THE ECONOMIC ROLE OF CATTLE IN COMMUNAL FARMING SYSTEMS IN ZIMBABWE*

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1 Introduction

1.1 Scope of the Paper

This paper is concerned with understanding cattle production in Zimbabwe's Communal Lands, in so-called communal farming systems. Although commercial offtake from Zimbabwe's communal cattle herd is low, communal farmers are productive and rational in their cattle herd management. The economic rationale for cattle ownership is firstly to provide draught power and manure for tillage and secondly to provide milk and meat for local consumption, although the role of livestock in the farming system varies significantly from one part of Zimbabwe to another. While cattle have social and cultural functions which are important these are generally secondary to economic functions.

It is argued in this paper that the contribution of communal livestock to the national economy in Zimbabwe has not been fully recognised. A model of communal cattle production is presented below which leads to an estimate of the average value of output from communal cattle at just over Z$200 per year per animal. On this basis, the total output from the communal cattle herd in Zimbabwe is estimated to be about Z$800 million (US$250 million) in 1991, representing a very substantial contribution to the rural economy. The analysis has policy implications concerning prospects in the communal areas for: increasing commercial slaughter offtake, control of cattle numbers, cost-recovery for veterinary services, and improved planning and appraisal of veterinary programmes.

The remainder of this section considers the characteristics of the communal farming sector in Zimbabwe, emphasising its heterogeneity and the consequent difficulty of making generalisations about it. Subsequent sections examine the various roles of cattle in Zimbabwe's Communal Lands, and then attempt to quantify and value the outputs of communal cattle, leading to an assessment of the contribution of these cattle to the national economy. The final

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Table 1 Selected Data on Household and Agricultural Production Parameters for Different Communal Lands in Zimbabwe

Natural region	CAU II	CWS II	KND II /III	CMA III /IV	MUT IV	NYA IV	BUH IV	ZVI V	ALL -
Number of households surveyed	52	52	46	39	52	60	58	56	415
Average number of members per household	9.3	8	11.6	7.1	9.8	11.9	8.4	11.9	9.8
Income									
Net farm income	1720	772	1490	226	351	651	657	682	735
Non-farm income	380	320	795	51	583	342	56	541	374
Total household income	2101	1092	2285	277	934	993	713	1223	1109
Percentage of households rec'd AFC loan, 1988-89	18	46	40	2		4	2		14
Average arable area per household *ha*	2.43	2.48	4.14	2.38	1.51	3.43	3.12	4.46	2.99
Crop area grown *ha*	2.93	2.58	4.11	2.03	1.81	4.29	3.22	4.86	3.28
Percentage of cropped area, by crop									
maize	76	63	57	59	59	50	35	36	51
cotton	4	3	38	0	0	1	0	0	6
groundnuts	9	12	3	15	12	11	18	15	12
small grains	3	6	1	26	22	30	37	36	22
other	8	16	1	0	7	8	10	13	9
Average number per household									
cattle	8.3	6.3	10.7	5.9	5.4	7.7	7.5	4.5	7.0
goats	3.9	1.8	2.7	4.0	6.8	9.3	8.0	15.0	6.7
Percentage of households									
owning a plough	89	75	100	82	71	83	79	91	84
owning a harrow	17	10	43	24	14	5	7	23	18
owning an ox-cultivator	54	48	79	16	20	10	10	16	32
owning a scotch cart	35	39	62	38	14	28	28	36	35
applying manure	61	49	39	80	46	78	67	57	60

Source: *First annual report of Farm Management Data for Communal Area farm units. 1988/89 farming season. Farm Management Research Section, MLARR, Harare*

Note: *CAU = Chirau CL, Chirorodziva District, Mashonaland West Province*
CWS = Chiweshe CL, Chiweshe District, Mashonaland Central Province
KND = Kandeya CL, Pfura District, Mashonaland Central Province
CMA = Chirumanzu CL, Takawira District, Midlands Province
MUT = Mutoko CL, Mutoko District, Mashonaland East Province
NYA = Nyajena CL, Masvingo district, Masvingo Province
BUH = Buhera CL, Buhera District, Manicaland Province
ZVI = Zvishavane CL, Zvishavane District, Midlands Province
Locations of study sites are shown in Figure 1, with Chirumanzu shown as Chilimanzi.

Table 2 Selected Data on Household Composition, Income and Agriculture from the 1986 GFA Survey

Study site	**MK**	**CM**	**NS**	**CB**	**MB**
Natural region	**I/II**	**III**	**IV**	**IV/V**	**IV/V**
Average number of members of household	7.5	8.1	8.1	8.6	9.9
Percentage of total household cash income from					
crops	74	49	17	33	29
remittances	14	13	28	13	21
off-farm	10	32	41	48	44
meat and milk sales	2	6	14	7	5
Percentage of households received credit, 1986	17	11	1	6	3
Area cropped per household *ha*	1.65	1.59	1.51	1.85	1.86
Percentage of cropped area under					
maize	72	69	69	54	60
small grains	6	20	14	29	29
legumes	15	11	13	13	10
other	7	0	4	4	1
Percentage of households owning					
cattle	81	75	63	61	61
donkeys	4	14	35	34	42
Draught animals per household	2.2	2.3	2.0	1.6	1.8
Tons of manure used per household	2.3	3.1	1.5	1.4	1.2

Source: *GFA (1987) Study on the economic and social determinants of livestock production in the Communal Areas - Zimbabwe. Final Report. Gesellschaft für Agrarprojekte consultancy to the Department of Veterinary Services.*

Note: *MK = Makoni CL, Manicaland Province*
CM = Chilimanzi CL, Masvingo Province
NS = Nswazi CL, Matabeleland South Province
CB = Chibi CL, Masvingo Province
MB = Mberengwa CL, Masvingo Province
Locations are shown in Figure 1

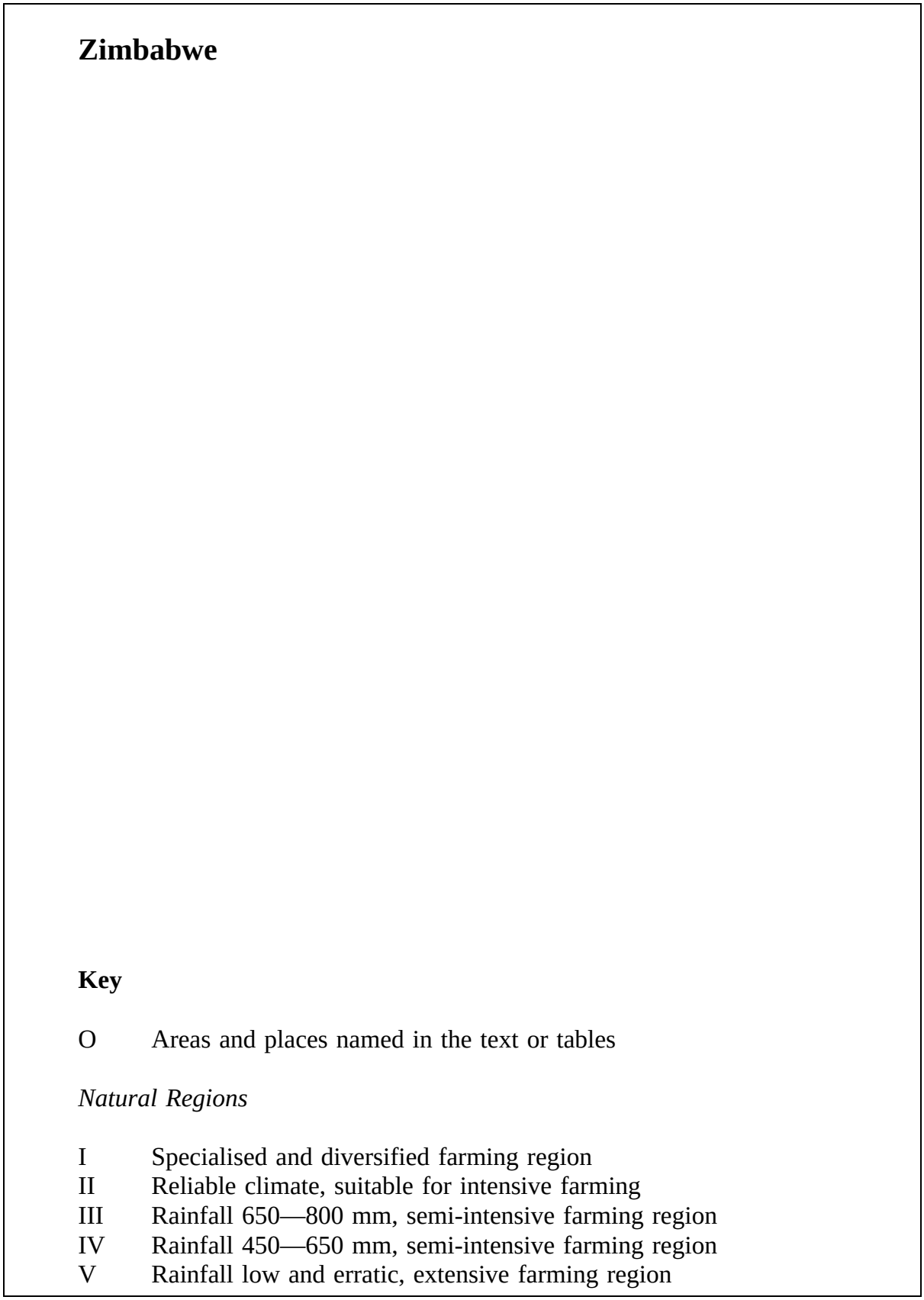


Figure 1 Map Showing Location of Study Sites in Relation to Natural Regions

part of the paper examines various policy implications which derive from this analysis.

1.2 Heterogeneity of the Communal Farming Sector in Zimbabwe

The Communal Lands of Zimbabwe are very diverse in character. Agroecology varies considerably between the semi-arid low-veld and the eastern highlands, affecting the relative contributions of cropping and livestock in the farming system. Population density varies significantly throughout Zimbabwe and has a strong effect on agriculture, as land shortage tends to lead firstly to more intensive crop production and secondly to reduction in areas available for grazing. Off-farm income has a major effect on investment in crop and livestock inputs. Consequently, farmers in so-called dormitory Communal Lands close to urban centres, mines or commercial farming areas tend to use more cash inputs to agriculture than farmers use in more remote locations with lower levels of off-farm employment. The availability of good roads and the distance from marketing points can also affect choice of crops and the rationale for livestock production.

The heterogeneity in household economics and agriculture is illustrated in Tables 1 and 2. Table 1 provides selected data from a 1988/89 farm management survey (MLARR, undated, *ca* 1991) while Table 2 provides data from a 1986 survey commissioned by the Department of Veterinary Services (DVS, GFA 1987). Locations of survey sites are shown in Figure 1, in relation to Natural Regions. Zimbabwe is officially divided into five natural regions (NRs) according to the classification of Vincent and Thomas (1962) as modified by AGRITEX (Surveyor General 1984). These are shown and explained on Figure 1. Household income patterns, farm credit, types of crops grown, livestock holdings and levels of implement ownership vary significantly from one Communal Land to another.

Because of this heterogeneity, caution is required when making generalisations about the communal farming system—the ‘typical’ situation probably does not exist. However, there is a degree of commonality. While the land use in some parts of Matabeleland may be closer to pastoralism than agropastoralism, the farming system in most Communal Lands is based on mixed farming. Households cultivate their own small arable plots, producing subsistence food crops and sometimes cash crops such as cotton and sunflower. Small livestock herds kept by these households are grazed on nearby common land, returning each night to the owners’ residential location. Broadly similar farming systems are found in parts of Zambia, Malawi and Mozambique.

2 Cattle Functions in Communal Farming Systems

Most of the cattle in Zimbabwe's communal herd are of Sanga type, mainly unimproved Mashona (Oliver 1966) with a number of other indigenous types (eg Ngoni or Nkone, Tuli) being of local importance (Brownlee 1977).

Social and economic aspects of communal cattle production in Zimbabwe have been examined numerous times over the last decade (Steele 1981, Sandford 1982, Avila 1987, GFA 1987, Cousins *et al*. 1988, contributors to Cousins 1989, Steinfeld 1988, Scoones 1990, and Barrett 1991). The functions most frequently identified as being important have been classified by Barrett (1991) as shown in Table 3.

Cattle production is closely interrelated with crop production. Cattle provide draught power for tillage, manure and transport as inputs to crop production. They consume stover and other crop wastes as inputs to livestock production. Cows usually provide milk for the cattle-owning household and sometimes also for local sale. A significant proportion of slaughter offtake occurs within the Communal Lands providing meat and animal by-products to the local community. Other cattle are sold for fattening or slaughter in the commercial sector to raise cash. Investment of crop income in cattle ownership leads to capital growth as the herd grows through reproduction. All of the above outputs are in principle amenable to quantification and economic valuation.

Table 3 Summary of the Different Functions of Cattle in the Communal Farming System in Zimbabwe

Relating to crop production
- tillage (ploughing, ridging, weeding)
- provision of manure
- transport (of inputs and produce; also wood, water etc)

Consumption
- milk for domestic consumption (and local sale)
- meat, hides, horns and other by-products for domestic consumption (and local sale)

Household finance
- investment of crop income (capital growth through herd growth)
- savings (capital storage: for school fees, bridewealth)

Social
- ritual purposes (eg installation of ancestral spirits, ritual slaughter, bridewealth)
- social status and pleasure in ownership

Source: Based on Barrett (1991)

Other functions of cattle in the Communal Lands of Zimbabwe are less readily measured and valued but are nevertheless of importance. Cattle are used for storage (as opposed to investment) of capital. Many farmers in Zimbabwe sell their smallstock (usually goats and chickens) to meet occasional cash requirements. However, in years of drought or other domestic crisis the farmer's cattle may be the only major asset which he or she can turn into cash. Cattle also have spiritual and cultural roles in rural society in Zimbabwe (see for example Danckwerts, n.d.: Chapter 14). It is traditional that bridewealth payments (*lobola*) are made in cattle. Sometimes there is a ritual requirement for a household to keep a mature bull upon which an ancestral spirit (*mudzimu*) is installed by a spirit medium. Such bulls are known as *mudzimu* bulls. Custom calls for the slaughter of a beast on important occasions such as the death of a cattle owner and at wedding ceremonies.

The Department of Agricultural and Technical Extension Services (AGRITEX) is already emphasising the multiplicity of livestock functions in the development of livestock extension programmes in the Communal Lands (Chinembiri 1989). An FAO-funded project is in progress to improve the design and coordination of AGRITEX extension programmes with the activities of the Animal Management and Health Centres managed by the DVS.

3 The Relative Importance of the Different Functions

The relative importance of the functions listed in Table 3 varies according to location, reflecting differences in the farming system according to agroecology and socio-economic factors. Priorities can change over time, for example following a drought when the main objective may become herd rebuilding. Within one area the value of different cattle functions is likely to vary between households, for example in relation to size of cattle holding (Steinfeld 1988:147).

Danckwerts (n.d., *ca* 1974) surveyed 20 veld management schemes in communal farming areas of Victoria (now Masvingo) Province covering Natural Regions (NR) II, IV and V. He estimated that ploughing accounted for 41 per cent of the total gross value of output from cattle production followed by 32 per cent represented by home consumption of milk and meat, 20 per cent from net sale of animals (disposals minus purchases) and seven per cent from the value of manure.

The informal surveys of Theisen and Marasha (1974) in Chiwundura (then Que Que Tribal Trust Land, NR III) ranked the objectives of cattle ownership in the order of production, consumption and social functions and lastly as a source of cash. This ranking was endorsed by Sandford (1982:14) as generally applicable throughout Zimbabwe in his review of livestock production in the Communal Lands.

The DVS study carried out in 1984 (GFA 1987, Steinfeld 1988) concluded that in Chilimanzi (NR III) milk accounted for 30 per cent of the 'the value of cattle functions' followed by 22 per cent from draught. In Mberengwa (NR IV) the corresponding percentages were 43 and 31 per cent.

Scoones (1990) carried out an in-depth study of agropastoral livestock production in Zvishavane district between 1986 and 1988. He estimated that draught provision (57 per cent of the economic value of cattle functions) was followed in importance by milk provision (22 per cent) and then transport (16 per cent), with manure, sale and slaughter accounting for the remaining five per cent. Scoones also carried out a pairwise ranking exercise of twelve farmers to explore people's assessments of the relative importance of different functions, including *lobola*. In this exercise, transport and draught were perceived as the two most important functions, followed by *lobola* and then milk. Farmers from a sand-veld area placed greater value on manure than those from the clay veld area. Women ranked *lobola* as a more important function of cattle than did men.

The Tsetse and Trypanosomiasis Control Branch (TTCB) in collaboration with the Agricultural Development Authority (ADA) carried out a baseline agricultural survey in Kanyati Communal Land in Mashonaland West Province in 1989 (Munn and Zonneveld 1990). The TTCB was particularly interested to collect information on cattle production in this tsetse-affected area. Among cattle owners, provision of draught power was the most important reason for owning cattle. The second-ranked reason was as a way of saving money. Provision of milk and transport were next in importance, followed by provision of manure. Production of animals for sale to the Cold Storage Commission (CSC) ranked low on the list of priorities, as did social and cultural reasons for cattle ownership. People who did not own cattle and who wanted to acquire them universally gave ploughing as their first reason for wanting cattle, with provision of milk and meat for home consumption coming next in importance. *Lobola* again did not appear to be an important consideration.

In some pre-colonial Bantu societies cattle ownership may have served religious and cultural functions rather than economic ones (for the classic statement, see Herskovits 1926). The 'Bantu cattle complex' has been discredited as an appropriate framework for understanding present-day cattle management by communal farmers in Zimbabwe (Mtetwa 1978, Steele 1981). However the viewpoint is still encountered frequently that communal farmers are tradition-bound in their attitudes towards cattle. While the social and ritual functions of cattle are still very real, the above studies tend to confirm that such functions no longer have a major influence upon decision-making about cattle herd management.

The most important functions of cattle in the Communal Lands in Zimbabwe today are economic functions, associated firstly with increased crop production through use of animal draught and secondly with provision of cattle products, mainly milk but also meat, for the household.

Table 4 A Summary of Available Information on the Relative Importance of Oxen, Cows and Donkeys as Draught Animals

		Percentage of animal draught provided by			
Location	**Year**	**Oxen**	**Cows**	**Donkeys**	**Reference**
Masvingo	1974	67	33	?	Danckwerts n.d.[1]
Mangwende	1984	78	17	5	FSRU 1985
Chibi	1984	43	27	30	
Makoni	1986	78	18	4	GFA 1987
Chilimanzi	1986	69	22	9	
Nswazi	1986	66	9	25	
Chibi	1986	48	19	33	
Mberengwa	1986	51	11	38	
Chilimanzi	1986	91	6	3	Steinfeld 1988[2]
Mberengwa	1986	75	4	21	
Mazvihwa	1987	44	44	12	Scoones 1990[3]
Kanyati	1988	24	23	53	Munn and Zonneveld 1990

Notes:

For this table the category 'oxen' includes bulls and steers where separately specified in the original literature; the category 'cows' includes data for heifers.

[1] Except where otherwise indicated, data in the table refer to the percentage of the number of animals used for draught represented by oxen, cows and donkeys.

[2] The GFA and Steinfeld data for Mberengwa and Chilimanzi derive from the same survey. The GFA data relates to the percentages of oxen, cows and donkeys in the draught herd. Steinfeld's data relates to the percentage of total area ploughed by each type of draught animal.

[3] Scoones's figures are calculated as the average composition of work spans.

4 Quantifying the Economic Outputs of Communal Cattle

Quantification of the outputs from communal cattle presents substantial problems. Manure and animal draught are not final outputs but inputs to crop production which are utilised mainly within the household owning the cattle. Consumption of milk and meat from local slaughter also takes place largely within the household, for which quantitative data are very few. The published

data which can be found are mostly derived from questionnaire surveys and not from direct observation and measurement.

4.1 Draught

The agricultural work of draught animals in communal areas can include ploughing, manuring, ridging and weeding, not only on the fields of the cattle owner but also on those of other farmers. In addition to agricultural work, cattle are used for pulling scotch carts to carry wood and water, among other general transport duties. It is necessary to identify which animals are used for draught, how much these animals are used and what work is achieved by this use in order to quantify draught output from the herd.

Which Animals are Used for Draught Purposes?

While castrated adult males (ie oxen) are the main draught animals, some farmers also use steers, bulls, heifers and cows (FSRU 1985, Scoones 1990, Munn and Zonneveld 1990). Cows may be used for draught even when lactating. As shown in Table 4, the importance of cows as draught animals appears to vary considerably from place to place.

Oxen are normally used for the most arduous tasks such as ploughing while cows are given the lighter duties. For this reason the ratio of oxen to cows in the 'draught herd' can differ significantly from ratio of area ploughed by oxen versus cows, as illustrated by the GFA and Steinfeld data in Table 4.

Annual and Daily Productivity

The amount of draught work carried out by cattle varies greatly from place to place and between households.

Annual draught output is partly constrained by the length of the growing season, variable throughout Zimbabwe, which determines the very short period in which ploughing is practicable. Local soil characteristics determine whether winter ploughing is feasible. The full utilisation of draught animals in field work is constrained in some places by limited availability of implements such as ploughs, ox-drawn cultivators, harrows and scotch carts (see Table 1). The use of draught animals for transporting water and wood varies from place to place according to availability of these commodities in proximity to residential sites. Daily productivity per animal depends partly on the soil characteristics, which affect the size of the span needed for field work and the area such a team can till in one day. Actual daily productivity is a function also of the plane of nutrition and health of the animals. Farmers are generally conscious not to overwork their draught animals and usually have a schedule of rest days for them. As the number of draught animals available per farmer increases, animals are worked less frequently in the field.

Steinfeld (1988) found that oxen worked on average for 35 days per year in Mberengwa and 50 days in Chilimanzi, at five hours per day. Scoones (1990) reckoned that in Mazvihwa an average span was 2.8 animals and worked for between 55 to 60 days per year, of which almost 75% was represented by ploughing.

Previous studies (eg Munn and Zonneveld 1990) show that a span can typically plough about 0.4 ha per day. On this basis Scoones's data indicate that a span ploughs some 16 ha per year ie almost six hectares per draught animal if (according to Scoones's data) the average span was 2.8 animals. This seems high in comparison with figures presented below. It is likely that a substantial proportion of the land was ploughed twice—ie winter ploughed and then re-ploughed prior to planting, as has been observed elsewhere (eg FSRU 1985, Munn and Zonneveld 1990). Scoones's data for ploughing may include ridging and weeding as well as both winter and summer ploughing.

According to the data in Table 1, the average area cropped per household in the eight communal lands surveyed was 3.28 ha. The average cattle holding was seven animals, including 2.8 draught animals on the assumption that approximately 40 per cent of the total herd is used for draught purposes, as derived below (Sections 4.5 and 5.3). These figures mean that even if all the cropped area was tilled using cattle the average area cultivated would be only 1.17 ha per draught animal. Taking into account the area ploughed by hand, donkeys and tractor the land ploughed by cattle will be less than 1.17 ha per draught animal.

Munn and Zonneveld (1990) found in Kanyati that the total cropped area amounted to 2,028 ha of which 38 per cent (771 ha) was ploughed with cattle. The cattle herd comprised 1,225 animals, of which 47 per cent (576 animals) were stated as being used for draught purposes. On this basis, each draught animal ploughed on average only 1.34 ha during the year.

By calculation from the data on areas cropped and number of draught animals per household as presented in Table 2, the GFA (1987) study showed that the area cropped was in the range from 0.7 to 1.2 ha per draught animal.

Thus the main ploughing of the farmers' fields generally involves an area in the order of only 0.7 to 1.3 ha per draught animal per season, which represents perhaps only a week's work. As draught animals are worked for many more days than this, the conclusion is that the main ploughing of the fields is a minor proportion of the total agricultural use of draught cattle. Secondary field work and transport appears to represent the major but highly variable proportion of annual draught output.

In Section 5, a hypothetical model of communal cattle production is used to estimate the economic contribution of these animals at a national level. For this analysis, it is assumed conservatively that the 'average' draught animal in Zimbabwe works for some thirty days per year. Five days are spent in the main ploughing of the fields, amounting to approximately one hectare ploughed per

Table 5 Comparative Data on Milk Production and Offtake from Communal Cattle

Location	Natural Region	Date	Lact'n length *days*	Daily off-take *litres*	Yield per lact'n *litres*	Sample size	Sample method*	Reference
Chilimanzi	III	1985/86	120	1.35	165	186 owners	Q	Steinfeld
Mberengwa	V	1985/86	140	1.78	251	152 owners	Q	(1988)
Mazvihwa	IV	1986/87	182	2.67	486	12 cows	M	Scoones (1990)
Kanyati	IV	1988/89	161	2.61	420	200 cows	Q	Munn & Zonneveld (1990)
Chiweshe	II	1985/88	180	1.5	270	85 lactations	M	Mutsvangwa *et al.* (in press)
Average			**157**	**1.98**	**311**			

**Note: Sample methods were either questionnaire (Q) or direct measurement (M).*

draught animal. The remaining 25 days are assumed to be spent on pre-ploughing activities, ridging, weeding, manuring and non-agricultural work.

4.2 Milk

The household offtake of milk from cattle is determined by a wide range of factors. The genetic potential of the breed is modified primarily by plane of nutrition. Stress factors such as work, parasitic infestations and disease challenge reduce milk yields. The use of cows for ploughing and other draught purposes also reduces fertility and therefore the frequency of lactation (Goe 1983, Matthewman 1987). Supplementary nutrition may increase milk production. The proportion of the cow's total milk production which is taken by the farmer varies from household to household, reflecting management practices.

Little information is available on milk offtake from cattle in the communal lands. There is no commercial offtake of milk from cattle in Zimbabwe's Communal Lands apart from a small-farmer dairy programme managed by the Dairy Marketing Board at the Rusitu resettlement scheme in the Eastern Highlands.

Studies on the milk production characteristics of Mashona cattle and crosses with exotic breeds have been carried out on research stations (eg Makaholi, Matopos, Grasslands) of the Department of Research and Specialist Services. For example, Tiffen (1987) has reported studies on milk yields of

mature Mashona cows on diets approximating to food availability in communal areas. For animals in the postpartum weight range of 300 to 400 kg Tiffen recorded 140 day total milk yields (including calf consumption) of 600 to 700 kg. Tiffen (personal communication) considers that lactations are unlikely to last significantly beyond 150 days; in the typical situation where calves are separated from the cows overnight and milking takes place in the morning, the calf probably shares the dam's milk 50:50 with the farmer. On this basis, household offtake would be in the region of 300 to 350 kg of milk per lactation.

Results from on-station trials may overestimate the potential production from Mashona cattle in the Communal Lands since on-station herds tend to have been selected for improved productivity. Mutsvangwa *et al*. (in press) carried out a study in Chiweshe Communal Land between 1985 to 1988 and found that household offtake of milk averaged close to 1.5 kg per day, with lactations lasting up to six months, equivalent to an offtake of 270 kg per lactation.

Table 5 summarises lactation and milk offtake parameters from some studies in Zimbabwe. These data suggest a typical household milk offtake in the order of 300 kg per lactation. For the analysis in Section 5, a more conservative figure of 250 kg per lactation will be used.

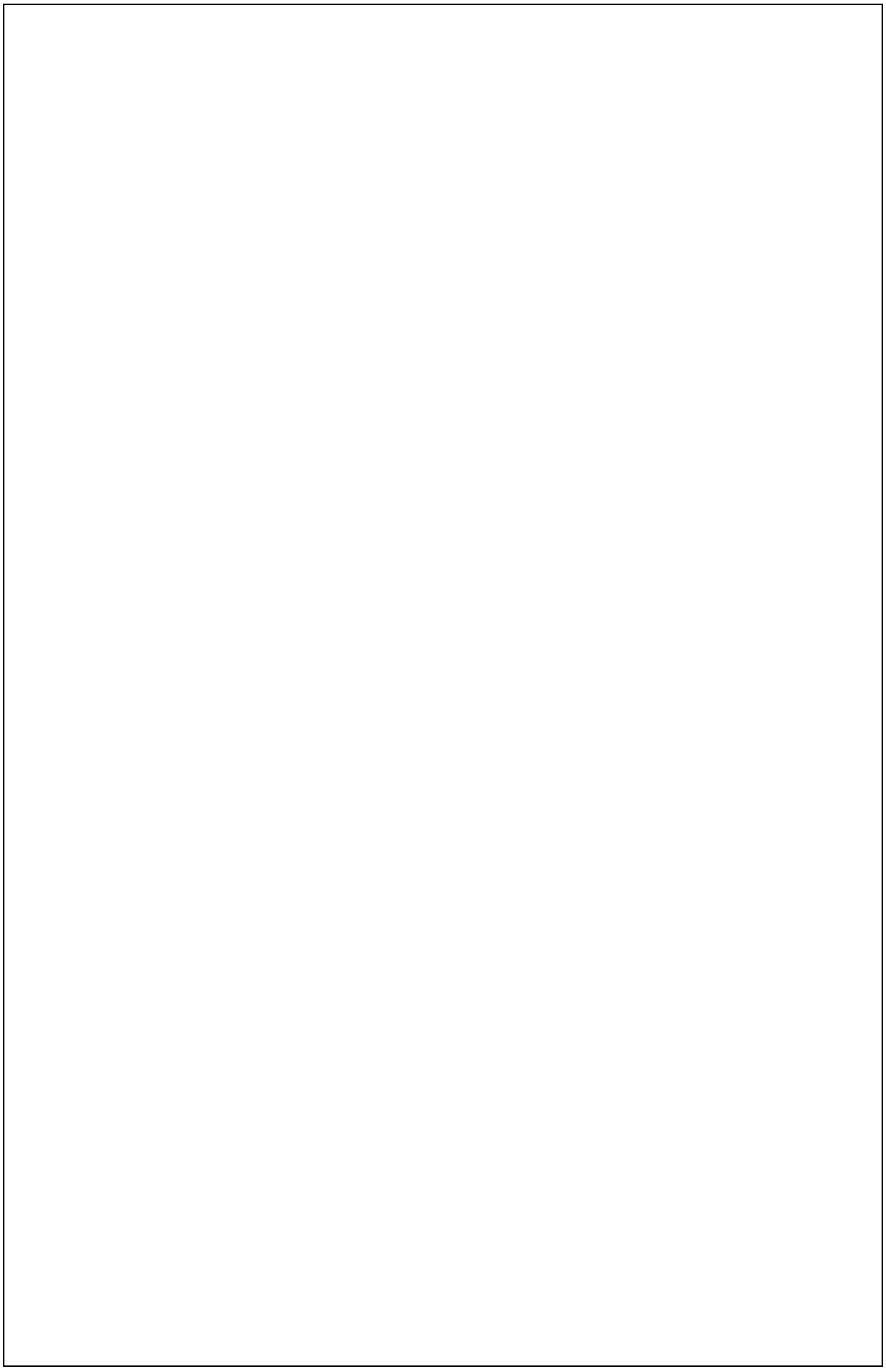
4.3 Manure

Views differ on the importance of manure in communal farming. Bratton (1984) in his study in Guruve, Wedza and Gutu considered that manure was a more important determinant of increased crop production by cattle owners than timeliness of ploughing, usually cited as an important benefit of owning draught cattle. Benefits relate to improvement not only in soil fertility but also in soil structure.

Scoones (1990) compared livestock production in areas of sand and clay veld and found that the benefits of manure application were much higher on the poor granitic sands than in areas of heavier soils. The value of manure on sandy soils has also been noted by other workers (Grant 1981, Mugwira 1984, 1988), particularly when applied in conjunction with fertiliser (Mugwira 1988).

The main source of manure is from the kraals in which the animals are kept overnight. From actual measurements, Scoones estimated that manure recoverable from kraals amounted to 2.6 cartloads (880 kg on a dry basis) per average animal per year but noted that this may be an overestimate because of the time of year of the study.

Steinfeld (1988:213-214) estimated that between 1.25 to 1.65 kg of cattle manure was collected and applied to fields per kg of bovine liveweight in the herd. The amount being used per household was in the region of one to three tonnes per year (see Table 2), of which over 95 per cent was applied to maize crops. Steinfeld (p92) reckoned that in Chilimanzi about 45 per cent of the theoretical total manure production from grazing animals was being used on



fields, while in Mberengwa the figure was only 17 per cent. If the average weight of an animal in the communal herd is in the region of 350 kg, then manure collection and use would be about 500 kg per animal.

Steinfeld concluded that manure is potentially of less value in the more arid parts of Zimbabwe, where returns to crop inputs are intrinsically less than in areas of greater rainfall and higher cropping potential. While this makes theoretical sense, a recent farm management survey (Table 1) found that the proportion of households applying manure to their crops was only 39 per cent in Kandeya (NR II, III) but 90 per cent in Buhera (NR IV), with the overall average being 60 per cent. Farmers in the higher rainfall areas can perhaps afford or otherwise prefer to make more use of commercial fertilisers and are less interested to use manure.

For the analysis in Section 5 it will be assumed that the amount of manure collected and used is 500 kg (dry weight), equivalent to 1.5 cartloads, per animal in the herd.

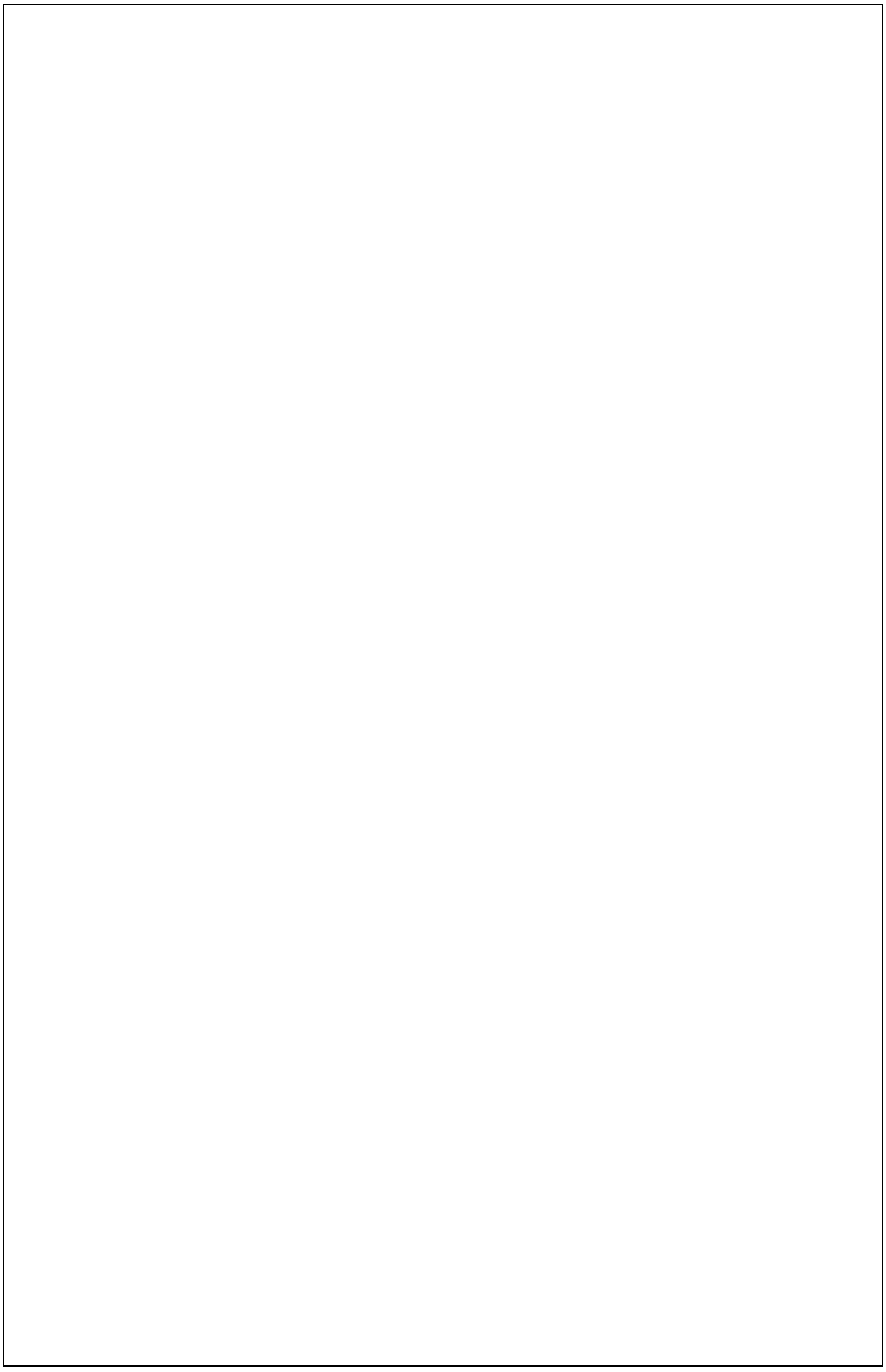
4.4 Herd Growth

Herd growth is an output of the cattle herd, equivalent to potential offtake.

Between 1902 to 1932 the African cattle herd in Zimbabwe expanded from about 50,000 to 1.75 million, representing an annual growth rate in excess of 12 per cent per year (Jarvis and Erickson 1986). Such high rates are close to the maximum biological rate of growth for this type of production system. This probably reflects commitment to herd regrowth by African farmers following the devastating impact of the rinderpest pandemic at the turn of the century. By contrast the African cattle herd increased to only 1.85 million in the subsequent 32 year period up to 1965, representing a negligible annual growth rate although this period saw several cycles of expansion and contraction. The lack of herd growth in this period appears attributable mainly to the prevailing economic climate combined with government policies to control cattle numbers in the African areas (Jarvis and Erickson 1986).

Following Rhodesia's Unilateral Declaration of Independence in 1965 herd growth was resurgent in the period 1966 to 1975, averaging over 6.5 per cent per year (see Table 6). This period marked a change in the political and economic climate. The coercive and unpopular Native Land Husbandry Act (Southern Rhodesia 1951) implemented in the mid-1950s had been finally abandoned in 1962-63. Following the Phillips Commission (Phillips *et al*. 1962) the government placed increasing emphasis on development of African agriculture. The attitude towards control of land use and cattle numbers became less authoritarian.

The communal cattle herd stagnated in the late 1970s, during the period of economic and political instability prior to achievement of majority rule in 1980. Since 1980 the herd has increased from approximately 2.9 million at independence to approximately 4.0 million in 1991, equivalent to an average



annual growth rate of some three per cent, despite serious drought in the period 1982-84.

Herd growth is primarily a function of the political and economic climate, determined by management factors rather than by biological factors. The more pertinent herd parameter to assess is the reproductive performance of the herd, which determines the combined total of herd growth and slaughter offtake which is feasible.

4.5 Reproductive Performance

The factors determining reproductive performance of the whole herd include firstly the proportion of the herd represented by breeding cows and secondly the calving rate for this group of animals.

Herd Composition

Various studies have reported herd composition (Table 7). Where age categories for different classes of animal are not closely specified, or where classification has been left to respondents, the value of the reported data is reduced.

In communal cattle production weaning is largely controlled by nature so that a specific age for differentiation between calves and followers (heifers, steers, bullocks) is hard to define. The categories ‘steer’, ‘bullock’ and ‘ox’ are often confused since some male followers are used as draught animals and castration is not carried out consistently at a particular age. Some farmers appear to delay castration in order to improve strength and body conformation for draught usage. The difficulty of using beef-production cattle classes for categorising communal cattle is shown by the lack of a directly equivalent Shona vocabulary.

The DVS collects information on individual animals at cattle dips, recorded monthly in the dip registers. Unfortunately the data are not very reliable regarding herd composition, because of inconsistency by field staff in transferring animals from the ‘calf’ category in the records to adult categories. It is not uncommon to find dips with cow/calf ratios indicating impossible calving rates, even in excess of 100 per cent. The Department is reviewing procedures for collection and management of data for the communal herd.

Despite these difficulties and the intrinsic variability of herd composition over time and space, the data presented in Table 7 are reasonably consistent. A ‘typical’ cattle herd in Zimbabwe appears to comprise between 45 to 50 per cent cows and heifers, about 35 per cent male adults and followers and between 15 to 20 per cent calves, including some animals which may be more than one year old. For estimating calf production, the key parameter is the number of breeding cows.

Breeding Cows

The ratio of heifers to cows in the herd is a function of the age at first calving and the length of time a cow is retained in the herd. Estimates of age at first calving include three years (Scoones 1990:230), 3.5 to 3.9 years (Steinfeld 1988), 4.3 years (Munn: unpublished survey data for Kanyati 1988), and 3.9 to 4.5 years (Sandford 1982). A figure in the region of four years appears plausible as a general average. Steinfeld (1988) reckoned that cows remained in the breeding herd for eight to nine years. Scoones (1990, p 240) reckoned that cows in Mazvihwa became unproductive and were sold at about ten years of age.

For the purpose of estimating a 'typical' herd composition in Section 5, weaning is assumed to take place at 12 months old, first calving at four years old and cows are assumed to remain in the breeding herd on average for at least a further six years. Cows would comprise two thirds or more of the non-calf females. If 'cows and heifers' are taken to comprise 45 per cent of the herd (see above), then cows comprise approximately 30 per cent of the total cattle herd.

Calving Rates

Sandford (1982) found in his field work that 60 per cent of the cows in his Kezi and Nyanda[1] study sites were lactating and some 40 per cent in Wedza. He considered that a typical calving rate[2] would be in the order of 45 per cent. Campbell *et al*. (1989:27) reported calving rates of 29 per cent in Chiweshe and 38 per cent in Zviyambe in 1982/83. These data were recorded in a drought year and in a part of the country typified by poor agroecology, with human and livestock populations substantially in excess of carrying capacity and where serious environmental degradation is widespread (Campbell *et al*. 1989:6). These rates must therefore be at the lowest end of the scale of productivity for communal cattle in Zimbabwe.

Steinfeld (1988) reported calving rates of between 43 to 64 per cent in Chilimanzi and Mberengwa in 1986 but felt that these might be higher than normal due to post-drought factors affecting herd dynamics. Scoones (1990) reported even higher calving rates (68 to 82 per cent) in Mazvihwa for the period 1984 to 1988. These rates are substantially higher than the national average for commercial beef ranching (recently about 60 per cent) and should be viewed with caution.

A figure in the order of 50 per cent appears plausible as being representative of the communal herd; for the analysis in Section 5 a more conservative figure of 45 per cent will be used. If cows are assumed to represent

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[1] Nyanda, named Fort Victoria prior to 1980, was renamed Masvingo in the early 1980s.

[2] Calving rate: calving rate refers to the number of live births per cow per year.

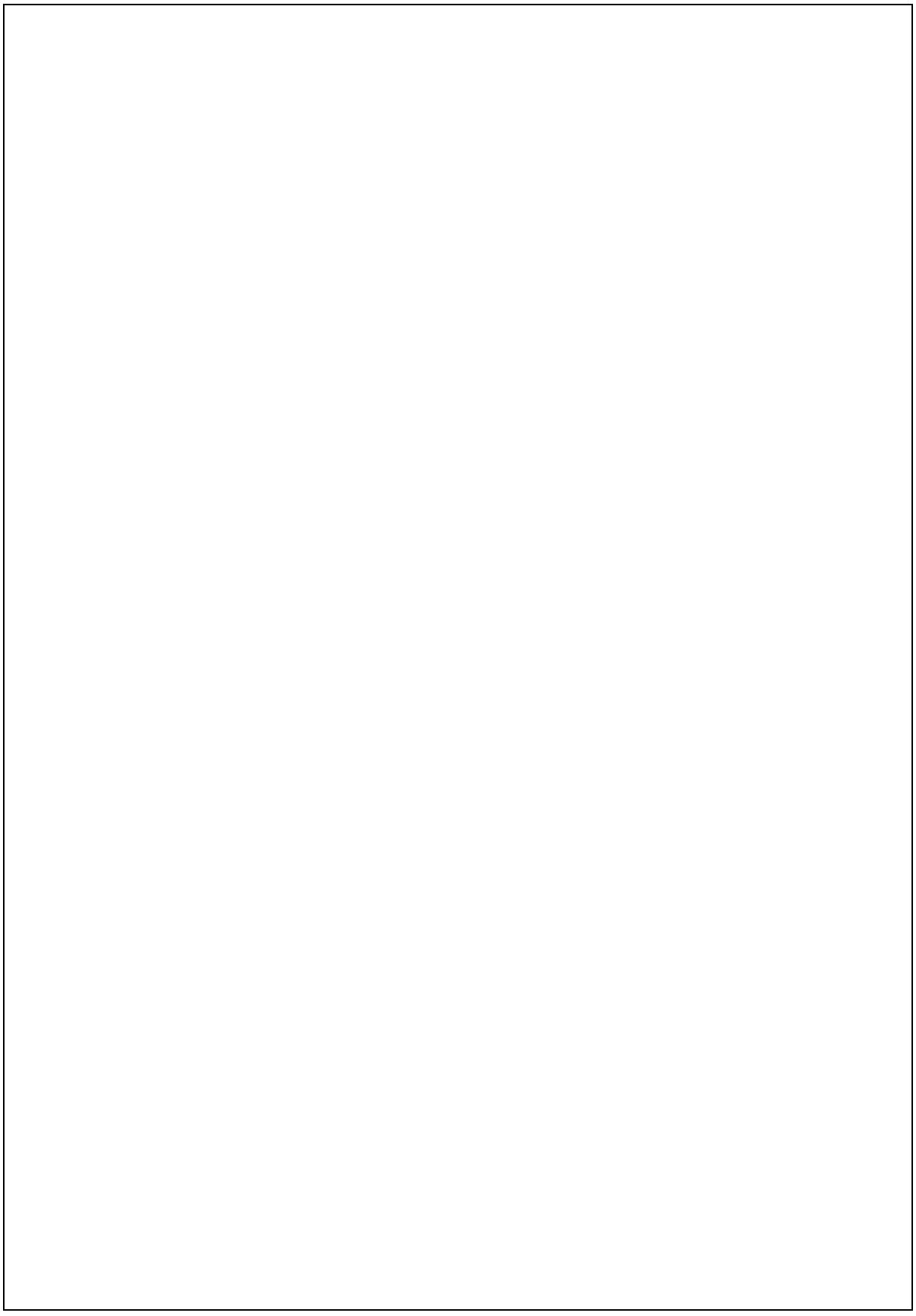

Figure 2 Average Livemass of Communal Cattle Purchased by the CSC in 1988

30 per cent of the total herd, a calving rate of 45 per cent would give rise to 13.5 births per 100 animals in the herd. This compares with a figure of 16.8 per cent in Table 6 for the period 1967 to 1975, which suggests that the above assumptions are reasonable.

4.6 Slaughter Offtake

Commercial Slaughter Offtake

According to figures issued by the CSC (Mutiwanyuka 1988) sales of cattle at their sales pens in the period 1981 to 1987 represented on average 2.3 per cent of the total communal herd in Zimbabwe, with annual offtake ranging between 1.2 to 3.7 per cent. These low rates compare with annual slaughter offtake in the range of 15 to 23 per cent from the cattle population on commercial farms over the same period.

The data in Table 6 indicate that in the period 1967 to 1975, sales and removals from the communal herd averaged 3.6 per cent per year, ranging from 2.9 to 5.5 per cent. This largely represents commercial slaughter offtake. Recent disaggregated data are available for the eight communal lands included in a recent farm management survey (MLARR, undated, *ca* 1991:79), where 'sales' averaged 2.3 per cent of the cattle herd in the 1988/89 season, ranging from 0.6 per cent in Kandeya to 6.0 per cent in Buhera.

For the analysis in Section 5 commerical slaughter offtake is assumed to be two per cent, taken to include communal animals purchased by commercial farmers for fattening.

Figure 2 shows the average weight of cows and oxen purchased by the CSC at sales pens in the Communal Lands in the period January to November 1988, which is taken as a typical year. Male animals accounted for 84 per cent of the purchases, with an average livemass of 423 kg. Females accounted for the remaining 16 per cent, with an average livemass of 357 kg. The average livemass for all animals purchased was 412 kg.

Average livemass varied over the year, mainly reflecting nutrition status. The heaviest weights are achieved from June to September, following the rainy season and supplementary nutrition from crop residues. This is when sales are high. Sales and average livemass were correspondingly low in the latter part of dry season and beginning of the rains (September to November), when animals and manpower are heavily involved in field preparation.

These weights may be higher than the average for animals in the communal herd as slaughterstock may be fattened by the communal farmer prior to sale. Steinfeld estimated that oxen in his study areas typically weighed about 320 kg while cows weighed 285 kg.

Local Slaughter Offtake

A significant number of older unproductive animals are slaughtered within the Communal Lands for local meat consumption. Some productive animals are also killed for rituals and celebrations. Few cattle die of old age: sick animals are often slaughtered before they die (so-called salvage slaughter).

Data published by the Whitsun Foundation (1978, see Table 6) indicate local slaughter offtake averaging 2.4 per cent per year in the period 1967 to 1977. A recent farm management survey (MLARR, undated, *ca* 1991:79) estimated average local slaughter as 1.4 per cent of the cattle herd, ranging from nil to 3.5 per cent among eight survey sites throughout the country.

Scoones (1990:238) appears to dismiss the significance of local slaughter in Mazvihwa in the period 1986 to 1988. Steinfeld (1987:126) estimated subsistence slaughter offtake in the region of 1.5 to 3.5 per cent in his study area. Munn and Zonneveld (1990) recorded a four per cent offtake in Kanyati in 1988/89. Reasons for this offtake included:

Illness of the animal	36%
A feast	20%
Old age of the animal	16%
Ritual obligation	16%
Accident (salvage slaughter)	4%
Other reason	8%

This empirical evidence can be cross-checked with simple calculations about herd dynamics. According to empirical data for the period 1967 to 1975 (Table 6), total herd offtake (including natural mortality, local slaughter and live sales or transfers out of the herd) in this period was 10.3 per cent, which is consistent with an average age at death (including calf mortality) of about eight years and herd growth of 2 per cent per year, which appears plausible.

For the analysis in Section 5, total herd offtake is assumed to be in the order of ten per cent per year. Natural mortality is about five per cent per year (see Table 6). Natural deaths are lower than might be expected since a proportion of ill or injured animals is slaughtered for consumption before natural death. If commercial offtake is taken as two per cent per year then local slaughter offtake would be three per cent.

5 Valuing the Economic Outputs of Communal Cattle

Problems of valuation arise at several levels: firstly, in trying to value the physical units of different types of output and secondly trying to ascertain what proportion of the communal herd is actually contributing to output, particularly in the case of animal draught.

5.1 Subsistence Consumption of Direct Outputs

Valuation of services and products both produced and consumed within the household presents methodological difficulties (Chibnik 1978, Behnke 1985, Jackson 1989). Use of producer (farm-gate) prices tends to undervalue the benefit gained by the farmer from consumption of his goods, while use of consumer prices may overvalue the benefit: if the farmer actually had to pay these prices, he would probably choose not to consume as much as he does. Some household surpluses may be traded locally but transactions are often on a non-cash basis, involving family obligations or given in return for help in the fields.

The simplest approach, accepting its limitations, is to use local market prices for transactions in the goods or services or nearest comparable substitutes where possible. This is usually feasible in the case of draught provision, milk, manure and meat from local slaughter of animals and is the approach adopted in the analysis presented below in Section 5.3.

Barrett (1991) has argued that the valuation of animal draught using empirically obtained local hire rates may be a satisfactory approximation in some circumstances but probably understates the economic value of draught output from communal cattle. He has suggested an alternative approach to valuing animal draught based on assessment of the contribution of cattle to crop production, a part of the crop-livestock interaction, discussed in the following section.

5.2 The Crop-Livestock Interaction

In general, incomes of households owning cattle are substantially higher than those of households not owning cattle. For example, in Kanyati Communal Land (Munn and Zonneveld 1990):

Households owning	*Number of families*	*Average annual income (Z$)*
Cattle and donkeys	54	2,032
Cattle only	64	1,205
Donkeys only	130	1,100
Number of cattle or donkeys	127	668

The main source of household income was sale of crops (70 per cent) and differences in income were principally due to increased crop production associated with cattle ownership. A strong relationship between crop production and cattle ownership has been observed elsewhere within Zimbabwe (eg Gobbins and Prankherd 1983, Shumba 1984a, FSRU 1985, Steinfeld 1988, Scoones 1990) and other parts of Africa where the farming system includes a

Table 8 Estimate of Total Economic Output from a Herd of 100 Communal Cattle (Z$, 1991 prices)

	Number of animals	Unit of output	Annual output	Unit value	Total value	%
Draught	40	Days work	1,200	11.2	13,404	63.6
Milk	30	litres	3,375	0.85	2,869	13.6
Manure	100	cartload	1.5	12	1,800	8.5
Local offtake	3	kg meat	480	3	1,200	5.7
CSC offtake	2	head	2.5	400	1,000	4.7
Herd growth	2	head	2	400	800	3.8
Total value of outputs					**Z$ 21,073**	**100.0**
Average gross value of annual output per animal					**$ 210.73**	

Notes:

1. Each draught animal is assumed to work for 30 days per year. Five days are occupied in ploughing one hectare, worth Z$85, equivalent to Z$17 per day. The remaining 25 days output are valued at Z$10 per day, which is substantially below prevailing hire rates for a tractor or draught animal teams (eg MLARR, undated, ca 1991: p49). This is partly to be conservative and partly to reflect that hire charges include labour and implements. Average daily income per draught is calculated as Z$11.17 per draught animal.

2. Milk output is calculated on the assumption of a 45 per cent calving rate and household offtake of 250 litres of milk per lactation. This is valued at 85 cents per litre compared with urban commercial milk prices of Z$1.10 per litre. This discount reflects that consumers would probably consume less if full market price had to be paid.

3. Recovered manure production is estimated at 1.5 cartloads (500kg) per animal, as derived in the text and valued at Z$12 per cartload (estimate, based on Scoones, 1990).

4. Local offtake is estimated at three per cent as discussed in the text. It is estimated that 160 kg of meat and offals are produced per carcass, with a local sale value of Z$2.50 per kg (conservative estimate).

5. Animals sold to the CSC or adding to the herd are valued at Z$400 per animal (conservative estimate).

strong interaction between cultivation and cattle production (eg McCown *et al*. 1979, Francis 1988). However, not all differences in household incomes are due to cattle ownership. Households owning cattle are often larger than households who do not (eg Steinfeld 1988:51) and have more labour available for fieldwork. In some cases farmers may own cattle because they are wealthy (eg through off-farm income) as opposed to them becoming wealthy by owning cattle.

The principal linkages between cattle ownership and crop production are through increase in area ploughed and yields per unit of area. The increase in area ploughed is primarily due to availability of animal draught to replace hand tillage. Shortage of animal draught appears to be a widespread constraint to crop production throughout Zimbabwe (Zinyama 1988). Increase in yields may be due to better and more timely ploughing, combined with release of labour for duties such as early weeding (Barrett 1991).

Where detailed farm management information is available, the contribution of cattle ownership to gross household income can be established by production function analysis (Upton 1976, Baumol 1977: Chapter 11). The method is well suited to evaluation of detailed agro-economic survey data but is difficult to apply at a national level to value cattle production in Zimbabwe's Communal Lands. In the following section, valuation of animal draught uses the method of replacement pricing, ie use of estimated prices for hire of draught animals.

5.3 Total Output of the Herd

The objective in this section is to provide a crude but plausible estimation of the total value of the tradable outputs from cattle in communal production systems. The foregoing discussion provides a possible approach to valuation of the output of a individual lactating cow or a draught oxen. To value the total output of a herd, the output of each animal class must be weighted according to the herd composition, which has already been discussed in Section 4.5 (see Table 7).

Average Output per Animal

The national herd is estimated above to comprise approximately 30 per cent breeding cows and 30 per cent male animals used for draught. The remaining 40 per cent comprises calves, followers and unproductive adults. It is assumed that one third of the non-calf females are used for draught purposes, so that draught animals comprise 40 per cent of the total herd.

Using the parameters derived above, Table 8 estimates the economic output from communal cattle in Zimbabwe. Table 8 is not suggested to be representative of everywhere or even anywhere in Zimbabwe, but rather a plausible example used to illustrate the economics of communal cattle production. Indeed, the productivity parameters have been deliberately estimated conservatively to underline the significance of the resulting analysis. The model

indicates that the annual value of total output averages just over Z$200 per animal in the herd (inclusive of calves and followers). For adult animals, the annual value of output is much higher: an oxen is worth some Z$335 per year for its draught output alone. Draught is by far the most important output in economic terms, accounting for almost two thirds of the total value of cattle output.

While adult animals are contributing so much to the rural household, it is understandable that a farmer does not want to sell an animal to the CSC for several hundred dollars when its on-farm output is worth two or three hundred dollars per year, year after year. In addition, these cattle provide financial security and serve socio-cultural functions. The decision by farmers to retain animals as long as possible appears highly rational.

Average Output per Hectare

For broad comparison of cattle productivity in communal production systems with other production systems (eg beef ranching or wildlife utilisation) it is essential to compare productivity per unit of area grazed rather than per animal.

Output per hectare depends on the stocking rate, usually expressed in livestock units per hectare (1 LU = 500 kg bovine livemass[3]). The potential grazing capacity of non-arable natural veld in Natural Regions IV and V has been estimated to range between six to 16 ha per LU (Mombeshora and Maclaurin 1989). At stocking rates of ten hectares per livestock unit, or seven hectares per animal, the gross revenue from communal cattle production is close to Z$30 per hectare. At the much higher stocking rates that occur in many Communal Land, gross revenue per hectare is higher. Inputs to cattle production are minimal other than herding labour, so that net income represents a substantial proportion of gross income.

Communal livestock production can now be compared with extensive beef ranching. With a stocking rate of 10 ha per LU (10 LU per sq km) and an annual offtake of 20 per cent, extensive beef ranching would produce one tonne of steer livemass per sq km per year, or approximately 500 kg of carcass. Even with producer beef prices inclusive of an export premium, this output would be worth less than Z$20 per ha in gross income. Commercial beef ranching has substantial fixed and variable overheads, so that net income is much below this level, perhaps by 50 per cent (Chris Nobbs, personal communication). This suggests that communal cattle production produces significantly higher income

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[3] Livestock unit (LU): the standard Zimbabwean definition is one LU is equal to 500 kg bovine livemass (Cattle Producers' Association Beef Production Manual, Appendix 8). A factor of 0.7 is commonly used for converting communal cattle herd numbers to LUs (eg Whitsun 1978, GFA 1987, Campbell *et al.* 1989) although some workers (eg Danckwerts n.d.:37, Sandford 1982:35, C Nobbs, AGRITEX, personal communication) suggest that this may overestimate the average weight of communal cattle.

per hectare (both gross and net) than appears currently feasible under commercial beef ranching in semi-arid parts of Zimbabwe.

This analysis does not take into account possible environmental costs of overstocking but does underline that communal cattle production systems have a high level of output in relation to the pasture they occupy. Similar findings in Botswana (Ridder and Wagenaar 1986) support the conclusion that productivity in communal farming systems may be much higher than is commonly supposed.

The economic superiority of wildlife management as an alternative land use to cattle production in semi-arid Communal Lands in Zimbabwe has been argued forcefully (eg Child 1988, Clarke *et al*. 1986). However, the argument has centred on comparison of the economics of beef ranching with wildlife utilisation in the commercial sector. The above analysis suggests that such comparison is inappropriate in the context of communal livestock production, and provides a rational explanation for farmers' resistance to the setting up of wildlife utilisation projects at the expense of cattle grazing opportunities.

National Output from the Communal Herd

At a national level, with the communal cattle herd in the order of four million, the above analysis suggests that these animals are currently contributing in the order of Z$800 million (approximately US$250 million) per year to the rural economy in Zimbabwe, without taking into account the socio-cultural importance of cattle and their role in providing financial security.

6 Policy Implications for Animal Health and Production

6.1 A Model of Communal Cattle Production

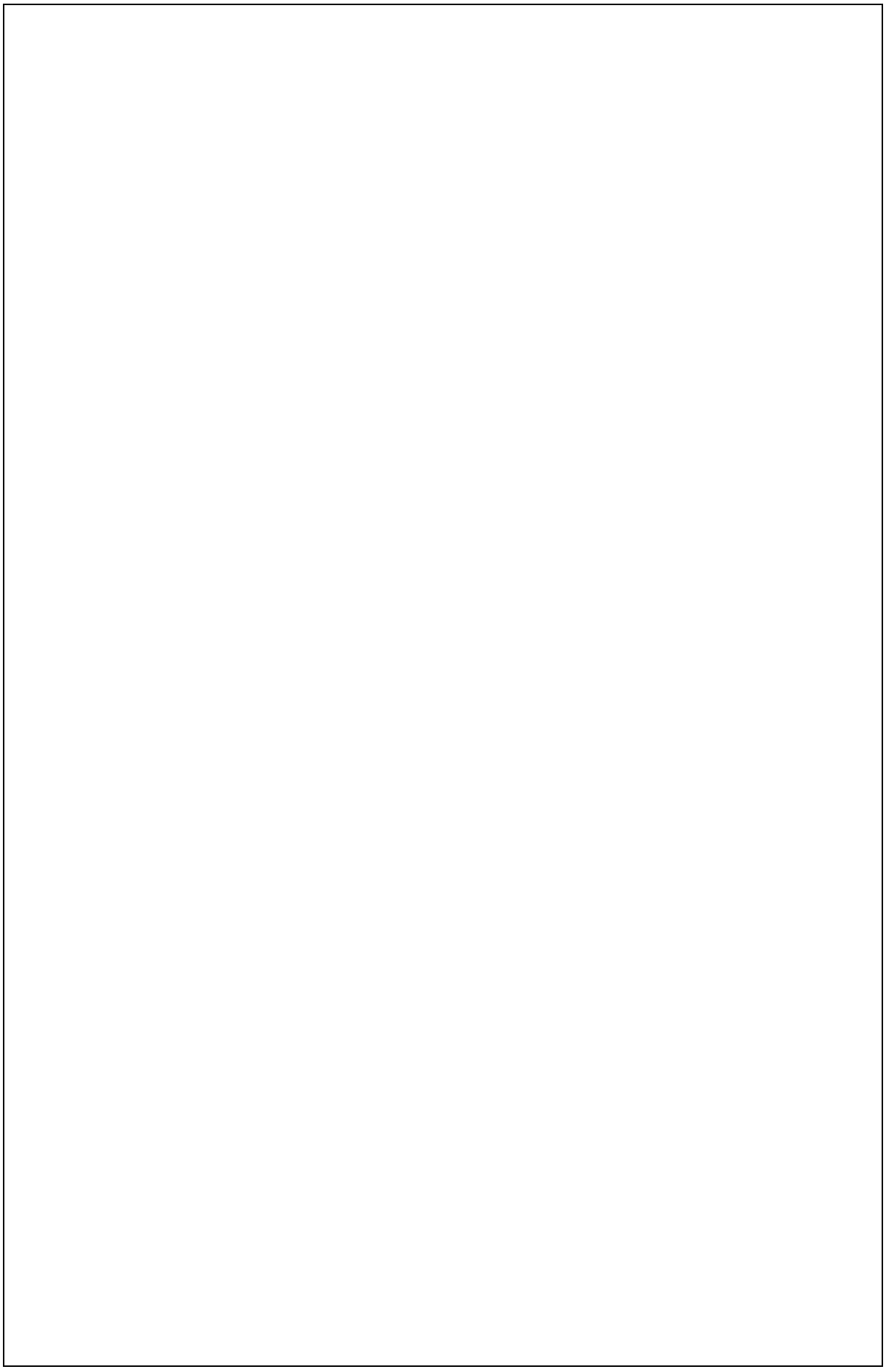
The model of communal cattle production in Zimbabwe which emerges from this paper has the following features:

- Farmers' objectives in owning cattle primarily derive from economic rationality.

- This rationality is based firstly upon the importance of cattle ownership for crop production.

- The economic rationale for communal cattle production is based secondly upon the provision of cattle products, mainly milk, for household consumption.

- Ownership of cattle is an attractive investment and provides household security in drought years.



- Cattle have other social and cultural functions which are not amenable to valuation but which are nevertheless important.

- Communal cattle production produces revenue per animal and per hectare which is comparable if not greater than revenue from extensive commercial beef ranching in semi-arid parts of Zimbabwe.

6.2 Implications for Increasing Beef Offtake

Government policy towards cattle development in Zimbabwe has tended to emphasise the importance of beef production from the national cattle herd. While Government should arguably be focussing on draught and subsistence roles of cattle in the rural areas (eg Cousins 1989), beef exports are important as an earner of foreign exchange for Zimbabwe and the domestic market for beef is large.

Annual slaughter offtake from the commercial herd has been in the range of 15 to 23 per cent, while from the communal herd it has been less than three per cent (Mutiwanyuka 1988). In the decade since independence the commercial cattle herd has contracted significantly while the communal herd has increased (see Table 9). This has caused a significant reduction in the supply of slaughter stock to the meat industry, leading to regular meat rationing on the domestic market and public pressure to reduce exports. Thus policy-makers have given attention to the scope for increasing commercial offtake from the communal herd.

The model of communal cattle production presented above supports the view that low offtake from the communal herd is not due to economic irrationality or to inefficient production by communal farmers. Measures to increase offtake are unlikely to be successful if they are based on the assumption that the main constraints to increased offtake are lack of credit, lack of marketing facilities, communal tenure of grazing lands, so-called ‘traditional attitudes’ or lack of knowledge among communal farmers. Offtake is not likely to increase substantially in response to minor increases in slaughterstock prices offered by the CSC.

Efforts to increase commercial slaughter offtake should focus on specific Communal Lands where agroecology and socio-economic circumstances are particularly favourable to development of beef production units within the local farming system, rather than national programmes. Generally, efforts to increase commercial offtake might be more successful if directed towards older unproductive animals rather than the prime two or three year old stock which the CSC may prefer to slaughter but which communal farmers are rational to retain in their herds.

6.3 Implications for Control of Cattle Numbers

According to the National Development Plan for 1986-90 (Republic of Zimbabwe 1986:27)—

> The most important aspect of livestock production which is occupying the mind of government is the accumulated and continuing deleterious effects of overstocking and over-grazing in communal lands which are causing severe and potentially irreversible ecological degradation. A comprehensive national programme... will include stock control, better land management and de-stocking where necessary.

The communal lands of Zimbabwe do not have sufficient grazing area to support the draught cattle which farmers require for their crop production. Thus a shortage of draught animals coexists with overstocking of the available grazing land. In this situation, Government objectives to limit growth in cattle numbers are likely to be achievable only if presently widespread tillage constraints are alleviated.

Cattle development programmes should therefore aim to improve the draught output of the existing communal herd. This may include better management of grazing areas (Chinembiri 1989) and strategic nutrition, for example by promotion of the storage and use of crop residues for winter feeding. Draught productivity can be improved through promotion of cow traction and the introduction of improved implements (Steinfeld 1988). Village-level draught constraints may be reduced by promoting the sharing of draught animals and management of communal grazing areas (Bratton 1984, Muchena 1989). Such livestock and pasture management components could be usefully coordinated with programmes to promote low tillage farming methods (Shumba 1984b).

The different rationale of communal cattle production from commercial beef ranching influences the optimum stocking rate. In beef ranching, the economic optimum stocking rate maximises beef production per hectare (Jones and Sandland 1974, Carew 1976): it is better to have a few fat animals than many thin ones. For a communal cattle production system, the economic optimum may be a higher stocking rate than in the beef production system while remaining below the ecological carrying capacity. We simply do not have the necessary data on the relationship between the productivity of communal cattle and stocking rates to assess this possibility.

If sustainable stocking rates for communal grazing areas are higher than presently recognised, this would increase the economic justification for veterinary interventions such as tsetse control for which costs are area-related, as the benefits per sq km are directly related to the number of cattle which the affected area can sustain.

Additional arguments have been put forward for reconsidering the number of cattle which communal farming areas can sustain without environmental degradation (see for example Scoones 1990, Abel and Blaikie 1990, De Leeuw and

Tothill 1990, Barrett *et al*. 1991). This issue requires urgent investigation in Zimbabwe.

6.4 Implications for Policy towards Cost-Recovery for Veterinary Services

Throughout Africa interest has been growing in privatisation of some veterinary services and cost-recovery of veterinary services provided by the public sector.

The model of communal cattle production presented above suggests that farmers gain substantial economic benefits from cattle ownership, at little cost as the principal input to production is open range nutrition and herding labour. Cattle owners should be able to afford a moderate payment for animal health and production services provided by the State, even though household income from sale of slaughterstock is not substantial.

Increase in household income from cattle ownership is mainly in terms of greater amounts of cash crops sold to the Cotton and Grain Marketing Boards (CMB, GMB). There may be a case that credit for animal health services and other cattle inputs in the communal sector could be financed against stop orders on farmers' accounts with the CMB and GMB, as is already the case with credit for crop inputs.

6.5 Implications for Planning and Appraisal of Animal Health Programmes in the Communal Areas

This reassessment of the economic importance of cattle in communal farming systems has general implications for the planning and appraisal of veterinary projects, programmes and policies in Zimbabwe's Communal Lands:

- Firstly, greater recognition of the substantial economic value of communal cattle should increase the economic justification for veterinary interventions in this sector.

- Secondly, such interventions must be planned and appraised on the basis of their impact on animal draught and milk production, rather than upon the conventional productivity parameters associated with beef production.

For this purpose, better data are needed concerning the physical outputs from communal cattle production systems, covering a wider range of locations than those for which present data are available and over a number of years. Particular attention must be given to assessment of the draught use of cattle, which represents the major economic role of the communal herd.

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Table 6 Livestock Numbers and Dynamics of the Communal Herd in Zimbabwe, 1967-1975 ('000 head)

Year	1967	1968	1969	1970	1971	1972	1973	1974	1975	Average 1967-75
Total herd size	1773.7	2013.6	2068.8	2292.4	2467.4	2586.6	2676.3	2852.5	2929.2	
growth rate	n/a	13.5%	2.7%	10.8%	7.6%	4.8%	3.5%	6.6%	2.7%	6.5%
Births	430.3	304.8	389.9	407.4	395.6	335.3	435.7	420.8	450.5	
% of total herd	24.3%	15.1%	18.8%	17.8%	16.0%	13.0%	16.3%	14.8%	15.4%	16.8%
Sales and removals	63.9	69.9	60.4	87.8	91.2	78.6	102.8	156.8	85.1	
% of total herd	3.6%	3.5%	2.9%	3.8%	3.7%	3.0%	3.8%	5.5%	2.9%	3.6%
Local slaughter	43.2	46.4	44.3	50.8	59.1	67.8	55.1	67.8	80.4	
% of total herd	2.4%	2.3%	2.1%	2.2%	2.4%	2.6%	2.1%	2.4%	2.7%	2.4%
Deaths	39.4	165.3	68.9	122.6	119.4	90.4	107.3	112.3	91.6	
% of total herd	2.2%	8.2%	3.3%	5.3%	4.8%	3.5%	4.0%	3.9%	3.1%	4.3%
Total herd offtake	146.5	281.6	173.6	261.2	269.7	236.8	265.2	336.9	257.1	
	8.3%	14.0%	8.4%	11.4%	10.9%	9.2%	9.9%	11.8%	8.8%	10.3%

Source: Ministry of Internal Affairs, Government of Rhodesia, via: Whitsun Foundation (1978) A strategy for rural development. Data bank Number 2: The peasant sector. Tables F13 to F18.

Table 7 Summary of Data on Communal Herd Composition from Previous Studies and Official Sources

Details of study												
Reference	Danckwerts undated	Whitsun Foundation 1978				Shumba 1985	GFA 1987		Scoones 1990	Munn & Zonneveld 1990	Barrett unpub.	Overall Average
See note	(1)	(2)	(2)	(2)	(2)	(3)	(4)	(4)	(5)	(6)	(7)	
Place	Nyanda	Chiweshe	Gutu	Matshe-tshe	Vict-oria	Mang-wende	Chili-manzi	Mber-engwa	Mazv-ihwa	Kanyati	Guruve	
Year	1974	1970s	1970s	1970s	1970s	1982	1986	1986	1987	1988	1988	
Herd composition %												
Bulls	5.5	3.0	5.3	5.5	2.2	6	7	3	9.7	9	6.2	5.7
Oxen	21.4						27	20			29.1	
Steers	7.0						12	10			3.7	
Oxen and steers	28.4	34.3	26.5	28.4	24.6	35	39	30	18.9	31	32.8	29.9
Cows	30.8						30	32	31.3	33	36.7	
Heifers	17.1						12	16	13.3	14	10.8	
Cows and heifers	47.9	48.6	49.8	47.9	47.7	39	42	48	44.6	47	47.5	46.4
Calves	18.1	14.1	18.4	18.2	24.5	20	12	18	26.8	13	13.6	17.9

Notes:

(1) Danckwerts notes the figures 'for what they are worth', commenting that the classification of stock was left to respondents themselves and 'calves' might be anything up to 2 years old.

(2) Date unspecified, but the general coverage of the report is the period 1966 to 1975.

(3) Shumba specifies his calf category as under two years old.

(4) In the GFA study, calves are under 1 year old; bulls, oxen and cows are over 4 years.

(5) Scoones's classification is based on the GFA system.

(6) Ages for each class were not specified.

(7) Unpublished analysis of stock returns for 17 dip tanks in Guruve District on file at the District Veterinary Office, Guruve.

Table 9 Livestock Numbers by Sector, with Volume and Value of Commercial Slaughter Offtake, 1975 to 1989

	Livestock numbers *'000 head*				Sales of Livestock *Z$ million*		Slaughterings			
	Commercial sector *as at 31 March*			Communal sector	Comm-ercial	Comm-unal	Volume *'000 head*		Value	Aver-age
Year	Beef	Dairy	Total	*31 Dec*			CSC	Other	Total *Z$'000*	*Z$*
1975	2882	127	3009	3123	73.2	7.2	445.9	62.0	60016	118
1976	3007	126	3133	3183	84.9	8.5	562.6	64.5	70537	112
1977	3103	123	3226	3388	102.0	6.9	658.5	53.0	85556	120
1978	2960	117	3077	2950	99.9	4.9	651.6	57.4	82162	116
1979	2600	109	2709	2860	111.8	3.2	564.4	63.6	86748	138
1980	2304	106	2410	2869	115.5	5.2	457.7	51.7	85660	168
1981	2287	104	2391	2895	124.8	7.6	351.2	74.4	89564	210
1982	2298	102	2400	3262	195.1	8.1	451.0	59.6	144793	284
1983	2253	105	2358	3189	209.5	8.7	457.4	56.2	147548	287
1984	2120	111	2231	3234	230.8	12.5	431.4	78.5	163455	321
1985	1979	111	2090	3409	224.3	24.2	400.5	58.2	148908	325
1986	2014	112	2126	3657	224.3	24.2	308.5	73.7	144171	377
1987	1892	121	2013	3905	318.9	11.1	389.2	48.6	209713	479
1988	1884	121	2005	3815	343.9	13.5	327.0	84.5	228931	556
1989	1867	123	1990	3856	343.5	40.8	293.5	82.9	234746	624

Source: Quarterly Digest of Statistics, Central Statistics Office, Harare, December 1990, Tables 12.2, 12.3, 12.7, and 12.8