

Valuation of communal area livestock benefits, rural livelihoods and related policy issues

Delali B.K. Dovie, Charlie M. Shackleton and E.T.F. Witkowski

Abstract

The multiple benefits from livestock production to rural households are evaluated in Thorndale, a communal area of the Limpopo Province South Africa. Monetary values of livestock products are presented. Values from most previous studies are static (and thus outdated), as a result of conceptual and methodological shifts. The net monetary value of the direct benefits from livestock was estimated as \$656 per household/annum, excluding the holding of cattle for savings. The net value is equivalent to 22.7% of the value of the other livelihood sources that were considered, and inclusive of cash income streams, crops, and secondary woodland resources. A net 168% herd increase in livestock was recorded between 1993 and 1999. More households owned goats compared to cattle, and cattle were important for use as draught power, and for milk. Households without livestock benefited through gifts and services, valued at \$33 per household/annum. Policy concerns are the provision of adequate market and pricing mechanisms for communal area livestock, tailored savings, investment support, credit schemes, and infrastructure. An appropriate multipurpose benefit production model, other than a commercialised model is suggested for the sector.

Introduction

Livelihood options in communal areas

Several studies have recently contributed significantly to our knowledge base on livelihoods in communal areas of South Africa (e.g. Cousins, 1999; Shackleton et al., 2001; Dovie et al., in press). These studies have recognised the relative contributions of different livelihood sources. The studies uphold that the majority of households in communal areas are dependent on resources from the local woodlands, and livestock production. Though fewer households often own livestock, they are a source of potential assets to rural households (Cousins, 1996), because of their participation in the rural economy. Small-scale farming through which some communities and households make their living has sprung up in recent years, with production on a hectare basis similar to those of commercial farms (McAllister, 2000; Dovie et al., 2003). It has been shown that households are eager to keep livestock for the multiple benefits they provide (e.g. Shackleton et al., 2001), rather than for the social status as it has been in the past (Duvel and Afful, 1996). The formal cash income streams, most especially from non-agricultural sources, have also provided income to households, but often in combination with the land-based sources (Ellis, 1998; May et al., 2000; Bryceson, 2002).

Livestock production and the valuation of non-marketed outputs in communal areas

Low input, small-scale livestock husbandry remains a primary land use option in communal areas over most of southern Africa (Behnke, 1985; Cousins, 1994; Shackleton et al., 2002). Under circumstances of variable macro-economic policy, labour market and changing environmental regimes, people adopt multiple livelihood strategies (Chambers, 1997; Cousins, 1999). Such strategies include livestock production in communal areas (Tapson, 1991; Scoones, 1992; Shackleton et al., 1999), and the harvesting of natural resources (e.g. Dovie et al., 2002; Shackleton et al., 2002). The multi-purpose nature of livestock production and hence multiple benefits in communal rangelands has been noted to yield high economic returns (Barrett, 1992; Scoones, 1992). Economic values could be higher than those for commercial ranches that rely on single purpose production, such as for beef (Behnke, 1985; Barrett, 1992). Low returns of livestock production in communal areas could be attributed to (i) insufficient empirical case studies (Dahlberg, 1995), (ii) the use of conventional and sometimes inappropriate economic models to measure production and financial returns (Cousins, 1999), and (iii) failure to consider all uses (Beinart, 1992).

Recent studies (e.g. Campbell et al., 1998; Shackleton et al., 1999; Adams et al., 2000) have attempted to place monetary values on non-marketed benefits from livestock in communal areas. These have resulted in the use of different techniques based on either (i) conventional commercial economic models, and thus only making use of data on marketed output, or (ii) calculating direct-use values associated with the producers' objective in a livelihood system (Cousins, 1999). The second option notably takes into account the value of products that are without formal markets, and giving way to attributing monetary value to direct-use values without using a derived—demand approach. It is, however, acknowledged that quantifying non-marketed outputs in monetary terms is difficult, and can be controversial. In spite of this, using direct-use values have been found to be flexible and appropriate (IIED, 1997; Edwards and Abivardi, 1998). Several valuation approaches have, however, been carried out on areas, such as on a per hectare basis (e.g. Scoones, 1992; Hatch, 1996) and/or on individual animal basis (e.g. Shackleton et al., 1999; Adams et al., 2000). The lack of accounting of all uses in a multipurpose livelihood system potentially results in significant underestimation of livelihoods, and hence the need for drastic conceptual and methodological shifts. Households do depend on livestock for the milk and meat they provide, and many non-marketed outputs, such as for local transport of goods, from cattle (Scoones, 1992; Shackleton et al., 1999). Smaller animals such as goats and sheep are also kept for their meat, and the short-term monetary returns they generate on sale are enormous. Livestock provide opportunities for socio-cultural uses, and returns such as dung and draught power for crop cultivation (Barrett, 1992; Campbell et al., 1998).

Thus all goods and services obtained from livestock by rural communities need to be investigated, and valued, yet few studies have done this (e.g. Dahlberg, 1995; Shackleton et al., 2001). The aim of the paper therefore is to report on the various benefits of traditional livestock to rural households, and their value in monetary terms and subsequent implications for policy. Three hypotheses are tested as (i) households' ownership of livestock is dependent on cash injections from formal employment, (ii) value of consumption of the two major products, meat and milk increases with increasing cash income, and (iii) herd size increases with household size.

Study area description

The study was undertaken in Thorndale village and the adjoining woodlands (31°28'E; 24°39'S), situated in the Bushbuckridge Lowveld, Limpopo Province, South Africa. Land uses in the Bushbuckridge region are communal rangelands (64.7%), plantation forestry (10.8%), dry-land arable agriculture (6.6%), irrigated arable agriculture (2.2%), residential (2.8%) and nature conservation (12.9%) (Shackleton et al., 1995). There are high human population densities, (>300 people/km² in the west and approximately 160 in the east, Shackleton and Shackleton, 2000). Thorndale is under communal tenure, and land is zoned into arable and residential plots with the remaining to be used as grazing lands, and for the extraction of natural resources such as fuelwood, thatch grass, construction materials, fruits and reeds (Dovie et al., 2002). Thorndale is remote, cut off from major commercial centres, and the population estimated at 450 persons from 71 households. Apart from teachers at the village primary school and a few workers of the nearby Manyeleti Game Reserve, there is no other paid formal employment within several kilometres of the village. The primary livelihood activities are arable agriculture, animal husbandry and the extraction of natural resources.

Data collection and analysis

Information on (i) livestock goods and services, (ii) outputs and inputs, and (iii) unit costs of products were collected largely through structured and semi-structured interviews using questionnaires. These were uniformly carried out on a household basis (Bernard, 1994). In households where it was difficult to isolate a respondent, a collective household interview was conducted. Additionally, interviews were combined with simple participatory rural appraisal (PRA) tools such as matrix ranking, seasonal calendars and product flow diagrams to simplify data collection. A sample of 45 households representing 63.4% sampling intensity was randomly selected using aerial photographs and ground control points. The mean number of permanent residents was 6.28±0.8 persons/household, used in this study for computations.

The quantities and direct-use values of the livestock goods and services were calculated on a per household basis for user households only and scaled across the entire sample in relation to frequency of use and calculated averages. Monetary values were calculated in South African Rand and converted to US dollars at the exchange rate of \$1=R6.14 prevailing at the time of the field work. The livestock products were measured with village standards using bowls, which in some cases (e.g. cow dung and meat) were weighed. There was an emphasis on daily, weekly and monthly consumptions in the context of the various climatic seasons. The monetary values of products were then computed from known and existing prices quoted in the village. In the cases where it was difficult to assign a price to a resource because it was not traded in the village, prices from the closest local village and town markets were used. The value of products per household was calculated from Eqs. (1) and (2)

$$V_{prd} = p_i q_j, \quad (1)$$

where V_{prd} is the value of the i th resource consumed by the j th household, P_i the unit price of the i th resource, and q_j the quantity of the i th resource consumed by the j th household.

If n is the number of all households then

$$V_{allprds} = \sum_{i=1}^k \sum_{j=1}^n p_i q_j, \quad (2)$$

where $V_{allprds}$ is the value of all products consumed by all households; and k the total number of all resources.

Values were calculated for benefits derived at various stages of production, consumption and sales, taking into account the cost of production. The weight of cow dung was derived from Shackleton et al. (1999); e.g. one pick-up vehicle (bakkie-load) holds 300 kg dung; one wheelbarrow holds 40 kg, and one 80 kg maize meal bag holds 35 kg. One bakkie-load of dung was selling at \$9.8 (\$10.3); one wheelbarrow load was \$1.4 (\$1.5), and one 80 kg bag sold at \$0.80 (\$0.90), values adjusted from 1998 to 1999 values in brackets using the inflation rate. An average unit weight of cow dung was calculated to cost \$0.03/kg. The present year value of capital items was estimated from Eq. (3), using real inflation rates for that time period.

Value in present year,

$$y_k = y_1 \prod_{j=2}^k (r_{(j-1)/100} + 1), \quad (3)$$

where, r_{j-1} is the annualised inflation rate in the $r_{(j-1)}$ th year, y_1 the first year value; y_k the value in year k , $j=2,3,4,\dots,k$, and k is the current year for estimate.

The present monetary or annual values and costs associated with fixed assets of high longevity such as fences were estimated via linear depreciation (Eq. (4)), with value of asset determined by its value in the first year. Responses of respondents about the most important benefits from livestock, and reasons why livestock owners slaughtered animals, were weighted (Eq. (5)). The net values of products were estimated from Eq. (6):

$$\text{Annual value} = (\text{value of asset})/(\text{useful life}), \quad (4)$$

$$\begin{aligned} \text{Total weighted value} &= \sum (\text{allocated weight}) \\ &\times (\text{number of households}), \end{aligned} \quad (5)$$

$$\begin{aligned} \text{Net value of products} &= (\text{gross value of product}) \\ &- (\text{cost of production input}). \end{aligned} \quad (6)$$

Results

Livestock ownership

Sixty-four percent of households owned livestock (cattle and goats) while 36% did not own any. Of the livestock owning households, 34% owned cattle only, 49% goats only, and another 17% owned both. Cattle numbers ranged from 2 to 67 animals per cattle owning household, and 1 to 13 for goats. The number of households owning livestock increased from 1991 to 1999 (Table 1). Generally, the total herd size of livestock fluctuated, but with a net increase of 168% between 1993 and 1999, following the severe 1992 drought in South Africa (Fig. 1). Average herd size of cattle increased markedly from 1996 to 1999 (Table 1, Fig. 1).

Table 1
Mean herd size of cattle per cattle owning household in Thorndale from 1991–1999

Year	Cattle owning households			Goats owning households				
	Number of owners	Herd size		Number of owners	Herd size			
		Minimum	Maximum		Mean	Minimum	Maximum	Mean
1999	15	2	67	19.8	19	1	13	5.6
1998	13	2	55	17.2	18	2	21	7.4
1997	10	2	42	16	12	2	17	8
1996	6	2	37	11	10	2	11	5.8
1995	6	1	55	18.5	11	2	32	9.8
1994	2	6	17	11.5	9	1	17	6.3
1993	1	0	12	12	7	2	19	9
1992	2	1	12	6.5	7	1	18	6.7
1991	1	0	43	43	5	1	11	6

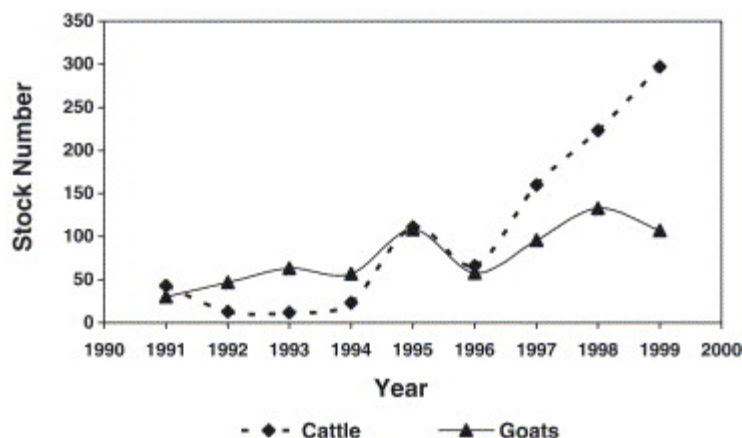


Fig. 1. The change in number of cattle and goats from 1991 to 1999 in Thorndale (Source: Stock inspectors' records, Seville B Bushbuckridge).

The annual net value for the goods and services rendered by cattle and goats to stock owning and non-owning households was estimated at \$656.20 per household (Table 2a), representing 22.7% of all livelihood income (Table 2b). The benefits to non-livestock owning households were estimated at \$33 per household (Table 2a).

Table 2
(a) *Direct-use values associated with cattle and goats per household in Thorndale in 1999*

Item	Cattle	Goats	Non-stockowners	Total
Gross value (\$)	764.97	17.74	32.96	815.67
Production cost (\$)	-158.06	-1.41	0	-159.47
Net value (\$)	606.91	16.33	32.96	656.20

(b) *Comparing monetary values of major livelihoods of households in Thorndale village in 1999 (adopted from Dovie, 2004)*

Livelihood sector	Value per household (\$)	Relative contribution (%)
Crops	443.4	15.4
Informal income (value of non-wage earnings and contributions)	451.6	15.6
Secondary woodland resources	559.0	19.4
Livestock	656.0	22.7
Formal income (wages, pensions, grants and remittances from wages)	777.0	26.9
Total	2887	100

Table 3
Ranking of (a) important benefits of livestock to households and (b) various reasons attributed to the slaughtering of livestock by households in Thorndale in 1999 (highest total weight=most important)

(a)

Livestock	Benefits	Wt. for 1st most important	Wt. for 2nd most important	Wt. for 3rd most important	Total weight
Cattle	Ploughing	15	4	3	22
	Milk	12	4	2	18
	Live Sales	6	8	1	15
	Savings	3	8	2	13
	Meat	6	4	2	12
	Ceremonies	3	2	3	8
	Skin	0	0	1	1
	Dung for manure	0	0	1	1
	Lobola payment	0	0	0	0
Goats	Meat	45	2	2	49
	Ceremonies	6	10	3	19
	Cash	3	10	5	18
	Savings	0	10	2	12
	Skin	3	4	0	7
	Reciprocal lending	0	0	5	5
	Lobola payment	0	2	2	4

(b)

Livestock	Reasons	Wt. for 1st most important	Wt. for 2nd most important	Total weight
Cattle	Ceremonies	10	3	13
	Consumption	6	4	10
	Dying animal	2	2	4
	Sold for cash	2	0	2
	Old animal	0	1	1
Goats	Meat	10	4	14
	Ceremonies	10	4	14
	Cash	5	2	7
	Savings	0	1	1
	Skin	0	1	1

Interrelationships between household factors, livestock ownership and livestock products

There were correlations between monetary values of livestock and (i) secondary woodland resources, and (ii) crops (Table 4). Additionally, the value of informal cash income correlated negatively with the value of meat consumed. There were no correlations between the household factors and other variables (e.g. with herd size, and value of meat) and other livelihood sources (Table 4).

Table 4
Relationship between household profiles, livestock ownership, products and respective monetary values

1st variable	2nd variable	<i>r</i>	<i>P</i>
Household size	Herd size	0.30	0.06
Livestock value	Value of secondary woodland resources	0.31	0.03*
Livestock value	Value of informal cash income	-0.03	0.80
Livestock value	Value of crops	0.32	0.02*
Livestock value	Value of formal cash income	0.15	0.29
Livestock value	Value of total cash income	0.18	0.21
Formal cash income	Herd size	0.20	0.10
Formal cash income	Value of meat consumed	0.20	0.07
Informal cash income	Value of meat consumed	-0.30	0.02*

Values of goods and services from cattle

Monetary values of milk, meat for own consumption and ploughing contributed the three highest values of the gross direct-use values of goods and services rendered by cattle (Table 5), to cattle owning households. Gifts from livestock owners to non-owners were vital to both (Table 5), either (i) as surpluses and/or (ii) means of maintaining social and kinship ties. Most cattle owning households herded their own cattle via family labour and only a few used hired help to herd their cattle during the day, and at minimal costs.

Table 5
Gross direct-use, and traded values of cattle benefits by households (HHs) in Thorndale in 1999

Benefit status	Goods and services	Value per user HH (\$)	Number of HHs (<i>n</i>)	Proportion of owning HHs (%)	Value to all HHs (\$)	Relative value to all HHs (%)
Direct-use value	Milk	694.79	10	67	465.51	60.85
	Meat (own use)	240.64	9	60	144.38	18.87
	Meat (gift)	68.40	3	20	13.68	1.79
	Manure (own use)	43.49	5	33	14.35	1.88
	Manure (gift)	2.51	5	33	0.83	0.11
	Dung (own floor)	3.01	4	27	0.82	0.11
	Dung (gift)	2.04	1	7	0.14	0.02
	Own ploughing ^a	177.04	9	60	106.22	13.89
	Lent ploughing ^a	11.47	1	7	0.80	0.10
	Transport	91.21	3	20	18.24	2.38
	Total Value	1334.6			764.97	
Traded values	Meat sales	4.48	4	27	1.21	0.70
	Hired ploughing ^a	28.50	2	13	3.71	2.10
	Live animal sales	374.59	4	27	101.14	58.00
	Ceremonial live sales	977.20	1	7	68.40	39.20
		Total traded	1384.77			174.46

^aThe cost of ploughing with cattle was estimated at \$0.80 an hour or \$72/ha and usually takes 16 d/ha, working 5.5 hours daily.

Cost of cattle production

Few cattle owning households purchased additional animals in 1999 (Table 6), comprising heifers and a cow. Households that used additional feed in the form of protein blocks were few (Table 6). All cattle owning households fenced their animals at night. Fences were constructed from indigenous poles and barbed wire, as well as with metal rods and wire mesh in various combinations. Cattle owners did not have to pay any levy or tax to maintain their animals. Animals were also dipped at no cost in the nearby village, Seville B.

Table 6
Total annual costs associated with production of cattle goods and services per cattle owning household in Thorndale in 1999

Goods/services	Number of households (<i>N</i> = 15)	Proportion of households (%)	Cost to beneficiary households (\$)	Cost to all households (\$)	Relative cost (%)
Hired help	3	20	273.62	54.72	35
Extra feed	3	20	39.09	7.82	5
Additional animals	4	27	317.59	85.75	54
Fencing	6	40	24.43	9.77	6
Total			654.73	158.06	100

Individual goods and services from cattle

The majority of cattle owning households had milking cows, and majority of them consumed all milk produced, with small quantities given away for free or sold to neighbours. The values of milk and meat consumed directly by cattle owners were estimated (Table 7). Cattle owning households exchanged beef as gifts among themselves. Cattle owning households used dung as manure, and also shared with neighbours in enormous quantities (Table 5). Majority of cattle owning households used their animals to plough their own arable land and intermittently to transport goods (replacing local taxis), and a few others lending their animals to neighbours for the same services. Animals were sold and/or slaughtered for payment of school fees, purchasing of household items, capital for trading and housing projects, and less often for ceremonies/celebrations. Live cow sold at \$440, heifer—\$261 and oxen—\$326 each. The roles of cattle sales for socio-cultural purposes were not important. Fewer households purchased and slaughtered animals for funerals, Easter and Christmas celebrations. Cattle were not used for what they are culturally noted for, *lobola* (formally accepted vernacular term for bride price) that may be paid in rural South Africa.

Table 7
Mean (\pm S.E.) quantity and value, of meat received as gift, and bought from other cattle owners by cattle owning and non-owning households (HH) in Thorndale in 1999

Item	Quantity of meat per non-owning HH (kg)	Value of meat per non-owning HH (\$)	Quantity of meat per other owning HH (kg)	Value of meat per other owning HH (\$)
Gifts	13 \pm 11	21.17 \pm 17.92	42 \pm 39	68.4 \pm 63.5
Bought	3.5 \pm 1.2	5.7 \pm 1.95	3.3 \pm 1.0	4.48 \pm 1.79

Value of goods and services from goats

Meat and cash from live sales of goats were valued monetarily (Table 8). The net direct-use value of goods and services was \$16 per goat owning household (Table 8). A total of 107 live goats were recorded across the sampled households, at a mean of 5.6 ± 0.7 goats per owning household (Table 1).

Table 8
The net direct-use value of goods and services from goats in Thorndale in 1999

Status	Products	Number of households		Value per household		Cost per household		Net value (\$)
		(n)	(%)	Beneficiary households (\$)	All households (\$)	Beneficiary households (\$)	All households (\$)	
Input	Hired Help	1	5	0	0	22.80	1.14	-1.14
	Fencing	1	5	0	0	5.37	0.27	-0.27
Consumed	Meat (own use)	8	42	40.39	16.96	0	0	16.96
	Meat (gift)	3	16	4.89	0.78	0	0	0.78
	Total			45.28	17.74	28.17	1.41	16.33
Traded	Skin	1	5	4.89	0.24	0	0	0.24
	Live sales	6	34	20.20	6.87	0	0	6.87
	Total			25.09	7.11	28.17	1.41	5.70

Cost of goat production

Eighty-nine percent of households either herded animals themselves or delegated other members of their own extended families. Such herding strategy had no direct cost to them, as those herders were integrated into the actual owning family. However, there were a few isolated cases where herders were hired. Other appropriate monetary valuations were carried out for costs that were incurred during goat production (Table 8).

Individual goods and services from goats

Meat from slaughtered goats was quantified by weight and valued (Table 8). The cost of live animals ranged from \$13 to \$24, and an average 19 kg animal sold at $\$20.20 \pm 2.12$. Some processing value was added to goat skins in the form of foot mats, musical drums, home stools and sitters. Most of these could not be valued due to lack of data on when the items were made and the value at that time. Few goat owning households sold live animals to relatives and neighbours in order to raise capital for housing projects and to buy beef and/or accumulate wealth to acquire large stock (e.g. cows). However, there were households who would not sell their animals because (i) they were meant for household meat supply only, (ii) were fewer in numbers and should be left to multiply, and (iii) were a form of savings.

Non-livestock owning households

Households that did not own any livestock received benefits of gifts or cheap goods and services from livestock owning households. Using animals for ploughing was the most valued benefit, and reflected in a direct-use value of \$19 per household (Table 9), and representing 59% of the total direct-use value to non-owning households. The value of milk consumed, contributed over 28%, followed by the value of meat (12.7%). Of the total value of the benefits enjoyed per non-owning household, most were freely obtained with no return payment.

Table 9

Net value of benefits derived from livestock products by non-livestock owning households in Thorndale in 1999

Products	Paid products			Free products			Overall value
	Value to beneficiary households (\$)	Proportion of households (%)	Value to all households (\$)	Value to beneficiary households (\$)	Proportion of households (%)	Value to all households (\$)	Total value per household (\$)
Milk	27.04	19	5.13	15.8	25	3.96	9.09
Meat	5.70	25	1.43	21.17	13	2.77	4.18
Dung for floor	0	0	0	0.13	44	0.07	0.07
Dung for manure	0	0	0	1.87	13	0.24	0.24
Ploughing	0	0	0	149.02	13	19.38	19.38
Total annual value	32.74		6.56	187.99		26.42	32.96

The most important reason for not owning livestock was the lack of money (56% of households), followed by the lack of herders, and also because most animals had been lost in the last drought in 1992. Most households (81%) wanted to own livestock whilst the remaining 19% did not. For those who wanted to own livestock, 68% preferred cattle, 13% goats and the rest indecisive. Reasons for the preference were provision of: (i) draught power, (ii) milk, (iii) meat, (iv) future savings, (v) sales for cash income, and (vi) transport. Half the non-owning households had no idea as to how they could acquire animals. Only 19% of non-livestock owning households bought milk from cattle owners and another 25% received milk as a gift (Table 7). Forty-four percent of the non-livestock owning households collected and used dung from stockowners' kraals for floor surfacing in dwellings at no cost (Table 7).

Discussion

Importance of multiple benefits of traditional livestock production

The livestock production objective of the majority of traditional farmers in communal areas is to optimise benefits within an overall livelihood context. Hence the need to consider other livelihood sources when valuing benefits from the livestock sector. In this study, livestock benefits were valued concurrently with consideration for other livelihood sectors (i.e. crops, natural resource extraction, formal and informal cash employment streams), and in relation to households' profiles. Although one third of households did not own livestock, they still shared in the benefits through gifts of, or cheap access to, milk, meat and dung, as well as draught power. It was observed that the ownership of livestock is not linked to household wealth in terms of cash income from formal and informal employment. This finding redefines the household as a complex unit of analysis. Additionally, the correlation observed between the value of livestock as against crops and natural resources (i.e. secondary woodland resources) represents a strategy to balance the possible rate of use of one particular livelihood for maintaining household income (refer to Dovie et al., in press). Fewer households owned cattle as compared to goats because most households did not have the purchasing power to own large stock (i.e. cattle) hence owning smaller stock animals such as goats.

The estimated net annual direct-use value of livestock of \$656 per household across all households is similar to the \$490 per household obtained in a previous study (i.e. Shackleton et al., 1999). The omission of intermediate and non-marketed outputs such as contributions to crop production via ploughing and cow dung as manure underrates the potential value of livestock. Yet access to ploughing was ranked by villagers as the most important reason for owning cattle. There were gifts of livestock products between livestock owning and non-owning households. Such gifts often go unrecognised in a livelihood strategy but they are a vital coping strategy in deprived rural communities in marginal environments. Therefore, the gift actually has benefits to the giver in terms of improving status and as an *insurance policy* that can be paid back in difficult times. Cattle owning households alone accrued over 90% of the total value of livestock goods and services (Table 2a), which compares well with Shackleton et al. (1999) study of 95%. These figures represent what probably could be referred to as over-dependence on cattle products with little or no diversification. In times of unfavourable production

conditions such as drought, households could become extremely vulnerable to food insecurity and poverty. The preference for keeping cattle is explained by the needs of rural people to sustainably supplement cash earnings, which is better achieved by keeping large stock (Duvel and Afful, 1996), and also for savings (Barrett, 1992; Shackleton et al., 1999). However, this study (Table 3a) rated ploughing and milk higher than savings. It has been argued that small stock animals are only kept for their meat and the short-term monetary returns they generate on sale (Dercon, 1998; Sieff, 1999).

Livestock numbers increased dramatically from the year 1994 and after a major drought in 1992. The increase in livestock numbers coincided with the political change in South Africa, where the majority black population ascended to power. It has previously been speculated that black people were not empowered to own greater numbers of livestock for purposes other than for domestic and cultural. The political change must have accounted for the boost in livestock production in anticipation of entering the formal commercial livestock market. Those who were not financially sound enough to own livestock probably went in for goats which are easily liquidated and provide the capital to invest in cattle, hence the increase in the numbers of goats. During the drought, households that owned livestock were most probably in better positions to sell their animals and used the proceeds to secure basic food for the household and their neighbours. The other households could have learnt lessons from this, and hence begun to see livestock as future investment for eventualities and decided to participate in the sector.

Valuation of individual benefits

The relatively high direct-use values of goods and services came mainly from milk, meat from cattle and draught power (Table 5). The monetary value for draught power was worth \$177 and as savings to 60% of cattle owning households who engaged the services of their animals for ploughing. Similarly, the use of cattle for ploughing by non-cattle owning households was worth \$19 per households per annum if cattle were hired from commercial sources, and hence savings to these households as well. The values attached to ploughing, and which are not considered in conventional models of commercial agriculture, accounted for 14% of the direct-use value of cattle, and only marginally less than that for meat, and representing 59% of benefits to non-owning households. Cattle as draught animals have an added advantage for their association with environmental benefits such as nutrient cycling through feeding and dung production (Sansoucy, 1995). In spite of the relevance of the ploughing benefits of cattle, it has been reported that some people only depended on draught power in times of financial constraints or delays in securing a tractor for ploughing and was therefore not an important contribution (Shackleton et al., 1999). In another study, over 90% of farmers interviewed in parts of the Limpopo Province did not use draught animals at all (Duvel and Afful, 1996), and contrary to observations made earlier. This difference could largely be due to tradition, because people will potentially use cheap but efficient alternatives in farming.

The high value contribution of milk (Table 5) in Thorndale can be attributed to the low level of income generating activities and cash flow in the village hence the preference for holding onto stock for purposes other than slaughtering and selling. There was no correlation between the value attributed to milk and cash incomes of households. Milk was again the most important product in the study of Shackleton et al. (1999), contributing 15.3% of the total value of livestock benefits. The importance of milk has similarly been observed among Zulu-speaking cane growing households in the KwaZulu-Natal province (Tapson, 1991). The value of milk was followed by dung for manuring and slaughtering animals for meat. A few households (33%) used dung for manure, worth \$44 per household per annum of savings to households, in place of spending on inorganic fertilisers.

The value attributed to meat did not correlate with the value of household income from formal jobs, but negatively with cash income from informal jobs. This follows a tendency of decreased value of meat consumed by cattle owners from their own stock in times of high cash income from informal cash streams and vice-versa. This behaviour of the household though difficult to explain, more probably implied that cash was spent on commercially sold meat. Alternatively cash was used on close substitutes for meat, or other needs of the household.

Though trade in livestock was not a pronounced activity in Thorndale, a reasonable value for live animal sales of up to 58% of the proportion of all traded values was recorded. The value of live animal sales and accompanied cash sales were observed as a priority activity in a ranking exercise (e.g. Duvel and Afful, 1996), and contrary to the low values obtained by Schmidt (1992). One does not expect uniformity in the importance attached to live sales but the link between live sales, household needs and income supplements would be worth exploring. Live animal sales are a household strategy to generate income for handling emergencies, a purpose that is well served by goats. There is also the often-neglected aspect of benefits of keeping cattle for rural transport using wagons and carts. The value of the use of cattle in this study saved households money for short distance commercial travels to collect fuelwood and water, as has been observed in other studies (e.g. Scoones and Wilson, 1989).

Goats were mainly slaughtered for their meat for home consumption and ceremonies, and not for meat sales as owners preferred selling the live animals (for ritual purposes) to the slaughtered ones with the meat having very little value. The herds of goats have increased since the 1992 drought (Fig. 1) until 1998 when numbers declined because owners claimed to have slaughtered and sold more animals compared to previous years.

The benefits derived by non-livestock owning households from livestock was \$33 per household per annum, equivalent to 5% of the total net direct-use value of livestock. The value was comparatively low, with the 11.4% recorded by Shackleton et al. (1999) also in the Limpopo Province. Milk and meat were also important to the non-cattle owning households. Similar observations have been made in other studies (e.g. Hundleby, 1991; Schmidt, 1992). Cost of livestock production was low and equivalent to 24.3% of the net direct-use value, comparing well to the 18.8% of net direct-use value in the study of Shackleton et al. (1999). Labour in this study was not an issue as family members offered free services in addition to other sources from neighbourhood networks and kinship ties.

The values of the individual livelihood contributions to household incomes are important for understanding livelihood dynamics. The use of only wage employment and more often the shelved value of crops such as maize to represent livelihoods is a gross underestimation. Though Thorndale is a small and single village the relative value of the combined land-based livelihoods was estimated as 57.5% (22.7% livestock) compared to 42.5% for tangible cash income streams (derived from Table 2b). This could be typical of most communal areas because resource use and employment issues around Thorndale are not highly different from majority of communal areas. The use of wage incomes to measure livelihoods largely remains a macro-level analysis and towards macroeconomic policy assessment and interventions. However, the often unaccounted local level activities of farming, gathering and extraction of natural resources undermine the appropriate analysis of microeconomic issues at the macroeconomic level for the appropriate intervention. Households therefore tended to rely on more than a single source for their livelihood incomes. Formal cash injections might be necessary to sustain the land-based options but the analyses show that even in the absence of such formal cash income sources, households are able to adapt to their situation through dependencies on natural resources. Households held onto their livestock for services such as ploughing and carting rather than for wealth. For example draught power added value to livestock, and reduced the input cost required for cropping.

Policy findings and the future of traditional livestock production

Several studies (e.g. Behnke, 1985; Tapson, 1991; Cousins, 1994 and Cousins, 1996; Shackleton et al., 1999) have previously made a strong case for the monetary and economic values of livestock production in communal areas, and the implications for agrarian reform. They have indicated that the sector has the potential to contribute to the economy at large and more significantly to the rural economy. In the wider economic context, however, it goes a long way to support the commercial sector in meeting the protein requirements of the population. There are four key findings of this study with implications for policy. Firstly, livestock have multiple uses within livelihoods. Therefore a policy recommendation of increased marketing and sales (e.g. a drive towards single purpose commercialised production) could well undermine some of these uses. Secondly, the key uses of cattle are for ploughing and milk, which would also be undermined by increased sales, unless cheap and viable alternatives are readily available, but they are difficult to manage in remote rural areas. Thirdly

the notion that there are limited sales and trade in the rural livestock sector is incorrect. Sales and slaughter in the commercial sector are usually measured as sales through state or commercial abattoirs, where record keeping is good. In these rural communities it is between neighbours and local villagers without records. Therefore, is the notion of low off-take and sales correct? If incorrect then all previous policy recommendations with respect to increasing off-take to (a) decrease perceived rangeland degradation and (b) perceived low productivity (in terms of weight gain per animal) are on the wrong track, and no wonder they have not worked. Fourthly non-livestock owning households do derive some benefits from the presence of livestock, and hence need to be included in decisions regarding livestock. Policy findings on the ownership and transaction of livestock products in the traditional rural livestock sector need to actively include households without livestock.

Proper market integration with appropriate marketing structures and pricing of products in the sector could contribute significantly to the wider economy, whilst extending potential benefits to most rural populations (Shackleton et al., 2001). Agricultural sector organisations should assist in the development of credit and savings institutions specifically for the communal area sector and to address the perceptions of little importance associated with communal area livestock. For instance, live cattle from traditional communal areas are not offered the same price in the livestock commodity market although standards might favourably compare with those of the commercially designated farms (Dovie, 1999, pers. obs). Furthermore, the notion that farming livestock in communal areas is not a source of employment needs to be addressed with a communal-area specific “labour model”. Non-livestock owning households wishing to own livestock are mostly female-headed, with little or no regular income to participate in the sector. An efficient and effective community investment support fund will allow women to raise funds to own livestock. Promoting the role of women and providing security for farm households are relevant but are, however, subject to an enabling policy environment especially with respect to common property resources (Cousins, 1994). There is no doubt that the role of valuation studies as policy tool could provide information on profitability and returns from livestock investment in communal areas, in improving traditional livestock farming.

Conclusion

The importance of undeveloped and non-marketed goods and services such as draught power and milk offered by communal area livestock is clearly shown in this study. Monetary values show that investment in livestock by rural people has many advantages that cannot be easily replaced by single-purpose commercialised endeavours such as meat or milk production only, and not both. The sale of goats reflects the importance of small-bodied livestock that are much less bulky and easier to dispose of in order to accumulate wealth to be able to afford cattle and responding to immediate household needs. Benefits to non-livestock owning households are substantial, and serving as buffer in times of shortfalls or failure of other livelihood sectors (e.g. drought, loss of employment of the main breadwinner), and hence such households need to become a policy focus as well. It is possible that the traditional agricultural sector can make significant contributions to national food security if policy appropriately recognises the multiple benefit of the traditional livestock system. Providing useful infrastructure and practical information about value added resources (e.g. leather, composting and rope), efficiency and production are relevant and probably more cost effective to develop within the sector, instead of its undervaluing. In spite of the findings of this research, and possible applications to most communal areas, results still remain narrow within a wide heterogeneous socioeconomic and human political economy, which would require much bigger scale analyses.

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