP and MNI (Lyman 2008: 50). As a result of this curvilinear relationship, both NISP and MNI values tend to provide comparable or at least relatively similar results for large faunal samples (*cf.* Bayham 1987; Brewer 1992: 214–217).

Ideally, the Cattle Index is calculated using NISP and measures changes in the ratio of cattle to sheep/goats in faunal samples (Badenhorst 2011). The Cattle Index can only provide values between 0 and 1. If the value is closer to 0, it indicates many sheep/goats and few cattle in a sample; if the value is closer to 1, cattle are abundant compared to sheep/goats. To calculate the Cattle Index, all cattle (*Bos taurus* and *cf. Bos taurus*) and sheep/goat (*Capra hircus, cf. Capra hircus, Ovis aries,*

cf. Ovis aries, Ovis/Capra, cf. Ovis/Capra) specimens are included (Badenhorst 2011: 167). The Cattle Index is calculated as:

$$\text{Cattle Index} = \frac{\text{Cattle}}{\text{Cattle} + \text{Caprines}}$$

According to Driver & Woiderski (2008: 3), the long-standing debate in zooarchaeology on how to quantify relative frequencies of animal remains has not advanced very far since the 1980s. However, ratios are widely used in this field. While most zooarchaeologists report the NISP and % NISP, some make use of other calculations using subsets of taxa. One of these methods is to calculate the ratio of two taxa, or two groups of taxa. Using this approach, variations in the two taxa, or two groups of taxa, are thought to reflect some important cultural or ecological phenomena (Driver & Woiderski 2008: 3). The Game Index, for example, measures the ratio of high-ranked game (all wild Bovidae, Suidae and Equidae) and low-ranked game (small ground game such as hares, hyraxes, or wild birds) in a faunal sample (Badenhorst, in press). Thackeray (1990) used a leopard as well as a leopard/brown hyaena index to measure the influence of carnivore activity at Middle Stone Age sites such as Klasies River Mouth. In addition, as ratios like the Cattle and Game Index can only range between 0 and 1, they are useful to make comparisons between different samples (but see Thackeray [1990] for a different approach).

The usefulness of ratios can be demonstrated using a hypothetical example, comprising three random taxa. Table 1 lists NISPs for cattle, zebra and chicken from two layers at one site. (The data may just as well represent two faunal samples from different sites.) Once comparisons between the layers (or samples) are attempted, problems arise. NISPs are a function of various factors, including the original number of animals; human population size and length of occupation; extent of the excavations; features excavated; thickness of layers; preservation, and taphonomy. Clearly, NISPs alone cannot be compared directly with one another. While % NISPs are no doubt useful, they can also be problematic. In the hypothetical example, the % NISPs of cattle decreased from Layer 1 to 2, which in turn increased the % NISP for zebra and chicken. However, the ratio of zebra to chicken remained constant over time. This example illustrates why ratios are more useful than NISP or % NISP alone.

In the present study, before calculating the Cattle Index for samples with only MNIs, we first applied the index to six random, large samples dating to the Iron Age to investigate if NISPs and MNIs would provide similar results. The results (Table 2) indicate that the same general trends are evident using both quantification methods. However, one interesting aspect is that the Cattle Index is almost always slightly lower when using MNI as opposed to NISP. Notwithstanding the limitations of applying statistical methods to zooarchaeological remains (Badenhorst 2008b), we performed a *t*-test (independent of variables) using Statistica, version 9.1 (Statsoft 2010), which indicates that the Cattle Index calculated from NISPs and MNIs (Table 2) were not significantly different (*t* = 1.11, d.f. = 16, *P* = 0.282). It is evident that when the Cattle Index based on NISP increases, the index values based on MNI increase.

RESULTS

Having established that MNIs can provide similar faunal trends when calculating the Cattle Index, we utilised all faunal samples with only MNI available dating from the Iron Age. Samples from the Early, Middle and Late Iron Age were calculated separately. Samples from a site occupied during more than one Iron Age phase, were placed in the earliest phase of the site's occupation. This approach would not alter the results in any way, as the purpose was to identify those samples that were exceptions to broad regional patterns.

Table 3 shows that most samples from Early Iron Age sites have Cattle Index values below 0.5, namely Mabveni (Zimbabwe), Broederstroom 24/73 (Gauteng), Happy Rest, Ficus A (both in Limpopo), Lydenburg Heads (Mpumalanga), Msuluzi, Ntshekane (both in KwaZulu-Natal) and Taukome (Botswana). This indicates that sheep/goats dominated cattle at these sites. One site from the Early Iron Age has a Cattle Index value of 0 due to a lack of any cattle remains in the sample, namely Mhlopeni (KwaZulu-Natal). Some samples have values above 0.5 when MNI is used to calculate the Cattle Index, namely Nanga, Bulila I, Salumano (all in Zambia), Nkope, Matope Court and Namichimba (all in Malawi) and Ficus B (Limpopo). However, many of these samples are small, an issue we return to below.

All three samples from the Middle Iron Age (Table 4) are located in the Limpopo Valley (Fig. 1). Their Cattle Index values range between 0.33 and 0.43, indicating that sheep/goats dominate these assemblages. These samples are large, and thus more likely to provide reliable results (e.g. Reitz & Wing 2008).

During the Late Iron Age (Table 5), all sites except Icon, Rooikrans, Kekane (all in Limpopo), OU 2 Midden 1 and

TABLE 1. *Hypothetical example demonstrating the usefulness of ratios over NISP and % NISP.*

Taxon	Layer 1 NISP (% NISP)		Layer 2 NISP (% NISP)	
Cattle	50	(33%)	20	(10%)
Zebra	50	(33%)	90	(45%)
Chicken	50	(33%)	90	(45%)
Total		(100%)		(100%)

TABLE 2. *Comparison of six Iron Age sites using both NISP and MNI.*

Sample	Cattle NISP	Sheep/goat NISP	Cattle Index	Cattle MNI	Sheep/goat MNI	Cattle Index	References
Nanda (AD 6th–7th century)	112	553	**0.17**	14	55	**0.20**	Plug 1993
Bosutswe Taukome (AD 700–800)	101	76	**0.57**	10	13	**0.43**	Plug 1996
Bosutswe Toutswe (AD 800–1200)	1125	698	**0.62**	52	46	**0.53**	Plug 1996
Bosutswe Mapungubwe (AD 1200–1300)	1197	554	**0.68**	47	36	**0.57**	Plug 1996
Bosutswe Zimbabwe (AD 1450)	227	106	**0.68**	9	12	**0.43**	Plug 1996
Boitsemagano (AD 17th century)	569	188	**0.75**	34	20	**0.62**	Plug & Badenhorst 2006
Mabjanamatshwana (AD 17th century)	449	118	**0.79**	79	41	**0.66**	Plug & Badenhorst 2006
Molokwane (AD 17th century)	1702	426	**0.8**	90	49	**0.65**	Plug & Badenhorst 2006
uMgungundlovu (AD 1829–1839)	2576	8	**1**	124	6	**0.95**	Plug & Roodt 1990

TABLE 3. *Cattle Index values from Early Iron Age sites based on MNI.*

Site	Relative date and phase	Cattle MNI	Sheep/goat MNI	Cattle Index	References
Mabveni	AD 2nd–6th century	4	5	**0.44**	Huffman 1975
Broederstroom 24/73	AD 350–600	1	21	**0.05**	Brown 1981
Happy Rest	AD 4th century	7	20	**0.26**	Voigt & Plug 1984
Nkope	AD 4th–8th century	1	0	**1**	Speed 1970
Mhlopeni	AD 6th century	0	6	**0**	Voigt 1984
Ficus A	AD 6th century	4	5	**0.44**	Plug 1981a
Lydenburg Heads	AD 6th–7th century	4	10	**0.29**	Voigt 1982
Msuluzi	AD 7th century	2	8	**0.20**	Voigt 1980
Matope Court	AD 7th–14th century	1	0	**1**	Voigt 1973
Namichimba	AD 7th–14th century	1	0	**1**	Voigt 1973
Nanga	AD 8th–10th century	23	3	**0.88**	Plug 1979b
Bulila I	AD 8th–10th century	7	2	**0.78**	Plug 1980
Salumano	AD 8th–10th century	11	4	**0.73**	Plug 1980
Taukome	AD 8th–10th century	44	76	**0.37**	Plug 1983
Ntshekane	AD 9th century	15	22	**0.41**	Maggs & Michael 1976
Ficus B	AD 9th century	23	16	**0.59**	Plug 1981a

OND 3 (both in the Free State) have a Cattle Index value of more than or equal to 0.5. The high Cattle Index values during the Late Iron Age indicate that cattle outnumber sheep/goats at most sites.

Small faunal samples are a major problem when comparing regional patterns of livestock use during the Iron Age of southern Africa. This problem is particularly acute when dealing with MNIs, since a single bone representing an individual can cause one taxon to outnumber the other. For example, at OND 2 (Table 5), cattle have a MNI of four and sheep/goats two. If one sheep/goat individual is added, the Cattle Index would change from 0.67 to 0.57. If two more sheep/goat bones are added, the Cattle Index would be 0.44, changing the dominance of one taxon over another, as one bone potentially adds one individual to the count. Nevertheless, if only large samples from the Early, Middle and Late Iron Ages with a combined cattle and sheep/goat MNI of >50 are considered (arbitrarily determined; Table 6), the values show a general increase from low to high over time (Combrink 2014). The Cattle Index using large samples with MNI therefore demonstrates that cattle outnumber sheep/goats only during the Late Iron Age. This is similar to the results obtained from large samples using a combined cattle and sheep/goat NISP of >100.

Returning to the Limpopo Valley, the Cattle Index for Middle Iron Age samples with either NISP or MNI provides similar results (Table 7). The Cattle Index based on NISP and MNI indicates that all values range between 0.33 and 0.44, except for Mwenezi and Malumba, which are above 0.5 (both based on NISP). The two anomalies are likely the result of small sample size for Malumba (Badenhorst 2011), and the long occupation of Mwenezi, which extends well into the Late Iron Age. The index values are near identical for Mapungubwe Hill and the Southern Terrace. The results also support the notion
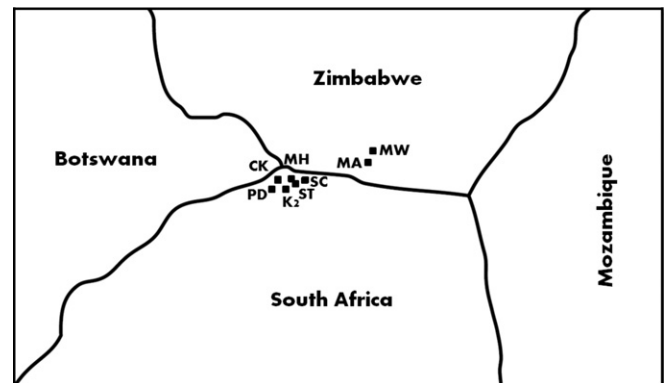
FIG. 1. *Middle Iron Age sites in the Limpopo Valley, where large samples indicate that sheep/goats outnumber cattle. PD = Pont Drift, CK = Commando Kop, MH = Mapungubwe Hill, SC = Schroda, ST = Southern Terrace, MW = Mwenezi, MA = Malumba.*

that NISP and MNI provide broadly similar results when the Cattle Index is calculated for large samples.

The Cattle Index can be calculated using both NISP and MNI. However, for acceptable results sample sizes must be large. A combined cattle and sheep/goat NISP of at least >100 (Badenhorst 2011) and, as demonstrated in this paper, a combined MNI of >50 (Combrink 2014), will provide the most reliable results.

DISCUSSION

The aim of applying the Cattle Index to faunal samples from the Iron Age is to investigate regional patterns with regard to livestock usage. Based on both NISP and MNI, the Cattle Index indicates that during the Early and Middle Iron Ages, sheep/goats outnumber cattle in large faunal samples

TABLE 4. *Cattle Index values from Middle Iron Age sites based on MNI.*

Site	Relative date and phase	Cattle MNI	Sheep/goat MNI	Cattle Index	References
Schroda	AD 750–1000	201	263	**0.43**	Voigt 1983
Pont Drift	AD 810–1110	59	119	**0.33**	Plug & Voigt 1985; Plug 2000
Commando Kop	AD 850–1000	29	46	**0.39**	Plug & Voigt 1985; Plug 2000

TABLE 5. *Cattle Index values from Late Iron Age sites based on MNI.*

Site	Relative date and phase	Cattle MNI	Sheep/goat MNI	Cattle Index	References
Icon	AD 1330	9	21	**0.30**	Voigt 1979
Ficus C	AD 14th century	35	10	**0.78**	Plug 1981a
OU 1	AD 15th century	2	2	**0.50**	Maggs 1975
OU 2 Midden 1	AD 15th century	1	4	**0.20**	Maggs 1975
Rooikrans	AD 17th century	13	17	**0.43**	Plug 1981b
Rhenosterkloof	AD 17th century	20	12	**0.63**	Plug 1981b
Mgoduyanuka	AD 17th–18th century	27	23	**0.54**	Plug & Brown 1982
OU 2 Midden 2	AD 17th–19th century	11	3	**0.79**	Maggs 1975
OND 2	AD 18th century	4	2	**0.67**	Maggs 1975
OO 1	AD 18th–19th century	68	17	**0.80**	Maggs 1975
Wildebeestfontein	AD 19th century	11	8	**0.58**	Plug 1979a
OND 3	AD 19th century	3	6	**0.33**	Maggs 1975
Kekane	AD 19th–20th century	6	14	**0.30**	Plug 1981a

TABLE 6. *Early, Middle and Late Iron Age samples with a minimum of >50 MNIs.*

Site	Relative date and phase	Cattle MNI	Sheep/goat MNI	Cattle Index	References
Taukome	AD 8th–10th century	44	76	**0.37**	Plug 1983
Schroda	AD 750–1000	201	263	**0.43**	Voigt 1983
Pont Drift	AD 810–1110	59	119	**0.33**	Plug & Voigt 1985; Plug 2000
Commando Kop	AD 850–1000	29	46	**0.39**	Plug & Voigt 1985; Plug 2000
Mgoduyanuka	AD 17th–18th century	27	23	**0.54**	Plug & Brown 1982
OO 1	AD 18th–19th century	68	17	**0.80**	Maggs 1975

from southern Africa. The only exceptions to this general pattern in sites with large samples are Bosutswe (the Toutswe, Taukome/Zhizo-Toutswe and Mapungubwe phases only) and Nqoma in Botswana, as well as KwaGandaganda (the Ndondondwane-Ntshekane and Ntshekane phases only) and Mamba in KwaZulu-Natal (Turner 1987; Voigt & Peters 1994; Plug 1996; Beukes 2000; Denbow *et al.* 2008; Badenhorst 2011; Combrink 2014). Nqoma was not included in the original study (Badenhorst 2011), although it was quantified using NISP (Turner 1987). During the Late Iron Age, cattle outnumber sheep/goats in most large samples, supporting the previous study on NISP (Badenhorst 2011).

The identified exceptions from the Early and Middle Iron Ages need closer examination. The change from a dominant sheep/goat-based economy to one based on cattle during the first to mid-second millennium AD, could have signalled a change from matrilineal and other non-patrilineal forms of descent to the dominant patrilineal societies documented during the terminal Late Iron Age (Badenhorst 2010). The broad changes in livestock usage occur at the time when ancestral Sotho-Tswana and Nguni speakers arrived in southern Africa (Huffman 2007). At KwaGandaganda, Mamba, Bosutswe and Nqoma, various factors could have fostered patrilineal descent. For example, at Bosutswe, farmers started making use

TABLE 7. *Cattle Index values from Middle Iron Age sites based on NISP and MNI in the Limpopo Valley.*

Site	Relative date and phase	Cattle NISP	Sheep/goat NISP	Cattle MNI	Sheep/goat MNI	Cattle Index	References
Mwenezi	AD 700–post 1655	83	46	–	–	**0.64**	Manyanga *et al.* 2000
Mwenezi	AD 700–post 1655	–	–	5	8	**0.38**	Manyanga *et al.* 2000
Schroda	AD 750–1000	–	–	201	263	**0.43**	Voigt 1983
Pont Drift	AD 810–1110	–	–	59	119	**0.33**	Plug & Voigt 1985; Plug 2000
Commando Kop	AD 850–1000	–	–	29	46	**0.39**	Plug & Voigt 1985; Plug 2000
K2	AD 970–1220	–	–	226	290	**0.44**	Voigt 1983
K2	AD 970–1220	428	549	–	–	**0.44**	Voigt 1983
K2	AD 970–1220	1210	1911	–	–	**0.39**	Hutten 2005
Mapungubwe Hill	AD 950–1300	–	–	142	200	**0.42**	Voigt 1983
Mapungubwe Hill	AD 950–1300	177	283	–	–	**0.38**	Voigt 1983
Southern Terrace	AD 10th–13th century	–	–	46	72	**0.39**	Voigt 1983
Southern Terrace	AD 10th–13th century	98	161	–	–	**0.38**	Voigt 1983
Malumba	AD 1010–1410	37	37	–	–	**0.5**	Manyanga *et al.* 2000
Malumba	AD 1010–1410	–	–	11	19	**0.36**	Manyanga *et al.* 2000

of cattle as high-ranked, larger game around the town declined over time compared to low-ranked prey (Badenhorst, in press).

If one accepts that numerical abundance indicates socio-economic importance (Badenhorst 2012), the notion that the wealth and power of leaders such as those at K2 was based on cattle (e.g. Huffman 2007: 373), needs to be reconsidered due to a lack of faunal evidence. Early and Middle Iron Age farming communities, including those in the Limpopo Valley, clearly kept large flocks of sheep/goats, as reflected in the Cattle Index (Badenhorst 2011; Combrink 2014). While the midden at K2, which contains crusts of cattle dung, may give the impression of a farming society that placed great emphasis on cattle (Huffman 2007: 373), this is not supported by the Cattle Index. Moreover, one head of cattle produces more than 10 kg of wet dung per day, while one sheep/goat produces only 1 kg, with the dung of the former also preserving better than that of sheep/goats (Badenhorst 2009a). Thus it is not surprising to find thick layers of cattle dung at a site like K2. As the dung of sheep/goats does not preserve as well as that of cattle (Badenhorst 2009a), it is not surprising that large sheep/goat dung deposits have not been identified in the Limpopo Valley yet.

Furthermore, occupants of Mapungubwe Hill had access to the same proportion of sheep/goats to cattle as those on the Southern Terrace. This implies that, based on the Cattle Index, there is as yet no evidence for sumptuary rules or meat provisioning at Mapungubwe Hill and the Southern Terrace (Badenhorst 2012; but see Fatherley 2009; Huffman 2010 for a study at K2).

It has been argued that cattle could be under-represented in faunal samples, and that their economic or social significance cannot be established from faunal remains alone (e.g. Huffman 2007). However, if farmers kept livestock, a proportion of both cattle herds and sheep/goat flocks would be lost annually due to natural deaths, and consumed. Their remains would be incorporated into the archaeological record, along with those of animals deliberately slaughtered for food or ceremonial occasions. While there is no doubt that taphonomic processes removed livestock remains over time, more important animals will still occur in larger numbers than others in faunal samples (Badenhorst 2012).

The Cattle Index, based on both NISP and MNI, varies, even when small samples are excluded. It is inconceivable that all Cattle Index values (calculated using either NISP or MNI) should be exactly identical for samples from different phases of the Iron Age. Factors that no doubt had an effect on the ratios include preservation variation, butchering activities and other taphonomic processes (Reitz & Wing 2008). Also, the ratios of living cattle and sheep/goats were not identical at farming villages in the past. However, the relatively similar ratios as expressed through the Cattle Index indicate that, with some exceptions, the importance attached to sheep/goats during the Early and Middle Iron Ages gave way to a dominant cattle-based economy by the Late Iron Age. It is possible that trade in livestock between farmers had an influence on the Cattle Index, although the likelihood of this is difficult to investigate on a regional scale.

The environment too may have influenced the numbers of livestock kept by at least some farming communities. For example, parts of modern-day Kruger National Park were infested by tsetse flies in the past. At Masorini, dating from the later part of the Late Iron Age, farmers could not keep livestock due to the presence of animal diseases such as nagana, caused by the tsetse fly. Fauna from this site yielded only evidence for game (Plug 1988: 190). Parts of the region were possibly also affected by diseases such as nagana during the Early and Middle Iron Ages (Plug 1988). At Taukome in Botswana, dating from the Early Iron Age, some cattle remains show evidence for osteoporosis. This condition is associated with poor long-term nutrition (Plug 2000: 122). Cattle remains from Hapi Pan contain anthrax spores, a disease that would have posed a serious threat to livestock (Plug 2000: 122–123). However, animal diseases are not the sole cause for the regional patterns and variations of livestock use in southern Africa during the Iron Age (Badenhorst 2008a, 2010). While sheep and goats are more resistant to diseases such as nagana (Badenhorst 2006), low numbers of cattle from the Early and Middle Iron Ages may be due to other reasons. Animal diseases vary with topography, rainfall, season and altitude and would not have affected the entire region uniformly; indigenous livestock breeds are hardy and not equally affected by disease; and in many cases, farmers probably took precautionary measures against animal diseases (Badenhorst 2008a: 220).

The sweet grasses of the mopane veld in the Limpopo Valley are well-suited to herding, but the dominance of live-stock over game in faunal assemblages from the region could signal a degraded environment (Plug 2000: 121–122; also Badenhorst, in press). Increased human populations in the region during the Middle Iron Age would have offered fewer hunting and foraging opportunities due to increased pressure on the environment by people and domestic animals. If over-grazing occurred in the Limpopo Valley, grass cover would have diminished, thereby encouraging bush encroachment. The latter provides favourable conditions for the spread of the tsetse fly. By the 19th century, the Limpopo Valley was infested by tsetse (Fuller 1923), but if tsetse fly was common in the 12th and 13th centuries, it could have caused great losses of livestock (Plug 2000: 124). Also, the Little Ice Age (AD 1300–1500), a period of cooling associated with lower rainfall, could have caused unpredictable weather conditions in the Limpopo Valley, with negative consequences for livestock production (Tyson & Lindesay 1992; Manyanga *et al.* 2000: 75).

In addition to the environment and animal diseases, cultural factors may have influenced livestock use. Randjies, in Limpopo Province of South Africa, dates to the 18th century, and was occupied by the Birwa people (Van Schalkwyk 1994). Its fauna yielded limited evidence for cattle and sheep/goats (Plug 1994), and hunted antelope dominate. This contrasts with most contemporary Late Iron Age faunal assemblages, usually dominated by cattle (Plug 1994). Nevertheless, the Birwa pay bride wealth using cattle, sheep or goats (Van Warmelo 1953: 35). Little is known about the culture of the Birwa, but this Sotho-speaking group was profoundly influenced by the Venda (Van Warmelo 1953; Van Schalkwyk 1994). Although the Venda are generally patrilineal cattle farmers, women play a part in their descent patterns (e.g. Bruwer 1956), which could have influenced herding practices (Badenhorst 2010).

CONCLUSION

The Cattle Index indicates that during the Early and Middle Iron Ages, sheep/goats outnumber cattle in most faunal assemblages. Exceptions to this are Bosutswe (the Toutswe, Taukome/Zhizo-Toutswe and Mapungubwe phases only) and Nqoma in Botswana, as well as KwaGandaganda (the Ndondondwane-Ntshekane and Ntshekane phases only) and Mamba in KwaZulu-Natal. In the Limpopo Valley large samples from the Middle Iron Age are also dominated by sheep/goats, and the Cattle Index does not support the notion that cattle wealth was paramount in socio-political developments in this region. Moreover, the Cattle Index reveals no differences in the

ratio of cattle and sheep/goat usage between Mapungubwe Hill and the Southern Terrace. It is only during the Late Iron Age when cattle outnumber sheep/goats at farming sites in southern Africa.

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