THE OVERSTOCKING AND OFFTAKE CONTROVERSY REEXAMINED FOR THE CASE OF KWAZULU

by David R Tapson

Abstract Cattle in KwaZulu constitute the non-human wealth of western societies. In this role they provide consumable goods, investment and security. In view of this, reduction in the numbers of cattle to accommodate concern over the environment would result in a real loss of wealth and therefore welfare to the communities. In contrast the evidence supporting the recommendation is not robust enough to support so drastic an intervention. Further, the cost in terms of stock reduction in order to achieve relatively minor increases in cover are very great. If the case against destocking is accepted as valid, then planners will be able to concentrate on maximising the welfare derived by human populations from cattle, rather than the welfare of the grazing resource.

INTRODUCTION

The origin of the Zulu people is obscure and modern anthropology has little more to offer than an unnamed informant, who told Bryant (1949:20) that `We came down on account of the grain baskets: following the locusts'. Bryant was unable either to unravel this piece of verbal history, or to determine where it was that they came down from, though he did offer a fairly heroic hypothesis. Where they are now, and have been since at least the mid 16th century, is in an assembly of ten geographically variable blocks of land, which together comprise KwaZulu, designated a self-governing homeland under the `separate development' policy of South Africa, now rapidly becoming an historical concept. At present KwaZulu comprises some 3.2 million hectares, of which 40 percent has high agricultural potential (sugar cane and other plantation crops), 18 percent is of medium potential (maize and other field crops), and 42 percent of low potential (livestock). This makes it considerably better endowed than South Africa as a whole which is some 85 percent low potential. It is situated on the east of the subcontinent, intermingled with Natal between the Drakensberg escarpment and the Indian Ocean coast. It has Moçambique as a northern neighbour and extends to approximately 31 degrees south of the equator.

Comment on cattle-keeping in KwaZulu over the years has contained two recurring themes. The first is that the country's grasslands are carrying an excessively high number of cattle, and the second is that as a consequence of this, not only is productivity of the herd lower than it could be, but the grazing resource has been severely degraded, resulting in unacceptably high levels of soil erosion. The earliest traceable reference to the problem in KwaZulu is `Planning, 27-12-38' quoted by Franklin (1948:128): `The persistence of native cattle holding ... is even more hampering to economic development, because religious cattle cumber and overstock the earth ...'.

The same themes have recurred in statements over a long period and from a wide range of commentators. Thorrington-Smith *et al.* (1978:93) describe KwaZulu as areas where `tribal/traditional men `pumula' (rest), where women scratch at the soil, where `wealth' in the form of cattle accumulates to the point of bringing the veld to a state near disaster ...'. KwaZulu Department of Agriculture (1980:85) held that `Livestock are generally regarded as a store of wealth and a medium of exchange. The annual growth rate of the herd is minimal but current overstocking is of the order of 100% with an associated mortality rate of 10%. There is practically no `market' offtake from the herd, ... Under present conditions the offtake from the tribal herd will remain dismally low and can only be described as a tragic waste of natural

resources'. The Buthelezi Commission (1982:171, Vol. II) recommended that `attempts should be made to change the attitude of the tribal people towards cattle so that they are seen as a productive resource rather than as a store of wealth'. Mention is also made of `the fact that so many cattle die each winter ...'.

In 1977, the aims of the KwaZulu Department of Agriculture were defined as `to conserve our natural resources in order to increase production from our crops and livestock' (KwaZulu Government 1977). In addition to this declared intent to conserve resources and increase output, the Minister between 1977 and 1982, repeatedly exhorted farmers to decrease livestock to relieve overgrazing, commenting in 1980 that `The only solution is to decrease our livestock population, introduce scientific grazing methods and upgrade the remaining livestock' (KwaZulu Government 1980).

The essence of these statements is that as a first step to correcting an undesirable, not say threatening situation in KwaZulu, large-scale destocking must occur, which would make possible the introduction of improved grazing management practices. This would not only halt or reverse the degradation but improve the output from the herd. It is proposed in this paper to show that:

- Cattle in KwaZulu represent the non-human wealth of consumption theory and a reduction in their numbers would represent a large, if difficult to measure, loss in welfare. Non-human wealth (Friedman 1957) is essentially the accumulation of a household's excess income over consumption, and in conventional economies consists of savings, consumer durables, investments in stocks and bonds, and property. It can be liquidated and consumed in emergency, or consumed routinely, as in the case of consumer durables. Cattle in KwaZulu act as repositories of wealth and are consumed in just the same ways.

- In contrast to the certain loss of welfare associated with destocking, the evidence supporting the recommendation is not sufficiently robust to justify an intervention which would have so drastic an effect on what is an already relatively poor group of people.

In the balance of this paper, data will be provided to illustrate the dynamics of the cattle system in KwaZulu. Both historical and research evidence will be presented to suggest that the concern for degradation is overstated. The conclusion will examine briefly the options available for future policy for cattle in Kwazulu.

HERD DYNAMICS

The data presented below were gathered in the course of a survey conducted in the Ogwini and Mabedlana Regions of KwaZulu in 1982 and 1983. These two Regions account for some 50 percent of the cattle of the territory and 60 percent of the recorded annual sales. For perspective, annual statistics are presented for the whole of KwaZulu as part of the evidence creating concern about productivity of the national cattle herd.

National Herd Statistics

Table 1: National Herd Statistics, 1975 to 1988

Year ending 31/03	Inven -tory '000 head	Mortality Number	%	Slaughtered Formal Number	%	Slaughtered Informal Number	%	Net Import/ Export	Sale Number	%
1975	1,273	127,766	10.0					(1,295)	12,994	1.0
1976	1,312	N/A						2,196	9,749	0.8
1977	1,349	156,377	11.9					5,036	9,606	0.7
1978	1,425	98,271	7.3	2,335	0.2	57,800	4.3	11,589	8,615	0.6
1979	1,431	111,923	7.8	5,135	0.4	70,850	5.0	21,721	8,060	0.6
1980	1,468	97,462	6.8	5,621	0.4	62,650	4.4	15,341	16,945	1.2
1981	1,357	154,836	10.5	5,591	0.4	71,750	4.9	4,525	9,634	0.7
1982	1,351	72,502	5.3	10,364	0.8	64,650	4.8	(13,067)	11,729	0.9
1983	1,447	67,151	4.9	3,652	0.3	69,690	5.2	4,874	9,048	0.7
1984	1,352	140,518	9.7	3,763	0.3	75,780	5.2	(2,399)	13,364	0.9
1985	1,344	63,932	4.7	3,782	0.3	57,750	4.3	12,682	5,862	0.4
1986	1,417	70,546	5.3	4,610	0.3	59,849	4.5	14,004	8,745	0.7
1987	1,483	67,248	4.7	3,687	0.3	58,300	4.1	8,225	8,201	0.6
1988	1,516	77,134	5.2	4,257	0.3	64,644	4.4	2,855	14,594	1.0
Mean	**1,394**	**100,438**	**6.7**	**4,780**	**0.3**	**64,883**	**4.7**	**Net**	**10,510**	**0.8**
SD	**68,004**	**32,011**		**1,987**		**6,026**		**Gain**	**2,901**	
CV	**0.05**	**0.32**		**0.41**		**0.09**		**86,287**	**0.28**	

Source: Annual Reports, Director of Veterinary Services, KwaZulu Department of Agriculture

A continuous time series of the important livestock statistics has been maintained in KwaZulu since 1975. The pertinent information available is summarised in Table 1. There are several points of interest from this table. The first is that inventory has grown over the period. While the 1988 figure of 1,516 million is 19 percent higher than the 1975 figure, the regression is not significant, suggesting that the present high values are one of the cyclical peaks characteristic of the data.

The fluctuations in total herd numbers can be related to seasonal variation in rainfall and concomitantly to the variations in mortality. Thus the drier seasons of 1979/80 and 1983/84 were associated with higher than usual mortality levels and reduced inventories. The recovery in herd numbers from 1985 onwards is associated with relatively low mortality levels. Mortality, lagged by one year, is positively related to herd inventory significant at the five percent level, with

R^2=0.68. This suggests that the herd is in fact at the limit of the carrying capacity of the veld and that fluctuations in herd numbers are largely affected by natural causes. Lyne and Nieuwoudt (1990) show that herd count, lagged by one year, is significantly related to rainfall, another expression of the relationship above.

Mortality is high with a mean value of 6.7 percent, and in three years reached or exceeded 10 percent. It also consistently exceeded the sum of informal and formal slaughterings (sales may not be added to slaughterings as many sales are made to butchers for direct slaughter). The overall trend in mortality is negative, although not significantly so.

The dominance of informal slaughtering over other forms of offtake is apparent. Informal slaughtering (referred to as `bush-slaughtering' in KwaZulu) is typically carried out for home consumption, either with or without a concomitant ceremonial function, and occasionally for sale. Formal slaughterings are those registered at abattoirs for sale through the formal system. A striking feature of the informal slaughterings is the relative lack of variability from year to year (CV 0.09 compared to 0.28 to 0.41 for the other coefficients). This suggests that while sales or formal slaughterings could be *ad hoc* and vary in accordance with variations within the cattle system, informal slaughtering is done in response to a demand or stimulus exogenous to the cattle system. Since the survey data show that the bulk of slaughtering is for ceremonial purposes, the exogenous variable may well be the death rate of the herd owners. The derisory scale of annual sales is apparent. Over the fourteen years when data were available, the mean was 0.8 percent and only once was 1 percent exceeded.

With the exception of the sales data mentioned above, the statistics from the survey area were remarkably consistent with those for KwaZulu as a whole, with the gradient of inventory growth identical to the national herd although again, not significant. In years of drought, mortality losses are slightly higher in the Mabedlana district, presumably as a consequence of the fact that it includes the bulk of the drier areas of the territory. For the years for which data are available, no trend can be established for calving rates.

Table 2: Sample Herd Trading Account (1982/83, N=370)

	Transaction	Number	%	
Opening balance				3,868
Deductions	Mortality	323	8.4	
	Sales	149	3.9	
	Lobolo paid	161	4.2	
	Slaughter	152	3.9	
Additions	Births	804	20.8	
	Purchases	126	3.3	
	Lobolo received	226	5.8	
Closing balance				4,239

Source: Survey data *Note: Lobolo = brideprice*

Relationships Between Herd Transactions and Herd Size

Basic to the study was the supposition that interventions based on the motivations of the individual cattle owners would be more likely to succeed than broadly worded statements of intent by policy makers. The national figures reflect the outcome of the mass of decisions made by the cattle owners, but do not adequately explain the underlying decision-making process. It is relevant, for example, that KwaZulu cattle owners select a set of management practices which result in a reproductive rate approximately one third of that which the genetic potential of the animals would suggest is achievable. Inter-herd movements which are a significant outcome of individual decision making are not reflected in the published statistics. This section summarises the cumulative outcome of all trading account transactions for the individual herds. The data made it possible to construct a trading account and an `opening balance' as at a year earlier for each individual herd. The figures presented in this section are the *sum* of the herd counts and transactions for all herds in the sample. They are intended to provide indications of trends, not necessarily absolute values.

Herd growth amounted to 9.6 percent compared to 7.1 percent for the national herd over the same time span. The main variations are in mortality and birth, both of which are higher than the figures for the national herd, although birthrate is still very low. The national statistics did in fact record an abnormally high birth rate for this period, although not as high as the sample herd. The balance is likely to be accounted for by differences in interpretation and sampling error.

It is notable that the `useful' offtake, consisting of sales, *lobolo* and slaughter, accounts for a turnover of 11 percent, more than ten times the usually accepted figure for offtake, defined as sales only. It is of interest that the sales figure, nearly five times the `official' figure, supports the

Table 3: Number of Sales from Sample Herd (1982/83, N=370)

Number of sales	Number of owners	% Owners
0	291	78.6
1	50	13.5
2	16	4.3
3	7	1.9
4	3	0.8
5	1	0.3
> 5	2	0.5
	370	**99.9**

Source: Survey data

observations made by both respondents and enumerators that the formal sales channel is not the preferred means of disposing of cattle.

Further, both *lobolo* and slaughter exceed sales in the sample herd. In terms of additions to the herd, purchases, at 85 percent of the value of sales, and *lobolo* contribute significantly to the build up in herd size. Without these two inputs the net increase would have been 0.5 percent instead of 9.6 percent.

The central purpose of this study was to investigate the phenomenon of the low offtake rate from the herd, when offtake was defined as sales. Attempts to identify the determinants of the sales offtake, by analysis of trends through individual cases immediately encountered the problem of a paucity of data points and the low values of the parameters. Table 3 provides the frequency of sales at different levels. Only 21.4 percent of owners sold cattle at all. Of those selling, 83 percent sold two head or less. The shape of the distribution of sales makes obvious the difficulties in determining relationships between sales and causative variables. The skewness of the distribution and small number of observations made linear regression unusable.

It was determined, therefore, to subdivide the sample into four groups, based on herd size, and to determine the probability of an individual animal being sold from each group. The null hypothesis was that the probability of an individual animal being sold is the same for all groups, regardless of herd size. The test used was Chi-squared test for independent samples. Given that the null hypothesis is rejected, the source of the contribution to the Chi-squared value must be determined to establish the source of the variability as an explanation of the relationships being tested.

In assessing the effect of herd size on any transaction, the relevant herd size to be used is that which existed *before* the transaction, not that which exists as a consequence of the transaction. The sample was therefore subdivided into four approximately equal groups based upon opening herd size. The need to adhere to discrete herd boundaries meant that the four

groups could not be exactly the same in size, but since probability was being tested for, this does not affect the Chi-squared test.

The descriptive data for the four groups is provided in Table 4. The spread of mean herd sizes across the groups is large enough that herd size effects should be apparent, if they exist. Herd size effects usually are expressed as an effect on turnover - thus the larger the herd the higher the expected turnover percentage. This could affect transactions both into and out of the herd.

Table 4: Group Data for Sample Herds (1982/83, N=370)

	Group size	**Herds**	**Cattle**	**Mean herd size**	**% herds**	**% cattle**
(1)	0-3	100	206	2.1	27.0	5.3
(2)	4-7	95	523	5.5	25.7	13.5
(3)	8-13	95	967	10.2	25.7	25.0
(4)	14-96	80	2,172	27.2	21.6	56.2
Total		**370**	**3,268**		**100.0**	**100.0**

Source: Survey data

The herd data used are provided in Table 5, in which the data have been assembled into the form of a stock account for each group, in the manner of Table 2. The data in Table 5 do not support the contention that turnovers will increase as herd count increases, for transactions either into or out of herds. While absolute values do in fact increase, relative values show a decreasing trend as herd sizes increase. The second significant indication from this table is the high level of activity in Group 1, relative to the other three groups. Thirdly, only in the case of the two *lobolo* transactions in Group 4, have transaction totals exceeded one head per owner.

Table 5: Stock Movements through Four Groups of Herds from the Sample (1982/83, N=370 herds)

Group	**Group 1**		**Group 2**		**Group 3**		**Group 4**	
Transaction	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Opening Balance	206	100.0	523	100.0	967	100.0	2,172	100.0
Deduct								
Mortality	23	11.2	37	7.1	80	8.3	183	8.4
Sales	13	6.3	25	4.8	35	3.6	76	3.5
Slaughter	21	10.2	38	7.3	52	5.4	41	1.9
Lobolo out	0	0.0	29	5.5	49	5.1	83	3.8
Total	**57**	**27.7**	**129**	**24.7**	**216**	**22.4**	**383**	**17.6**
Add								
Births	93	45.1	122	23.3	165	17.1	424	19.5
Purchases	39	18.9	17	3.3	21	2.2	49	2.3
Lobolo in	62	30.1	30	5.7	39	4.0	95	4.4
Total	**194**	**94.1**	**169**	**32.3**	**225**	**23.3**	**568**	**26.2**
Closing Balance	333	166.5	563	107.6	976	100.9	2,357	108.5

Source: Survey data. Note: All percentages are relative to opening balance.

Several significant conclusions can be drawn from this data. The first is that, contrary to the image projected by the official statistics of a herd in stasis, there is in fact a great deal of activity, both into and out of the herds. In fact, total offtake from the herds exceeds that from a ranch herd run under the extensive conditions applicable to KwaZulu and Natal, based on 60 percent calving rate and sales at three to four years old (Tapson 1982:5). Secondly sales are a minor component of offtake, and in fact sales are either exceeded or closely matched by purchases. Sales are one component of a set of consumption activities which also includes slaughter, *lobolo* and, it will be argued in the next section, mortality. The remarkable increase in herd count in Group 1 (66.5 percent) is evidence of both serious investment, and hard bargaining in *lobolo* agreements to build up herd numbers. In absolute terms, the net increase in Group 1 was only exceeded by that of Group 4, the largest herds. The pattern of offtake suggests strongly that the underlying motivation for cattle keeping is consumption, not production.

CATTLE AS WEALTH

The summary data provided in the preceding section have shown not only that offtake from the herd is considerably higher than official statistics indicate, but that the bulk of this offtake is consumed by the household of the cattle owner. This is no more than a quantitative confirmation of the argument that cattle are kept by Zulus for consumption purposes, and not necessarily for production. This section will describe a number of other uses of cattle, which together with direct consumption constitute the argument that cattle are essentially the non-human wealth of consumption theory as applied to the Zulu household.

Cattle as Milk Providers

The value of milk in the Zulu household has long been recognised. Krige (1936:55) recorded that `The mainstay of the Zulu diet is *amasi* or curds of milk, and most of their dishes are a mixture of the *amasi* with different vegetables'. That this is still the case is confirmed by Njoko (1990:3) who refers to *amasi* as `the staple food of a Zulu household'.

The significance of milk as an important factor early in the course of the main survey in Ogwini and Mabedlana, made it possible to test attitudes towards it in a later survey. This survey was conducted to determine whether there had been a reduction in the number of cattle kept in the cane growing areas. If a respondent recorded that he had retained cattle he was asked why he kept them since cattle-keeping in cane areas presents considerable problems. Of the sample of 74, 36 had retained cattle. The questionnaire allowed for four responses, which are summarised

Table 6: Respondents' Reasons for Keeping Cattle in Cane-Growing Areas (1983, N=36)

Reasons	**1st**	**2nd**	**3rd**	**4th**	**Total**
To supply milk	20	6	3	1	30
For cash sales 2	4	-	2		8
For feasts and ceremonies	4	1	3	-	8
For cultivation	1	3	3	-	7
For *lobolo*	5	3	2		11
To supply meat	-	6	-	-	6
For manure -	-	1	-		1
They represent wealth	1	-	-	-	1
Unclassifiable 7	3	4	2		16

Source: Survey data. Notes: (i) The question was open-ended. The classifications were arrived at after assessing the responses. (ii) The unclassified responses included five of `for no good reason'; `A homestead is not a homestead if it doesn't have cattle about it'; and three relating to compensation for injured fathers whose daughters might be molested by the respondents' sons.

in Table 6.

As Gandar and Bromberger (1984:11) experienced, estimation of milk yields presented difficulty and the data was discarded. However, 50 of the sample bought milk regularly, of whom 34 bought between one and six litres, and 16 bought from seven to over nine litres per week.

While there has been no attempt by the Department of Agriculture to address the issue of increasing milk supplies, a farmer and veterinary surgeon on the border of KwaZulu has successfully assisted Zulu cattle owners to establish small (up to one hectare) high-yielding pastures to improve nutrition specifically for milk cows. Substantial investments are made in fertiliser, fencing and high-yielding planting material, and Nguni cows kept on these pastures, can, in addition to rearing a calf, produce up to five litres of milk per day for the household for extended periods over the summer (Ardington 1983: personal communication[1]).

If a single most important reason for keeping cattle is to be identified, the literature together with available empirical data, and exhaustive discussions with both groups and individuals all point conclusively to milk. The KwaZulu `beef' herd, it turns out, is a dairy herd, according to its owners.

Cattle Required for *Lobolo*

[1] Dr P Ardington, Mandini Road, Mandini, 4490

The importance of cattle for *lobolo* as part of the marriage arrangements is long established. McLean (1883:27, cited by Herskowitz 1926:271) recorded that among the Zulu `it was only through the possession of these (cattle) that they were able to marry and establish themselves'.

Contrary to the assertions of many of the urbanised informants consulted, the practice of exchanging cattle as *lobolo* is still widely adhered to in the rural areas of KwaZulu. Table 2 shows that in fact *lobolo* exchanges exceed all other usages of cattle. This implies that *lobolo* predominates over other forms of disposal when disposal decisions are made.

With *lobolo* customarily set at 11 head, i.e. more than the total herd of over half the cattle owners (Table 4), plainly few families can afford the entire *lobolo*. This issue was identified early in preparation for the study, and provision made in the questionnaire schedule for recording outstanding debits and credits. The statistics are provided in Table 7.

Table 7: *Lobolo* Debits and Credits in KwaZulu (1982/83)

	Number	**% of total herd**
***Lobolo* out**		
Payments	161	4.2
Debits	435	11.2
***Lobolo* in**		
Receipts	226	5.8
Credits	491	12.7

Source: Survey data

The significance of the large undischarged *lobolo* debts lies in the security of the debt commitment. The issue was discussed at length with both farmer groups and informants and it is clear that the *lobolo* debt is binding and persists until fully discharged. The significance of this is that the existence of the *lobolo* debt could well influence disposal decisions.

Cattle Directly Consumed through Slaughter

Slaughtering at the homestead constitutes by far the greatest usage of national herd inventory. Over a span of 13 years, slaughter rates are almost ten times higher than sales rates. In addition, the slaughter rate has the unusual attribute of varying very little from year to year, unlike sales and mortality (Table 1). Of the 152 animals slaughtered, `for custom or celebration' was given as the reason in 118 cases (77 percent), with 16 cases of `for home consumption' (10 percent). Since animals slaughtered for ceremonial reasons are slaughtered to be eaten, the difference to an outsider is difficult to perceive. The principle customary reasons for slaughter are wedding

feasts and the ceremony associated with the end of mourning or `bringing home the spirit' of departed family members. The ceremony usually occurs approximately a year after the death, and is an illustration of the spiritual role of cattle (Krige 1936:169). Rural Zulus are ancestor worshippers, and cattle the means of communication with the ancestors (Berglund 1976). Despite the relationship between ceremony and slaughter Zulu officials hold that ceremonies are planned to occur at regular intervals in a community, thus ensuring regular supplies of fresh meat.

It seems likely that the decision to slaughter an animal is regulated by the need to satisfy a ceremonial demand, but the data suggest that insufficient cattle are available from the herd to supply that demand. In the main survey, of the 152 head slaughtered, 21 or 14 percent were bought in specifically for the purpose. It is significant however, that among cane growers, of the 70 responses to a query as to the source of cattle for ceremonial purposes, 52 or 74.3 percent reported buying cattle specifically for the purpose. On the other hand at least some individuals had a commercially usable surplus, as four head were slaughtered exclusively for sale as fresh meat.

Cattle Mortality: Eventual Consumption

Mortality as a consumption variable is not as unlikely a concept as it may appear at first sight. Since the Zulu cattle owner is a sentient being, aware of the fact that unless sold, slaughtered or exchanged for *lobolo* an animal will in due course die, then the act of retaining it until it does is a deliberate decision, not a random event. The Annual Report of the Director of Veterinary Services records every year that calves are allowed to die as a consequence of malnutrition or malnutrition-related diseases, in order to provide milk for the family. Just as the need for milk can explain an apparently dysfunctional management practice, so can the retention of older, even aged animals be equally rationally explained.

Chavunduka (1976:399), as a veterinarian, believes that African cattle owners wish to increase their herds as a consequence of experience of losses through epizootic diseases. `If a man loses half of his 100 cattle he is still better off than if he had lost half of his two cow herd'. Insurance against loss by increasing numbers is now widely recognised and reported. It was very specifically mentioned by discussants in the cattle owners' meetings, details of the losses suffered by individual farmers being provided as corroborative evidence. In the Mabedlana region many smaller herds had been completely wiped out and the devastating economic consequences were quite evident from the comments.

Livingstone (1985:3) describes insurance against risk as one of the two fundamental motives for expanding livestock numbers, the other being investment. He attributes to Lipton (1968) the application of a `survival algorithm' to explain `non-maximising' behaviour, and argues that it applies with greater force in the case of pastoralists. Since insurance against risk is a `good' derived from cattle, mortality is in this sense quite fairly deemed a form of consumption.

Cattle for Redistribution: the *Ukusiza* System

None of the analysis underlying neo-classical economic proposals for solving cattle and grazing issues include as a variable the fact that ownership of cattle carries responsibilities proportional to the benefits and status derived from numbers of cattle. More specifically, the goods derived from owning a large number of cattle do not accrue only to the owner. He is expected to distribute the benefits, for example through the institution of *ukusiza* (literally `to help') among households with either fewer or no cattle. Njoko (1990:3) describes the custom as being aimed at eradicating inequality and poverty, and in the process, imputing to the cattle owner `dignity

and presence' through his action. The survey did not provide data on the degree to which the custom is still adhered to. It was however consistently advanced by respondents both as a reason for owning large herds and as a counter argument to suggestions that grazing rights should be saleable or otherwise convertible. It was argued that people not owning cattle already benefit through *ukusiza* and the fact that meat from slaughtered beasts is available to the whole community. A typical transcription of a meeting in Chief Biyela's district reads: `Traditionally it is not our custom to lease the grazing. This comes in because when I am the owner of cattle and I happen to have more milk, I do not charge my neighbour to get milk from my home. And when I have slaughtered a beast, I do not restrict anybody to come and have a good feast'. There is also a clear indication of reciprocal obligations in the case where cattle are borrowed for ploughing: `When somebody owns no cattle they usually hire the draft animals, or when this particular somebody owns no cattle he goes and pays through labour; that means he goes and works and takes those animals'.

The goods which cattle deliver therefore accrue not only to the owner, but to a great extent to all the households making up the community of which he is a member. The prestige, dignity or presence this action confers on the large cattle owner is itself a good. The critical importance of this systematic distribution of goods is that under existing institutions the opportunity cost of producing them is low, both to the cattle owner, and to the non-cattle owner who gains access by an exchange of `rights in persons'. Institutional amendments which seek to reduce cattle numbers by what Vink (1986:133) refers to as the `familiar avenues of internalising externalities', will inevitably disturb what is an equilibrium established by custom. It is most unlikely that a cattle owner, faced with taxes, levies or grazing fees to increase the cost of keeping cattle and therefore the opportunity costs of the goods, would still be prepared to distribute his surplus free to the more indigent households of this community. The calculation of the consequent losses and gains in welfare would be an exercise in finesse.

Cattle as Non-Human Wealth

All of the evidence in the previous two sections suggests strongly that cattle in the household economy of Kwazulu quite accurately reflect the non-human wealth of consumption theory (Friedman 1957). The principle hypothesis of this theory is that household consumption is a function of household income (subject to certain modifying variables such as interest rates and the ratio of non-human wealth to income) and that wealth is the accumulation of income which is surplus to consumption. Thus, as income increases one could expect that consumption would increase. A wide array of empirical data shows that in fact it does so, but that in income classes below the mean, measured consumption exceeds measured income, and *vice versa* for income classes above the mean. This apparent anomaly is explained in the case of the lower income classes by recourse to debt and unexpected windfall lumps of income not regarded as measured or expected income. For the income classes above the mean, the surplus is accumulated as wealth.

To test the hypothesis that cattle represented wealth, the turnover data were recast as income (movements into the herd) and consumption (movements out of the herd). The individual pairs of observations were grouped into classes based on income. Using income as the explanatory variable the regression of consumption on income proved to be highly significant, with an R^2 value of 0.79. This was the only significant linear relationship which could be established in the data gathered during the survey, which included extensive demographic and management variables.

From both the quantitative and qualitative evidence available therefore it can reasonably be concluded that cattle do not represent working capital in KwaZulu, but are the non-human wealth of the Zulu household. To this extent they perform the functions of cash, savings, consumer durables, equity and property investments in a developed economy. This being so, the advantages of increase in marketable turnover imputed to stock reduction are illusory. Stock reduction would represent to the Zulu a disinvestment from a higher order asset to a lower order, cash, and therefore a real loss in wealth. Further, the direct consumption of the most valued output, milk, would if anything, be reduced (Tapson 1990:98). The cumulative effect of destocking to the levels suggested as optimum, would therefore represent a large and real, if difficult to estimate, loss in welfare.

POLICY IMPLICATIONS

Based on annual policy statements by the Minister of Agriculture, KwaZulu policy is plainly derived from anxiety over a perceived degradation of the grazing resource of the territory, and the concomitant soil erosion. Policy statements tend to be couched in terms of stressing the need to reverse the deteriorating trend in the condition of the veld and to halt soil erosion. The only solution offered for this is to relieve the grazing pressure on the veld through stock reduction, offering as a payoff to cattle owners the increased quality and productivity of the cattle herd which would result. This is diametrically opposed to the goals of cattle owners, expressed frequently and forcibly as a need to increase the number of cattle owned. On the evidence available, there is in fact a demonstrable need for more cattle to satisfy the demands that rural people have.

There is, therefore, a pressing need to resolve the contentious issue of stocking pressure if progress is to be made in achieving either set of objectives. The advice from most technical specialists is that destocking, by as much as 50 percent, is an essential prerequisite to any other action. The effects, however, would be so deleterious to the cattle owners that the government has not yet been prepared to consider it on both humanitarian and political grounds. Since the option of outright destocking is unlikely ever to be applied, it is necessary to examine the implications, which relate essentially to the sustainability of the system, which is the core of the issue. Sustainability can be threatened at three levels: the political, economic and ecological levels. Tapson (1990:197) has shown that given no violent external perturbations the system is economically and politically sustainable. The remaining dimension, ecological sustainability, will be dealt with here.

Ecological Sustainability

In this section it will be contended that the evidence to support the recommendation to destock is not robust enough to justify an intervention which will have a predictable negative welfare effect which could be drastic. Both historical and technical supporting evidence will be presented.

Historical Evidence

The essence of the warnings made over the last half century are that the grazing resource is at an advanced stage of destruction and that as a consequence, soil erosion is proceeding at an unacceptably high rate.

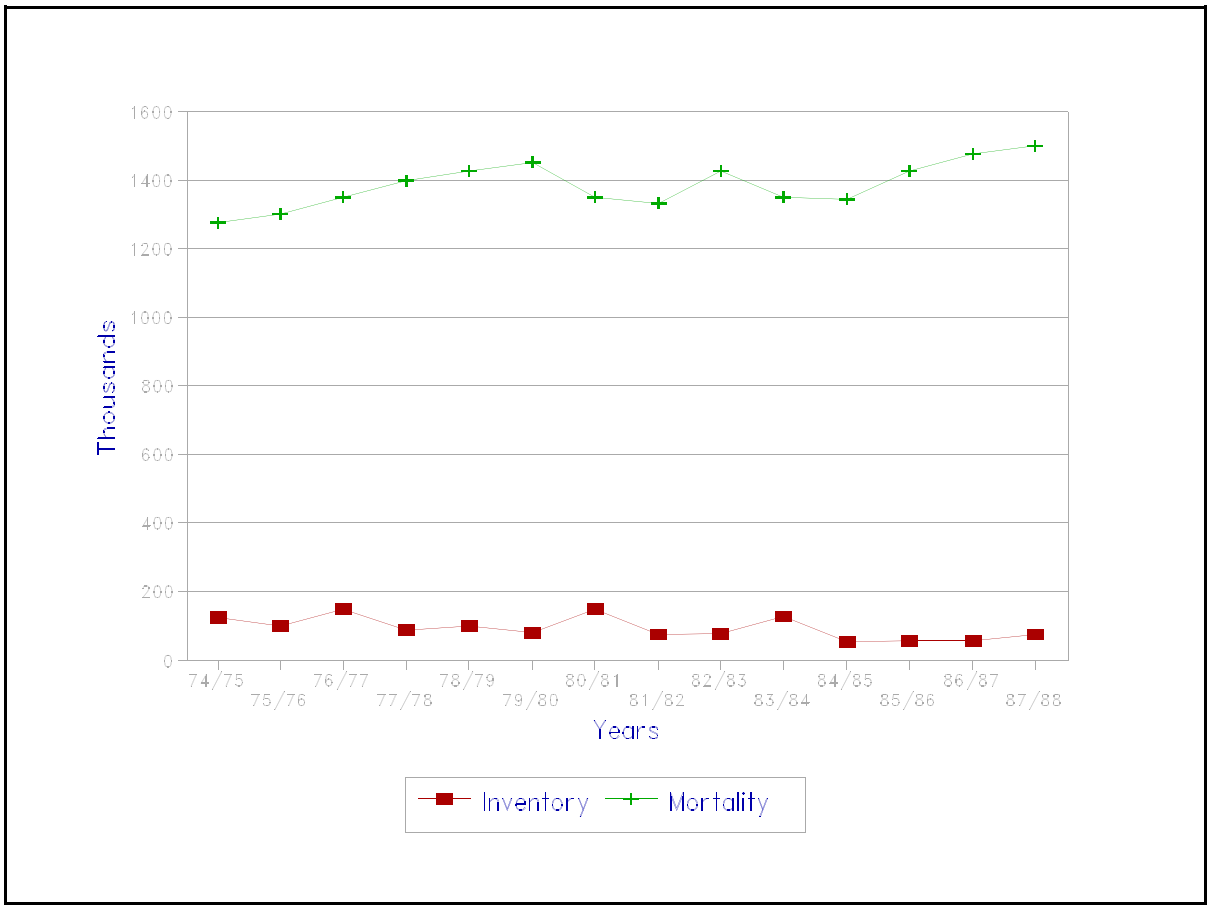

Figure 1: Herd Count and Mortality in the KwaZulu Herd, 1947-1988. *Source: Annual Reports of the Director of Veterinary Services.*

The earliest traceable reference to the problem in KwaZulu is `Planning 27-12-38' quoted by Franklin (1948:128). Brookes and Hurwitz (1957) refer to stock maintained at starvation point through the evils of overstocking and note that measures such as compulsory destocking and veld management schemes have had little effect in improving the veld.

These references show that this view has been extant for some fifty years, and the very length of this history provides the opportunity to derive omnibus or holistic indicators of the validity of the statements. Had the fears expressed been realistic over all or even part of this time, the decline in primary productivity as a consequence of the collapse over time of the basic resource, would have resulted in a decline in stock numbers, accompanied by a decrease in offtake and an increase in mortality. The evidence suggests quite the reverse. The stock census maintained by the self-governing administration of KwaZulu since 1974 has been recorded systematically and consistently. The time series also coincides with the period over which KwaZulu's land area has been relatively stable. Table 1 presented earlier shows that inventory has increased from 1.27 million in 1974/75 to 1,515 million in 1987/88, a peak resulting no doubt from a series of satisfactory growing seasons. Over this time period the inventory has fluctuated about a mean of 1.39 million with a coefficient of variation of 0.05. While sales, with a mean of 0.8 percent and mortality at 6.7 percent have fluctuated far more widely, neither show a trend over time which would indicate a deterioration in primary productivity. Mortality has in fact shown a declining trend (Figure 1).

It must be reiterated that this fifteen year time series comes at the end of a fifty year spell, from the beginning of which the veld has been facing an ecological catastrophe, according to some observers. Current understanding of rangeland dynamics suggests that grasslands will shift gradually to an equilibrium state in response to specific management regimes. The present conditions of the KwaZulu grassland should, therefore, be the outcome of fifty years of abusive management, and cattle numbers should decline over the period for which data is available. It is difficult therefore, to accept that there is a realistic base to the concerns.

Technical Evidence

At the root of the technical problem is dispute over the very definition of such critical concepts as `conservation' and `carrying capacity' (Mentis 1985:17, Bartels *et al.* 1990:1). Walker (1980:79) has proposed an analytical model showing that in semiarid savannas, `good' veld management aimed at high, stable production actually results in reduced resilience in the veld. He defines a stable system as one which does not change readily in response to stress, but if the stress is sufficient to cause a critical degree of change, may well not return to a condition of equilibrium. A resilient system on the other hand may well not be stable, but may be changed considerably and still return easily to its equilibrium state. In contrast, heavy grazing favours all the features leading to resilience, albeit at the cost of stability. McKenzie (1982:21) found that in Transkei, despite continuous grazing at levels twice the recommended stocking pressure, the grasslands contained an abundance of climax species and had a high basal cover.

Dankwerts and Stuart-Hill (1988:222) in studies of the mortality and recovery of grasses during a drought cycle, found differential values for Increaser I, Increaser II and Decreaser species which support the contention that heavily grazed veld would be inherently more resilient. The argument above suggests that the concept of optimum stocking rate, and even conservation, is value-loaded and subject to the value system of the manager or user of the veld. However, whatever these values may be, it appears that heavily grazed veld is more resistant to `degradation' than climax veld.

The basic tools of determining stocking rates, the Veld Condition Score or VCS (Tainton 1981:78) and Jones and Sandland model (1974) require examination. The Jones/Sandland model is soundly based in the logistic growth curve of population dynamics. The VCS, however, while subject to mathematically rigorous procedures is, in the end, dependent on a subjective evaluation of a benchmark site used to calibrate the technique. Further, while in some veld types the benchmark site may be quite stable, in more arid areas it is subject to seasonal variation, and needs to be recalibrated each time a VCS is conducted. Research results tend to reflect an inherent fragility in the procedure. Thus, Hardy and Hurt (1989:51) tested six different techniques on veld under widely differing management regimes and found none of them sensitive enough to index veld condition. Turner and Tainton (1989a:175) measured, among other variables, the relationship between animal performance and stocking rate and found no significant relationship, and that no Jones/Sandland model could be derived. More surprising, generally poor animal performance was obtained on veld with the best VCS. On the other hand, the same authors at a different site obtained results confirming the stocking rate models and VCS (Turner and Tainton 1989b:183). The inconsistency of the results does not offer the confidence which should be required before an intervention as drastic as destocking is considered.

The Implications for Soil Erosion

While deterioration in vegetation need not necessarily be irreversible, if it proceeds to the point where soil loss out of the system occurs, then the system is incurring irrecoverable damage, at least within the horizons of time and resources normally considered. Erosion then, is at the root of the concern about grassland degradation. In view of this, surprisingly little research has been conducted to investigate soil loss from grasslands under grazing systems. However, what little empirical data is available suggests that it is not an issue of any great concern. Parsons (1986:1) found in a survey of five large catchments feeding dams in the Transvaal, that three had incurred less than 1 tonne of soil loss per hectare, one at 2.96 and one at 5 tonne per hectare. The latter was held to be anomalous because of the short period of accumulation. Snyman (1985:89) using a rainfall simulator obtained comparable results on climax, subclimax and pioneer veld in the Free State. In a study evaluating a particularly adverse grazing and burning technique, Dankwerts (1990:15) found that soil loss was limited to 0.223 tonne per hectare, some one-twentieth of the levels accepted for arable land. Venter *et al.* (1989:89) measured a number of variables in a comparison of grassland condition between KwaZulu, held to have been subject to a long history of abusive grazing practices, and the Umfolozi Game Reserve. While the data showed that both long and short term soil losses were higher on the KwaZulu side, in neither case was the difference significant.

These findings are of particular importance in view of an examination of the degree of destocking required to achieve a given reduction in soil loss, carried out by Abel and Blaikie (1990:17). Using the SLEMSA model for estimating soil loss, and constructing a relationship between herbaceous cover, herbaceous biomass and stocking rate, they showed that in order to effect a five percent increment in cover, a 49 percent decrease in stocking rate was required. As veld condition improved, this ratio widened. At the level of 15 to 20 percent cover this would result in a soil loss decrease from some 4.8 tonne to 3.7 tonne per hectare. At 30 to 35 percent cover, however the reduction was in the region of 0.1 tonne per ha. Their conclusion is that reductions in soil loss are achieved at high cost to rangeland users, and that this cost increases as veld condition improves.

CONCLUSIONS

This paper has shown firstly that cattle represent wealth to the KwaZulu cattleowner, of a form completely analogous to the non-human wealth of consumption theory. This being so, the promised increase in output offered as a tradeoff for destocking is unlikely to be of value to the Zulu owner. A reduction in cattle numbers represents a real loss of welfare to the community. Secondly the evidence presented to support the contention that destocking is essential to avoid ecological breakdown is not robust enough to support so drastic an intervention. Further, the evidence shows little relationship between stocking rate and management practice on the one hand, and accelerated soil loss on the other. Since soil loss is an irreversible procedure this is of particular importance. These conclusions suggest two major policy implications for future planning of livestock interventions in KwaZulu, one fundamental and one more operational.

- Since the evidence presented removes the imperative to act to preserve the environment, planners are released from the psychological strait-jacket this imposed in the past. Planners are free now to concentrate on the welfare of the communities owning cattle, rather than on the welfare of the grazing resource.

- It is likely that the greatest probability of success resides in actions aimed at improving the benefit from cattle derived by their owners, `benefit' being defined by them. Since the cattle

exist within a very complex human and technical system, interventions will have to be both incremental and multi-faceted.

It does not seem impossible that Zulu cattle owners, offered interventions aimed at improving rather than decreasing their welfare, would respond more positively to suggestions of changes in management patterns than they have in the past.

REFERENCES

Berglund, A I 1976 *Zulu thought-patterns and symbolism* Cape Town: David Philip

Brookes, E H and N Hurwitz 1957 The Native Reserves of Natal *Natal Regional Survey* 7. Cape Town: Oxford University Press

Buthelezi Commission 1982 *The requirements for stability and development in KwaZulu and Natal* 2 volumes. Durban: H & H Publications

Chavunduka, D M 1976 The role of cattle in the traditional African Society. In: Smith, A J (ed) *Beef cattle in developing countries* Edinburgh: University of Edinburgh

Danckwerts, J E and G C Stuart-Hill 1988 The effect of severe drought and management after drought on the mortality and recovery of semi-arid grassveld *Journal of the Grassland Society of Southern Africa* 5(4):218-222

Danckwerts, J E 1990 The use of fire to provide nutritious grazing for livestock *Grasslands Society of Southern Africa Bulletin* In print

Franklin, N N 1948 *Economics in South Africa* Cape Town: Oxford University Press

Friedman, M 1957 *A theory of the consumption function* Princeton: Princeton University Press

Gandar, M V and N Bromberger 1984 Subsistence production and household budgets in Mahlabatini District, KwaZulu, 1981 *Development Studies Research Group Working Paper* 11. University of Natal

Hardy, M B, and C R Hurt 1989 An evaluation of veld condition assessment techniques in Highland Sourveld *Journal of the Grasslands Society of Southern Africa* 6(2):51-58

Herskowitz, M J 1926 The cattle complex in East Africa *American Anthropologist* 28:230-280, 361-380, 494-528, 633-644

Jones, R J and R L Sandland 1974 The relation between gain and stocking rate *Journal of Agricultural Science* 83:335-342. Cambridge

Krige, E J 1936 *The social system of the Zulus* London: Longmans Green

KwaZulu Government 1980 *A preliminary land-use plan for KwaZulu* Unpublished report: Department of Agriculture and Forestry

KwaZulu Government 1977 to 1980 *Minister's Policy Speech* Department of Agriculture and Forestry, Ulundi, Government Printer

Lipton, M 1968 The theory of the optimising peasant *Journal of Development Studies* 4(3)

Livingstone, I 1985 The common property problem and pastoral economic behaviour *Discussion Paper* 4. School of Development Studies, University of East Anglia

Lyne, M C and W L Nieuwoudt 1990 The real tragedy of the commons: livestock production in KwaZulu *South African Journal of Economics* 58(1):88-96

McKenzie, B 1982 Resilience and stability of the grasslands of Transkei *Proceedings of the Grasslands Society of Southern Africa* 17:21-24

McLean, Col 1883 A compendium of Kaffir laws and customs *Report and Proceedings of the Government Commission on Native laws and Customs* Cape of Good Hope

Mentis, M T 1985 Conserving rangeland resources *Journal of the Grasslands Society of Southern Africa* 2(3):27-31

Njoko, L S 1990 Livestock extension with special reference to cattle sales in KwaZulu *Paper presented at the First Extension Conference for Developing States*. DBSA, Midrand, March 1990

Snyman, A H 1985 *Vogbalansstudies op natuurlike veld van die Sentrale- Oranje Vrystaat* Unpublished PhD thesis, University of the Orange Free State, Bloemfontein

Tapson, D R 1982 Proposals for a cattle marketing strategy for Transkei *ARDRI Report* 1/82: University of Fort Hare

Thorrington-Smith E, M Rosenberg and L McCrystal 1978 *Towards a Plan for KwaZulu: A Preliminary Development Plan* 1. Ulundi, Kwazulu Government

Turner, J R and N M Tainton 1989a Interrelationships between veld condition, herbage mass, stocking rate and animal performance in the tall grassland of Natal *Journal of the Grassland Society of Southern Africa* 6(4):175-182

Turner, J R and N M Tainton 1989b Individual animal performance in relation to herbage mass and stocking rate in the Natal sour sandveld *Journal of the Grassland Society of Southern Africa* 6(4):183-185

Venter, J, B Liggitt, N M Tainton and G P Y Clarke 1989 The influence of different land-use practices on soil erosion, herbage production and on grass species richness and diversity *Journal of the Grassland Society of Southern Africa* 6(2):89-98

Vink, N 1986 *An Institutional approach to livestock development in Southern Africa* PhD dissertation, University of Stellenbosch, Stellenbosch

Walker, B H 1980 Stable production versus resilience: a grazing management conflict *Proceedings of the Grasslands Society of Southern Africa* 15:79-83