CHARACTERIZATION OF SMALL-SCALE CATTLE FARMING IN BOTSHABELO AND THABA NCHU DISTRICTS OF THE FREE STATE PROVINCE

by

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CHAPTER 1

GENERAL INTRODUCTION

Small-scale cattle production is extremely important for the economies of the developing countries in general, and to Southern African countries in particular. Cattle farming is an important part of the African culture and a way of capital investment or wealth accumulation, which determines the social status of the African man. Besides its direct benefits, cattle can sustain the household by providing meat and milk. The value of livestock and in particular cattle, in providing rural transportation, draught power for cultivation, manure for crops and fuel production cannot be underestimated. The ability of cattle in utilizing non-arable land and agricultural residues and plant by-products, transforming non-edible plant material into human food, is an additional advantage over other livestock species which compete with the human for food. Livestock production also plays a critical role in maintaining a cash flow to resource poor farmers, who grow crops essentially to provide food for household use (Sarwatt & Lekule, 1996).

The multi-disciplinary nature of livestock production and the complex interaction between the biological, technical and social components involved in the production cycle and its efficiency requires an integrated farming systems approach. The efficiency of these systems can be optimized through the adoption of proven technologies that make optimal use of the available nutritional, genetic and natural resources and ensure the long-term sustainability of the systems. The adoption of correct management practices such as feeding, breeding and disease control amongst others is essential to achieve these objectives.

Although small-scale cattle production (mainly for subsistence purposes), is practiced in most of the sub-Saharan region, its productivity is considered to be very low and in most cases insufficient to ensure food security - and seldom assures or generates adequate financial returns. Small-scale farming

cannot compete with more commercially orientated livestock production systems (Hofmeyr, 1996).

In the past, the traditional African livestock production systems have not received adequate attention from amongst others, policy makers regarding land rights, agricultural extension support services, access to credit and markets. These constraints have been recognized by the National Department of Agriculture (1998), which has reported that poverty in the rural areas of South Africa is associated with poor agricultural policies, which persistently marginalize small-scale black farmers as their access to resources such as land, credit and technical knowledge are limited.

The National Department of Agriculture (1998), has committed itself to address the above mentioned constraints and it is presently reformulating its policies to correct the discrepancies of the past. It is envisaged to provide full support to these farmers and help in uplifting their productivity and the well-being of the rural agricultural communities. Very little is known about the characteristics of these small-scale farming systems. In order to facilitate the policy makers to introduce appropriate policies and supporting services to assist these farmers and to fulfill the present government objectives, research into this field is needed. This urgent need for more research on small-scale farming systems, was identified by the National Department of Agriculture (1998).

The aim of this study was thus to characterize the communal farming systems in the Thaba Nchu and Botshabelo areas, to evaluate their sustainability, identify some constraints limiting their productivity and propose some recommendations to improve the productivity and sustainability of these farming systems.

CHAPTER 2

HISTORICAL BACKGROUND

This study was carried out in the two districts of the Free State province, which lies in the centre of the sub-continent, stretching from the Vaal to the Orange Rivers and from the Lesotho border to the border of the Kalahari desert. The survey was undertaken during 1997/99, and the area covered was the Thaba Nchu and Botshabelo districts.

The Thaba Nchu district forms part of the 70 km long Bloemfontein-Botshabelo-Thaba Nchu region, situated in the central Free State, along the Bloemfontein-Maseru corridor. The total area of the region is 1 274 square km (Krige, 1998). The region receives a mean annual rainfall of 600mm, but the variation from year to year is significant and droughts frequently occur. Temperatures are extreme and the area experiences hot mid-summer conditions and very cold winters. The combination of erratic rainfall and cold winters has resulted in a grassland vegetation cover with Themeda Triandra grass as the predominant specie. Thaba Nchu's surface water comes from two dams namely, Groothoek and Welbedacht. Generally the clay content of the soil is too high for acceptable agricultural cultivation (De Villiers, 1998).

In many respects, the Thaba-Nchu district is typical of the mixed arable and pastoral areas of the southern Highveld region of South Africa. The Thaba-Nchu district has a distinctive history. Firstly, it was the only district in the Free State in which Africans held freehold title to land. Secondly, it contained two of the three small African reserves in the Free State. Thirdly, reduced to little more than one-third of its original size, it emerged in 1970 as part the of independent Republic of Bophuthatswana. Thus it became a Tswana enclave in the heart of a region where the language of power was Afrikaans and the first language of most of the inhabitants was Sesotho. All these features give the tale of Thaba-Nchu a peculiar interest and complexity (Murray, 1992).

In the 1870's, Thaba-Nchu was comprised of more than 1200 square miles of valuable arable and pasture land. It adjoined the "conquered territory" taken by the OFS Republic from the Basotho of Moshoeshoe during the second Sotho-Boer war of 1865 to 1868. The majority of the inhabitants were Barolong. The population was then estimated to be between 12000 and 15000, distributed between the town itself and the outlying villages. The staple diet was sorghum porridge, but the people also cultivated maize, wheat, beans, pumpkin, melons and a variety of sugar cane. Livestock, mainly cattle, sheep and horses were usually kept in a grazing camp in one of the outlying parts of the Barolong territory (Murray, 1992).

During the 1950's and 1960's Thaba-Nchu became subject to rigid "top down" planning, which resulted in the establishment of 40 betterment villages (trusts). These inhabitants had access to land on a communal basis, as well as to residential plots through a permission to occupy (PTO) (Krige, 1998).

In 1969 the Thaba-Nchu reserve had 3 irrigation schemes, 10 dams, one co-operative dairy and a cattle-breeding scheme. The traditional Tswana custom was to hold land under communal tenure and for the people to live together in a "stat" or large village. The agricultural lands and cattle posts were situated some distance from the village. Until quite recently few productive people were to be found in the villages, besides the very old and the very young, during the harvesting season. Most of the inhabitants would go to the lands and live there during the week. Nowadays few of the Thaba-Nchu Tswana have any land to which they can go. Most had their lands dispossessed in 1965. It was told that if they wished to have land and keep cattle, they had to move to trust villages, or otherwise go to Selosesha Township, a couple of miles outside the town of Thaba Nchu. Very few moved into the trust villages (Murray, 1992).

The trusts (betterment villages) consisted of a group of farmers, who shared agricultural resources such as water, a crush pen, dipping tanks, and other available facilities. One of the first trusts was Gladstone, which was established in the southern part of the Thaba Nchu district in the early 1940's.

Early in 1939 a reclamation survey was carried out by local officials to determine the most appropriate utilization of the land. Restricted stocking rates were perceived to be a fundamental prerequisite for the rehabilitation of the reserves. The argument being that the reserves were grossly overstocked. The genetic quality of stock was poor and would continue to deteriorate without adequate control of breeding practices. As a result, livestock became more vulnerable to diseases and unsuitable for draught purposes (Murray, 1992).

As background, the trust villages varied in size, with 50 to 200 families, and generally 6 hectares of arable land and sufficient grazing for 10 head of cattle per family. The inhabitants had to build their own houses and sanitation. Apart from the inconvenience of having to move and rebuild their houses, people complained of being allocated less land and thus fewer cattle could be maintained. Many also expressed the opinion that while there were agricultural advantages, the main reason for being grouped, was that so the people could be more easily controlled. However most people eventually complied to their fate and moved peacefully. The houses of those who refused to move, were demolished (Murray, 1992).

The betterment schemes, which involve the re-planning of the reserves and the settling of people in trust villages, was a genuine attempt to increase the productivity of the reserves - which were overgrazed and manhandled agriculturally. Therefore, it could be argued that the resettlement demanded by these schemes was justified. Provided one accepts that it was just to allocate 13.7% of the country to the African population (Murray, 1992).

Thaba-Nchu was reincorporated into the Free State province on the 27 April 1994 (Krige, 1998). Up to 27 April, 1994 the process of land allocation was administrated in such way that applications were submitted to the tribal authorities. Land allocation was then transferred to Agricor, where the Department of Land Allocation issued permission to occupy (PTO) certificates. Land and stock rights were allocated to all existing rural villages. In the case of each trust village, the surrounding farming winterland was scientifically

evaluated by Agricor to determine the total area suitable for grazing (6 ha per large stock unit) and for arable land. Grazing land was fenced off into camps, with boreholes to ensure proper natural resource management. Each year a stock census was undertaken to ensure that the number of animals did not exceed the carrying capacity of a particular area. Agricor provided agricultural extension from the service centres in the form of advice, maintenance of the infrastructure and the cultivating of lands at a commission of the profit (Erasmus & Krige, 1998).

Onverwacht/Botshabelo (place of refuge) only 12 km away from Thaba Nchu, was natural pasture in 1979. In 1986, it was the second largest rural slum in South Africa (after Soweto). It accommodated 500 000 people in 1989, increasing from 64 000 people at the end of 1979 (Murray, 1992). Currently it is the third largest urban area in the province of the Free State, after Bloemfontein and Welkom. The inhabitants are predominantly South-Sotho, as most people who had been moved there since 1979, had come from the northern, central and eastern districts of the Free State (Murray, 1987).

Botshabelo began as a place of refuge for nearly 40 000 "illegal squatters", living at Kromdraai within Thaba Nchu. It was also planned as a place of relocation of excess people from Mangaung, the black residential area of Bloemfontein, and for most people removed from small town locations and white farms all over the Free State (Murray, 1987). Conditions for the first to arrive were bleak. Each family was given a 15 X 30 m plot, a tent and food for 3 days. Onverwacht had not been all that unexpected. The farm itself and the neighbouring farm Vaalkraal, had been previously surveyed for development (Robertson, 1991). This location covered an area of 11400 ha, originally earmarked for urban development, of which 3972 ha had been developed, and 1309 ha was still vacant in 1996. Rural Botshabelo had been earmarked for the settlement of 133 small-scale farmers and a nature reserve adjacent to the Rustfontein dam (Krige, 1996).

In 1986 it was estimated that 80% of the people were unemployed. One of the biggest sustainability problems was firewood. All wood within any

reasonable distance had long since been utilized. People were using cow-dung, if available, for fire purposes thus denuding the soil of nutrients, which would otherwise be returned to it. According to an article in an academic journal, several categories of people settled in Botshabelo - then called Onverwacht farm. Among these categories were groups of black people owning farms in areas designated to white people and others that were evicted from white farms (Robertson, 1991).

CHAPTER 3

LITERATURE REVIEW

3.1 POPULATION, FOOD PRODUCTION AND SUSTAINABILITY IN SUB-SAHARAN AFRICA

In Sub-Saharan Africa, approximately 70% of the population live in the rural areas, where crop and animal production are direct sources of food and provide an income for subsistence (FAO, 1997). Sub-Saharan Africa is regarded as a food crisis region of the world. In this area food consumption by an ever increasing population exceeds current food production and supply (Hofmeyr, 1996). This statement is supported by the FAO (1997), whereby it is documented that in 1994, 69% of the economically active population in sub-Saharan Africa were engaged in agriculture, compared to 84% in 1961. Food security and the sustainable production of animal protein are major problems in the African continent. In recent years it has become more and more apparent that, in many areas, this is only possible with hardy adapted animals (Van Niekerk, 1996). Farm animals can make a direct or an indirect contribution to human nutrition. Cattle are the primary source of cash income that pastoralists use to buy grain food. Thus livestock production enhances the economic viability and sustainability of farming systems (FAO, 1997).

Spio (1997) stated that Africa remains a continent in which per capita food production continues to decline – yet in terms of natural resources, Africa has enough land for nutritional self-sufficiency. It is believed that even with the assumption of low levels of inputs, the combined potential productivity in all African countries could feed nearly three times the people in need. This statement is similar to that stated by Beets (1990).

According to the food security index, Mozambique is the 6th most food insecure country in the world, while Lesotho, Malawi, Swaziland and Tanzania rank only as medium food secure countries. Botswana, which ranks highly as an example of economic success amongst developing countries, was the 7th most food insecure country in 1988 (Van Rooyen, 1997).

Abalu as quoted by Fényes (1998), stated the importance of understanding and tackling the problem of food insecurity in Southern Africa in a broad context of poverty, inadequate income, lack of access to productive resources and lack of synchronization between potential supply and effective demand. Van Rooyen (1989) suggested that in order to solve the above mentioned limitations, small-scale farmers needs should receive priority from an economic and political viewpoint, to enable long term efficiency in the South African agricultural economy.

3.2 THE ROLE OF LIVESTOCK IN SMALL-SCALE FARMING

Small holders rely on the natural resources for their daily livelihood and because there are few alternatives for a potential source of income, small holder farming has to be sustainable. Beets (1990) proposed that in order for sustainability in agriculture to be achieved, production should be based on systems where there is room for continuous change, leading to marginally raised productivity that can be sustained indefinitely. This was seen in Bangladesh, where Hossain *et al.* (1998) found that the productivity within some farming systems increased by the adoption of innovations and livestock productivity increased from 50 to 147%.

In most African countries, livestock production constitutes an important sub-sector of agriculture. It accounts for about 25% of the value of agricultural production in developing countries. In Uganda for example, it is estimated that small holders and pastoralists own over 90% of the cattle (Kalunda, 1996). In Kenya, small holder farmers produce over 75% of the total milk generated (Lanyasunya *et al.*, 1998). In India 70% of all livestock is owned by small-scale farmers. In 1990, African meat and milk consumption was generally lower than in all other regions (Lebbie, 1996). To overcome this problem the majority of small-scale farmers in Africa have resorted to crop-livestock integration systems. This is seen in Kenya (Nduibuisi *et al.*, 1998), Bangladesh (Hossain *et al.*, 1998) and India (Rao, 1998).

In India, livestock contributes 8% of GDP of the country and about 26% to the agricultural economy (Kaushik & Garg, 1998). Livestock production is vital for subsistence and economic development of sub-Saharan countries. It provides a supply of essential nutrients throughout the year, is a major source of government revenue and export earnings, sustains the employment figure and ensures income to millions of people in the rural areas and contributes draught power and manure for crop production. This viewpoint is supported by Rao (1998).

The contribution of the livestock sector of Agriculture to the national economies of different countries varies a great deal. Coastal countries in Western and Central Africa show low inputs by livestock production. Countries with large areas of arid land show relatively high livestock production inputs e.g. Ethiopia (Jahnke, 1982). This contribution of livestock to the food production chain and fertilizer (manure), has been emphasized by several authors (Beets, 1990; FAO, 1997; Micheni, 1998; Nduibuisi *et al.*, 1998). In many parts of Africa, cattle are still used for dowry (lobola) (Madikizela, *et al.*, 1998). Livestock is mainly used for slaughter during traditional occasions such as weddings and funerals and may also be seen as a way of status recognition or as a symbol of wealth (Smalley, 1996; Düvel, 1998; Madikizela, *et al.*, 1998). In 1990 to 1992 livestock made out 97% of the total meat consumed in Sub-Saharan Africa (Lebbie, 1996).

3.3 LIMITATIONS TO CATTLE PRODUCTION

3.3.1 Nutrition

Environment, particularly level of nutrition, has a profound effect on the reproduction and production performances of both sheep and cattle, with subsequent detrimental effects on the efficiency of production (Webb *et al.*, 1999). Nutrient supply to livestock is a component of any management system that needs to be carefully evaluated, controlled and manipulated. The energy requirements to support follicle growth, ovulation and early pregnancy are extremely low, compared to the requirements for maintenance and production (O'Callaghan & Boland, 1999). Animal nutrition is, and has

always been a serious restriction to the farmer. This is highlighted in small-scale farming, where animals are dependent on communal grazing. Beets (1990) has shown that marginal land quality and potential is an important constraint in animal production. Most soils are inherently mineral poor and unstable in the tropics and soil fertility is generally lower than in the temperate zones, constraining productivity and sustainability of livestock production.

Management of livestock and grazing practices affect subsequent pasture re-growth. Low production of pastures is usually seen in extensive systems in which the livestock are left to graze without proper planning (Jahnke, 1982). The rationale of a fodder bank grazing system, is based on the assumption that all the fodder needed to support cattle for 12 months of the year under an extensive grazing condition, are mainly produced during 4 months of the year (Smit, 1999). Water shortages plus a lack of soil fertility are important constraints and better management of water utilization can improve animal nutrition and thus production considerably (Beets, 1990). Water conservation can be applied through catchment management programmes (Smalley, 1996; Averbach *et al.*, 1998). Kanaoka *et al.* (1998) conducted a study whereby cattle grazed on an improved pasture, shortened the fattening period and increased the average body weight and daily weight gain compared to traditionally non-improved pastures.

The management of grazing is very limited in most of the countries in Africa, and stocking rates and rotational grazing are not practiced (Madikizela *et al.*, 1998; Düvel, 1998). The role of body reserves during production needs to be understood. Grazing behaviour and the intake of pasture by the grazing cow are also critical areas influencing production. Inadequate pasture intake is considered to be the major factor limiting animal production on pastures (Dugmore, 1991). Under-nutrition delays puberty in both males and females and reduces production in these animals. If severe, it even manifests in the retardation of bone growth (Leonard & Loosli, 1965).

Alternative feeding systems and nutritional supplementation that use little or no grains and that are environmentally friendly should be explored. In China

beef is produced by feeding urea-treated straw and cottonseed cake as supplements. In Latin America and Asia, pigs are produced on cassava tubers, sugar cane tops and juice (Lebbie, 1996). All ruminant production, irrespective of type, is directly dependent upon an adequate supply of green feed, usually provided by natural grasslands or irrigated pastures. Primary production of both is affected by aridity in the natural physical environment (De Jager, 1996).

Matizha *et al.* (1995), suggested that supplying protein-rich forage for grazing animals and fixing atmospheric nitrogen for associated grasses, adapted tropical forage legumes could cause large increases in animal and forage production at a cost more affordable to farmers. Natural pastures form the mayor source of nutrients for beef cattle, but its low nutritive value and poor carrying capacity during the dry season are major constraints to animals on communal grazing. Mazorodze *et al.* (1994) pointed out the beneficial effects of offering protein supplements to beef cows on pastures during the dry season. In the trial, cows on range alone and range plus legumes had significantly lower calving and weaning rates, compared to those on range plus protein and planted grass pasture plus legume. The findings of this study are also supported by the work done by Manyuchi *et al.* (1992).

Due to a lack of grazing area, overstocking and degraded grazing areas, considerable reduction in cattle number in small-scale section is necessary, compared to commercial farming, especially during periods of drought. In 1983 to 1985 drought necessitated a reduction of livestock in the former Transkei of 21%, Bophuthatswana 26%, Venda 56%, Ciskei 57% and only 1.8% in the then South Africa (Magadlela & Kadzere, 1996). The rangelands of the Transvaal middle veld are characterized by a drastic decline in nutritive value during the fall and winter months. This necessitates the extensive use of protein supplements of planted pastures and fodder crops in livestock production systems (Rethman & Lindeque, 1996). This on-going decline in the quality of natural pasture can also be seen in studies by Kimambo *et al.* (1996), Viljoen *et al.* (1996) and Boyazoglu (1998). Economic efficiency of any animal production system depends largely on feed efficiency, which is a

function of feed consumption and the rate of weight gain (Scholtz & Van der Westhuizen, 1998).

3.3.2 Fertility of livestock

Throughout Asia and Africa, two systems of livestock farming are recognized at the village level, namely traditional and improved systems. These systems depend on climatic as well as socio-economic factors. Long calving intervals and late age at first calving are among the major problems encountered in animal production, but the factors responsible for the infertility of the herd remain obscure. Previous livestock surveys of village herds have not addressed fertility problems, resulting in many shortcomings on fertility data (Jainudeen & Salim, 1998).

Reproductive parameters are important when evaluating livestock management performance in animal production systems. Successful production results from constant attention to daily events, require more sensitive and immediate measurements of performance. In most cases a combination of failures in many of the independent factors creates the problems in reproduction that are currently encountered. A large database is necessary to define, correct and monitor reproductive management performance. As performance is ultimately determined by the quality of the labour force, ongoing monitoring for accountability and education is necessary for success (Klingborg, 1987).

Reproductive performance is the most important factor influencing the profitability of meat production. Early recalving of the lactating cow is influenced by several environmental factors, and this should be taken into account in management practices of the herd. The relative importance of these factors varies from area to area and is related to climatic factors, nutritional status of the natural pasture and the type of production system (Lademann & Schoeman, 1994).

Generally cows do not conceive before an optimal live body weight is attained. It is an accepted breeding practice that heifers should be bred when a specific

body weight is attained at a given age. During periods of nutritional stress, food reserves in the body are utilized with a high priority to physiological processes, and this could affect the age at which this target body weight is reached.

The reproductive performance of the breeding female is probably the single most important factor influencing herd productivity. This is because all forms of output depend on the female. It is the determinant of output, which is most susceptible to improvement, simply by using adequate management practices, already used by some farmers in the community. The usefulness of data on reproductive performance lies in the ability to help identify the causes for poor reproductive performance and hence create opportunities for improvement (ILCA, 1990).

Pryce *et al.* (1998) confirmed that calving interval and days to first service in cattle after calving were longer in first lactating animals, compared to older animals. Poor fertility is the major culling reason in first and second lactation animals. Calving interval and days to first service may be longer in heifers than in cows, as heifers have additional nutritional requirements for growth. For this reason, some farmers may calf heifers earlier in the season, lengthening the interval from calving to first service. However, this practice requires maintenance of an optimum feeding level during the post weaning period (Lepen *et al.*, 1993). This statement is supported by Spitzer (1986), who reiterated that many first calf heifers take longer to return to oestrus following calving, than do mature cows and fail to rebreed, or breed late during their second breeding season.

In a small-scale farming system, breeding bulls (although occasionally grazed separately during the daytime), are maintained with cows all the year round. Breeding females tend to conceive when the plane of nutrition is increasing and body condition is improving. Long inter-calving intervals suggest that the majority of animals do not recover sufficient body condition early enough after the previous calving, to calve annually. This is possibly in part due to animals exhibiting lactational anoestrus. There is an apparent reduction in the levels

of gonadotrophic hormones and the mechanisms that enhance its sexual activity in suckling cows. The effect is not seen in animals that are not suckling. The period of anoestrus is also exaggerated by poor nutrition. There is evidence that the effect is overcome by improved management, animal health and nutrition (Roderick *et al.*, 1998).

In order for a cow to conceive and maintain pregnancy, it is imperative that synchrony is achieved between a number of physiological and managerial processes. These include a visible manifestation of oestrus (Darwash *et al.*, 1999). Stewart *et al.* (1993) quoted the calving percentage of non-dairy cattle in South Africa to be about 50%. One of the major reasons for this low calving rate in beef cows, is an extended post partum anoestrus period exhibited by suckling cows.

Fertility of village herds is inadequately monitored, as organized reproductive management programmes are lacking. Innovations of new technologies on the management of reproduction should be focussed on solving field-oriented problems that benefit the small-scale farmer. Simple herd reproductive management programmes in selected village herds may reveal factors affecting the fertility of cattle in small village herds (Jainudeen & Salim, 1998; Sanjabi *et al.*, 1998).

De Groff (1996), suggests that improvement in bull management practices in the rural setup can substantially reduce breeding costs. It appears that in many cases producers could easily increase the mating load by half. A bull to cow ratio of 1:5 is practical and would be a much more efficient utilization of bull power. According to Lindsay (1996), males in a free ranging system are expected to mate with many more females. It is stated that attempts to reduce this low ratio have been frustrated by the lack of fully understanding the enormous variability in sexual capacity and libido of males of seemingly similar size and physiological condition.

3.3.3 Land Tenure

The tradition of communal tenure of the natural resources is almost universal in the African continent. The limitation on the improvement possibilities without institutional change remains. Communal land tenure adds the risk that improvement measures simply promote the existing overgrazing syndrome. Communal grazing land tenure also prevents an individual from making an effort. If an individual keeps the cattle off the communal grazing to conserve valuable species or fodder for use in the dormant season, the pasture will be grazed by the cattle of other farmers (Jahnke, 1982). In the African context, the communal grazing rights are based on the natural right to free and communal grazing and water for their stock on the communal land available to all grazing animals (Jeppe, 1980).

Demand for land has become urgent in small-scale farming in South Africa. Arable and pastureland is threatened almost everywhere by residential encroachment. Based on the provincial land reform research programme, 67.7% of South Africa's black rural households desire farm land (Marcus *et al.*, 1996). The available estimates suggest that the developing countries have not yet used half of their potential land resources, although in Asia the best land has long been occupied (Beets, 1990). It is therefore important that land be allocated and utilized to its potential before it is totally occupied by non-agricultural activities.

3.3.4 Climatic and cultural environment

The seasonal climatic effect on reproductive performance influence herd management efficiency and management programmes and are becoming more and more important as tropical, sub-tropical and arid areas of the world take on an even greater role in feeding the nations.

Thermal stress reduces the grazing time of animals in tropical and sub-tropical areas (Swanepoel & Hoogenboezem, 1994), as well as the duration of oestrus and a lower intensity of oestrous behaviour in cows (Thatcher & Collier, 1986).

Tropical degeneration syndrome in *Bos taurus* cattle has been first reported by Bonsma (1980).

Production of beef cattle in the tropics is characteristically low. The problem is largely environmental, mainly as a result of low quality nutrition during the dry winter months (Hetzel *et al.*, 1989; James *et al.*, 1992; Webb, *et al.*, 1999). Knowledge of the vast differences in South African people of various cultural backgrounds and socio-economic ethnic groups, is necessary when evaluating farming systems and developing new agricultural technologies. So for example, apart from being deprived of land and agricultural credit facilities, black South African farmers were confined to the reserves which have led to fragmented and unproductive barren lands (Butler *et al.*, 1977).

3.3.5 Animal health

Tambi *et al.* (1999) stated that most governments no longer have enough funds, while the availability and quality of veterinary services is rapidly declining. The private sector in the delivery of animal health services is gaining increasing recognition, as an alternative to State provision. The training of small-scale cattle farmers in animal health care is extremely essential as the Indigenous stock can carry a heavy worm burden and look apparently healthy as a result of host-parasite balance. In fact the disease charged environment in the rural areas can be held responsible for the low productivity of local stock to an extent of approximately 50% (Rao, 1998). Diseased livestock are less productive than healthy animals and lower production results in a lowered income and thus less animal protein production (Bruckner, 1995).

The use of home remedies when the cattle are sick has been reported in the southern part of the Free State Province (Dreyer *et al.*, 1998). The application of used engine oil as an acaricite and the use of chickens as predators of cattle ticks are examples of these home remedies. Rocha *et al.* (1991) reported that in the southern part of Mozambique small-scale cattle farmers practice tick control by dipping and vaccinating against the common diseases. These programmes are done free of charge and are supported by

local Government. However, the control of internal parasites is not usually practiced, as it is not financed by Government.

Sieff (1999) reported that in Tanzania, wealthy households are defined by the number of livestock they own. Therefore farmers from this group spend a greater portion of their income on animal health practices, as there are more cattle to care for. These practices include buying dip and worm remedies as well as vaccines against common diseases.

Environmental issues, many of which ultimately involve animals, are important in the spectrum of animal health. Soil erosion due to overgrazing and changes in soil structure and its ability to harbour disease-causing agents (pathogens) is an issue of concern (Soulsby, 1998).

One of the most important ways in which socio-economic factors influence disease occurrence, is through national disease control policies and practices. In much of Africa the public sector has played a dominant role in disease control, but in many countries of the region, a dramatic decline in government budgetary allocations of veterinary services has been experienced in recent years - resulting in deteriorating veterinary infrastructures and the decreasing ability to effectively deliver disease control programmes (Perry & Mukhebi, 1995).

Krecek *et al.* (1995) found the distribution of vectors causing diseases in cattle from commercial farming areas and those in resource poor farming communities to differ considerably. The commercial beef production sector has relatively low cattle stocking densities and high standards of pasture management. On the other hand, the informal sector has a high stocking density and poor pasture management, with sparse tree cover. The tick can therefore not survive and is absent from most of the communal lands of the highveld.

3.3.6 Access to credit

Access to credit still remains a major problem to small-scale farmers. Financial institution's demand for financial security from insecure, resource poor farmers, remain an obstacle. Most farmers still do not have lease of the land they occupy and for the financial institution to assist farmers, a lease is needed. Marcus *et al.* (1996) stated that the banking sector in South Africa has little experience in assessing development risk and lack staff to deal with rural financing at the community level. Spio and Groenewald (1997) stated that an efficient system of financial intermediaries is essential and sufficient environment for the growth of the economy and social production is a necessity. The establishment of rural and community banks may be supportive to the rural cattle farmers. The access to formal private financial services available in rural areas of Kwazulu Natal Province, is constrained by high transaction costs and inadequate collateral and poor debt servicing capacities (Fenwick & Lyne, 1998).

Spio (1997) stated that access to credit by small-scale farmers has been constrained by the reluctance of commercial banks to lend to farmers under customary tenure, where ownership titles cannot be given as collateral for loans. Coetzee (1998) reported that small-scale farmers made use of savings rather than credit. It was found that these farmers accessed loans from the development corporations and the informal markets. Credit corporate ventures such as village banks, that are organised and owned by farm members, are seen in the North West Province.

The Government has taken a number of measures to restructure the rural financial market, with the objective of building a system of financial services that provides much broader access for all (National Department of Agriculture, 1998).

3.4 CHARACTERIZATION OF SMALL-SCALE LIVESTOCK FARMING IN AFRICA

Within most of the African region, small-scale farming systems vary little regarding herd size or herd composition and the economic role of the system

in contributing to the country's economy. According to Rocha *et al.* (1991), the Mozambican traditional small holder sector makes up 87% of the national cattle herd. In Uganda it is estimated that the small holders own over 90% of the cattle (Kalunda, 1996), while in Kenya, small holder farmers contribute to over 75% of the total milk produced. In India 70% of all livestock is owned by small-scale farmers. In Ethiopia small-scale farmers produce 90% of the agricultural outputs (Smalley, 1996). In South Africa the setup is different and Marcus *et al.* (1996) stated that the agricultural economy is in the hands of the commercial farmers. Within the commercial sector, the productive output is concentrated. 25% of commercial farmers produce more than 80% of the livestock output. Self-sufficiency indices show that national food self-sufficiency has been achieved, where livestock production has an index of 98. Yet household food security levels are shockingly low. An estimated 60% of the rural population live below the subsistence level (Marcus *et al.*, 1996).

According to Spio (1997), small holdings play a very important role in African agriculture, both in terms of the number of people involved and the size of the farms. For example, in Mali, 75% of farms are under 5 hectare, while in Kenya 770 000 small holdings ranging in size from about 0.5 hectare to 10 hectare were recorded in 1990. The number of large holdings (>10 hectares) was only 3175. In 1971, 90% of the total population of Kenya lived in rural areas, of whom 70% lived on small holdings.

Van Rooyen (1989) found that white commercial farmers produced an output of R1298 per person (R119/ha cultivated), compared to R65 per person (R34/ha cultivated) for black small-scale farmers. The commercialized white farming sector generally operates under farm business principles, encouraging commercial production and is supported by specialized institutions and organizations such as the Land Bank and Research Institutes. Small-scale black farmers on the other hand, operate largely outside this institutional support structure, with restricted access and opportunities.

In South Africa, small-scale is often equated with a backward, non productive, non-commercial, subsistence agriculture and it is usually associated with the

black farmer (Kirsten & Van Zyl, 1998). This is in contrast with the situation in other parts of the world, especially Africa, where as already mentioned above, small-scale farming plays an important role towards food security and the country's economics. Magadlela and Katzare (1996) stated that the communal areas in South Africa support about 20% of the total cattle population in the country, while Machethe (1990) suggests that production in these areas is less than 10% of the total agricultural production in South Africa. However, evidence illustrates that small-scale farmers in developing countries are considered to be more efficient, given a level playing field, than large scale farmers. This has been established empirically in Asia, Latin America and Africa (Kirsten & Van Zyl, 1998).

Small-scale farming in South Africa can only gain its rightful place in the country's economy, provided efforts are made to enhance the application of present policy initiatives such as land reform, strengthening agricultural research, extension, provision of finances and the management of risk. Marketing and stimulating international trade, put in place, can eliminate limitations encountered in small-scale farming systems (National Department of Agriculture, 1998).

3.4.1 Markets

Bad roads, distance from markets, transport logistics and the high cost of moving livestock discourage many small-scale farmers from trying to market products. Instead they tend to produce only what can be consumed and sell locally (Mwakubo & Maritim, 1998). Productivity of small-scale farming can only be improved if the systems are partly commercialized. It is thus necessary to improve the economic environment in which the farmers operate (Beets, 1990).

Barnes *et al.* (1996) reported that constraints concerning agricultural marketing in Ghana, include lack of feed-back information from marketing centres to the producer, no price information and lack of support from financial institutions.

Attempts to improve the operational efficiency of livestock have been the focus of attention of many African livestock development projects and programmes. This is because there has been a tendency to assume that lack of infrastructure or institutional support has been the major constraint on livestock production. Often the provision of additional facilities failed to improve the efficiency or induce increased production and marketed offtake (ILCA, 1990).

From this literature review, it can be emphasized that cattle production is and has always been a very important tool towards food security. It can be seen that livestock production in the small-scale system has been used for many reasons in agriculture (food, work, bank and fuel). There are however, limitations in livestock production and reproduction that are obstacles in the way of improvement of small-scale farming efficiency. It is also interesting to note the differences in small-scale farming in Africa, more especially, when comparing South African small-scale farming with the other parts of Africa. It shows that South Africa has a long way to go to learn from experiences of their African counterparts.

CHAPTER 4

MATERIAL AND METHODS

This study was executed over a period of 20 months in two districts of Bloemfontein, namely Thaba Nchu and Botshabelo. These areas although close to one another (10 to 12 km from one another), showed considerable differences in agricultural infra-structure.

Thaba Nchu

Thaba Nchu is divided into 40 agricultural villages known as "trusts". In this study 21 trusts were randomly chosen. Animal health officers from Thaba Nchu are involved and responsible for the animal health of these trusts. These animal health officers were then also responsible for introducing the researchers and research assistants to the herdsmen in these areas. During this study it was important to work in close collaboration with these officers. The herdsmen then organized his men for a traditional gathering ("pitso") in order to introduce the researcher to the whole village. In this way the team was accepted and allowed to work in the villages.

The visits to the farmers within one village/trust were done by house to house visits, and the interviews were done on an individual basis and the data recorded. A questionnaire was presented to each animal farmer or household.

During the survey 255 cattle owners were visited and interviewed (Figure 4.3). This personal interview was essential, as data had to be as reliable as possible and come from a reliable source. The first attempt to interview farmers in groups was not successful as everyone gave similar answers to the same question. The numbers of cattle in the trusts visited, ranged from 250 to 300 per trust. The total number of cattle owned by farmers visited was 2694.

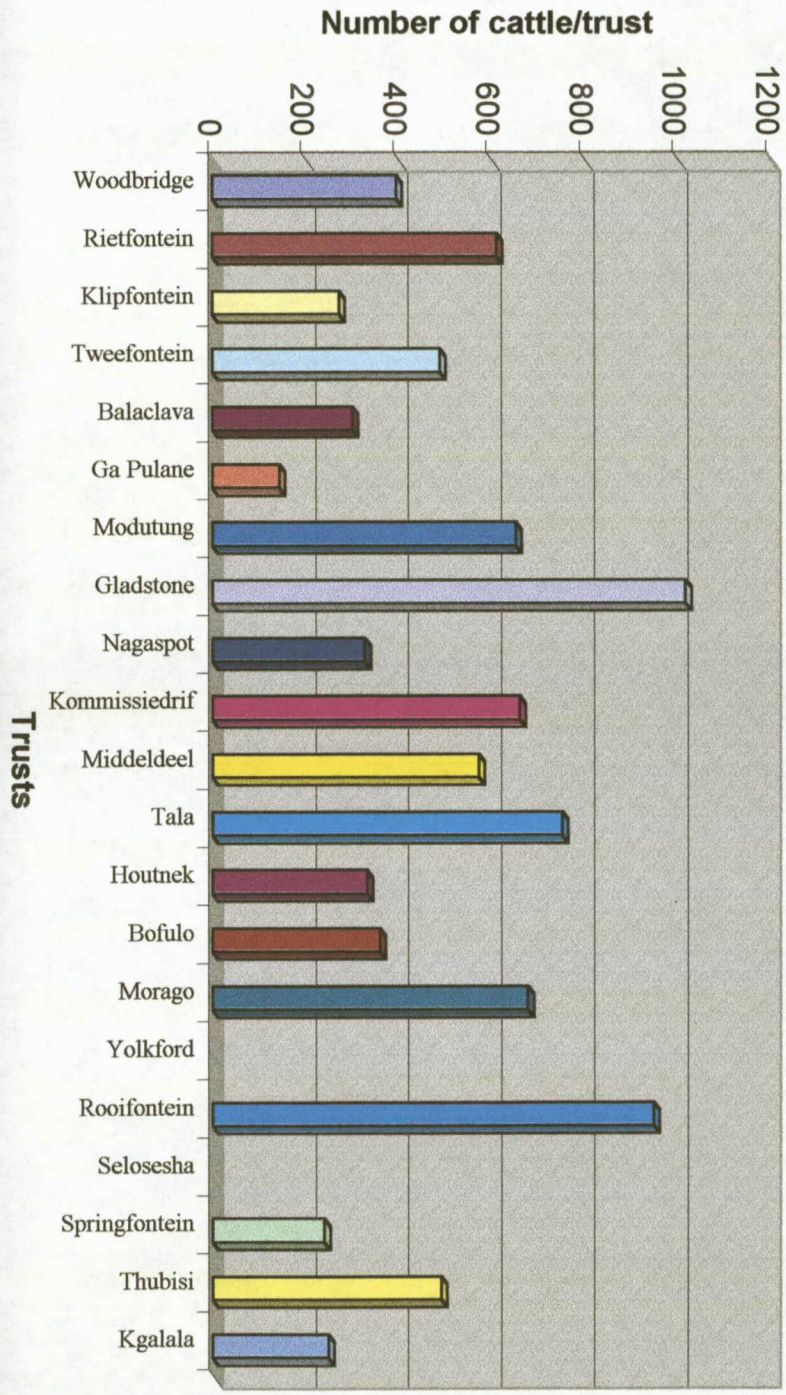


Figure 4.1 Example of the trusts visited in Thaba Nchu

Botshabelo

The other district studied, was Botshabelo, which is situated 10 km from Thaba Nchu. The area is divided into general blocks or sections. In this setup the farmers elect their own leader and it is through this person that the researcher can meet with the rest of the farmers. Ten sections were selected at random and within these blocks 265 farmers were individually interviewed. These farmers owned a total of 1907 cattle (Figure 4.2).

The questionnaire was designed to determine the farming systems used in these areas - more especially relating to the animal production (cattle) and reproduction practices. Information was accumulated of the farming systems with the aid of field days whereby farmers were gathered together and all aspects relating to animal production, discussed.

The questionnaire as such, had 28 questions in total (Annexure 1). The questions mostly related to the reproductive performance of the cattle and general animal production practices used. The aim in designing the questionnaire, was to try and determine the number and types of cattle owned by the farmers in these areas, and to try find a solution why the animal systems used were or were not economically and reproductively successful. Managerial aspects were considered when designing the questionnaire. The fundamental objectives were to characterize the farming systems used in these areas and also to determine which reproductive parameters can be obtained from farmers who keep cattle on communal grazing. The aim of the survey was also to encourage farmers to improve the production and reproduction performance of cattle through improved management practices.

Figure 4.2 **Sections of the Botshabelo district used for the generating of livestock (cattle) production data**

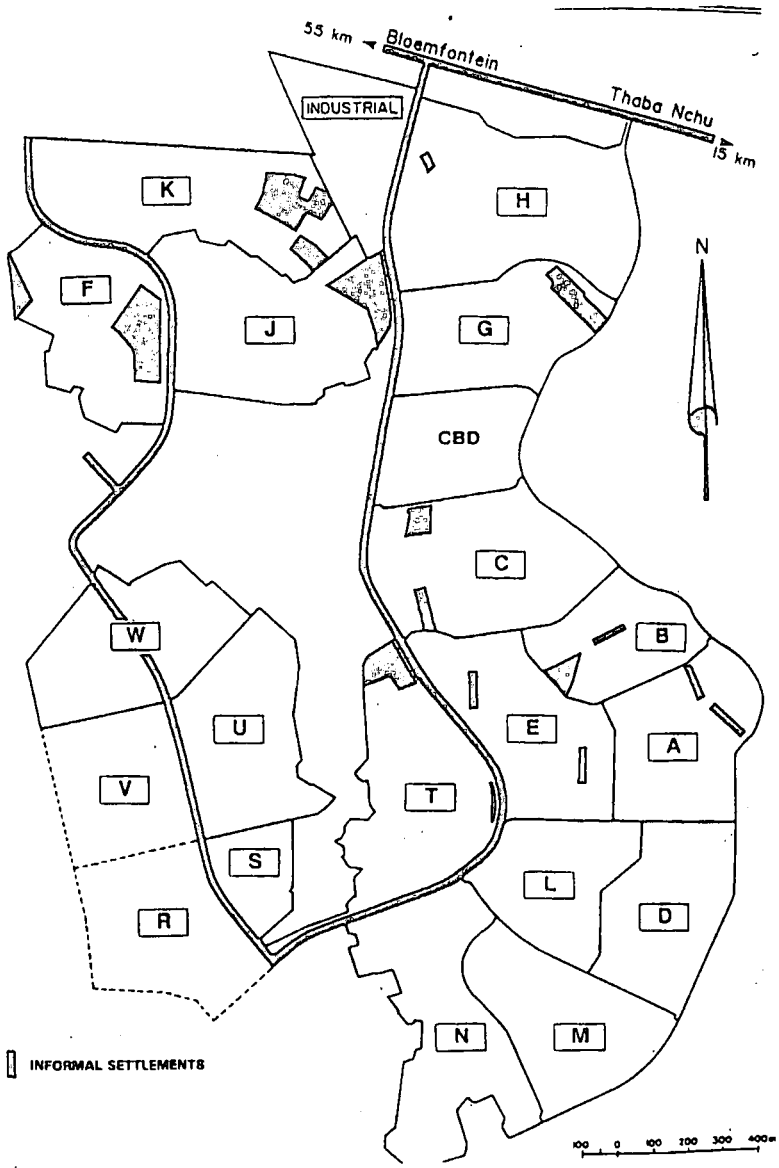
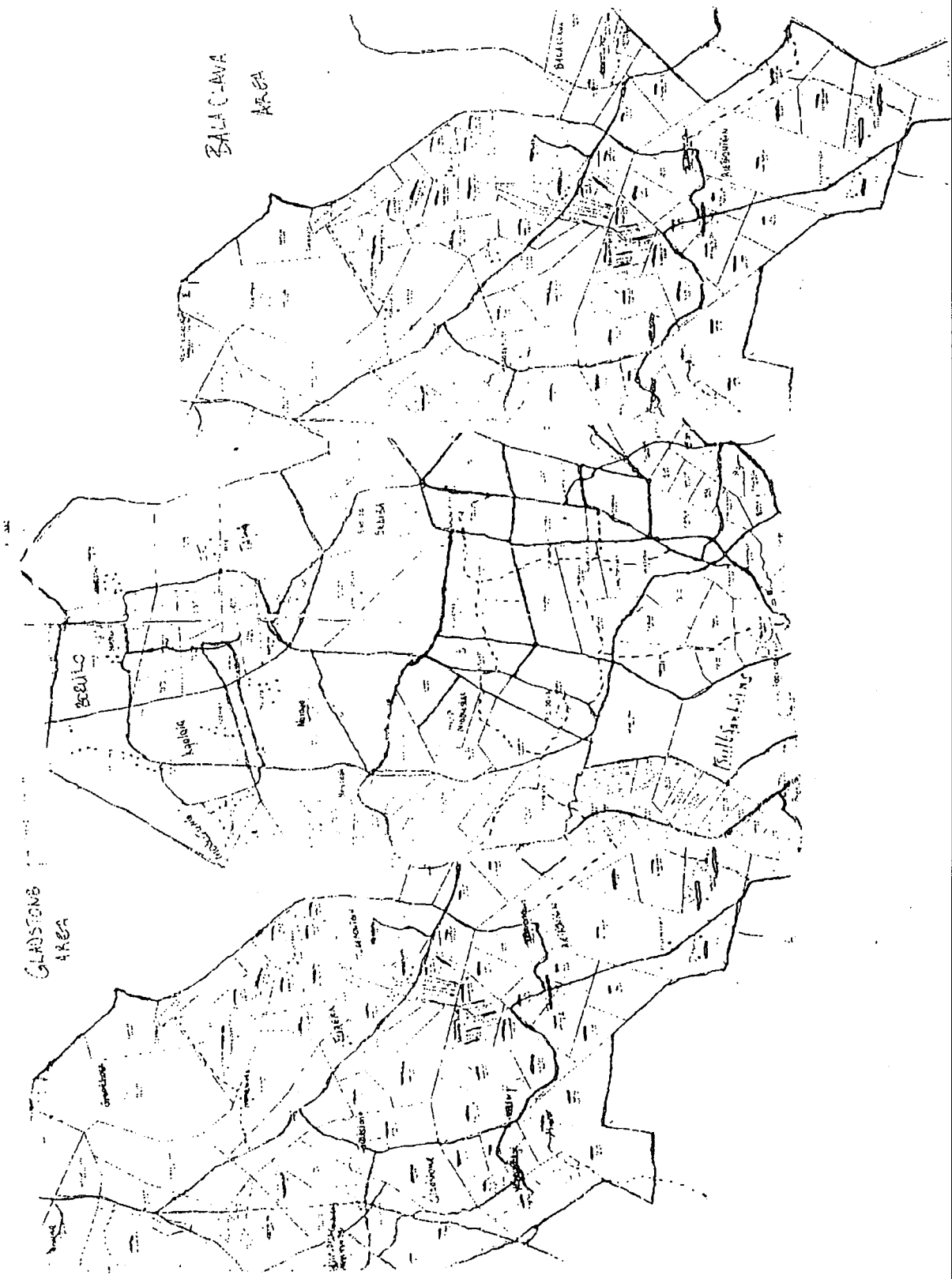


Figure 4.3 Sections of the Thaba Nchu district used for the generating of livestock (cattle) production data



CHAPTER 5

RESULTS AND DISCUSSION

5.1 HERD SIZE AND STRUCTURE

The data of the survey, regarding herd size per cattle farmer in Thaba Nchu and Botshabelo are presented in Table 5.1. The results show the mean herd size in Thaba Nchu to be 10.8 cattle, which is significantly higher ($p<0.01$) than the mean herd size in Botshabelo of 7.2 animals per cattle farmer. The majority of the farmers in both areas own between 5 and 10 head of cattle. About a quarter of the farmers in Thaba Nchu and a third of those from Botshabelo have less than 5 cattle. Very few farmers have more than 20 head of cattle (8.3% in Thaba Nchu and 1.9% in Botshabelo, respectively). No farmer owns more than 40 head of cattle in Botsabelo, while in Thaba Nchu, 3 farmers own 64, 92 and 107 head of cattle respectively.

Table 5.1 Herd size per cattle farmer in Thaba Nchu and Botshabelo

	Thaba Nchu	Botshabelo
Herd size distribution	**Number of farmers (%)**	**Number of farmers (%)**
<5 animals	67 (26.2%)	77 (29.1%)
5-10 animals	101 (39.6%)	152 (57.4%)
11-20 animals	66 (25.9%)	31 (11.6%)
21-50 animals	18 (7.1%)	5 (1.9)
> 50 animals	3 (1.2 %)	-
Mean herd size ± SD	10.8 ± 11.5 [a]	7.2 ± 4.8 [b]
Total number of farmers	255	265

[a, b] – Mean herd sizes differ significantly ($p<0.01$)

These results are in agreement with that reported by most authors in similar small-scale farming systems in Southern Africa. According to Dreyer et al. (1999), the average number of cattle/farmer was 9.33 in the same districts of the Free State. In Venda, Nthakheni (1993) found the average herd size to be 8 cattle/farmer, while in the former Transkei, mean individual herd size was

estimated at 6 (Bembridge, 1984). Rocha *et al.* (1991) in the south of Mozambique, showed similar results in his survey, with most of the farmers owning less than 10 head of cattle. These mean herd sizes are however much lower than those reported by Mtetwa (1982), who found the mean herd size in Botswana to be 16 cattle per household. Sieff (1999), has also reported herd sizes in Tanzania, where households have an average of 4.6 cattle/capita.

Murray (1992) reported that the severe drought of 1884 caused a great decrease in livestock numbers and had a great influence on the herd size of the small-scale cattle farmers in the Thaba-Nchu area. The same author reported that thereafter, several resettlements resulted in the establishments of trust villages, in smaller and less fertile lands, where the number of cattle/household was limited by law. These trusts although, intended to improve farming practices, ended up culling livestock and reallocating arable lands. This decision economically affected most of the households, who were still substantially dependent on crop and cattle farming for a livelihood. As the herd sizes and arable fertile lands decreased, these farmers started migrating to the urban areas where they could find work in order to support their families. Nthakheni (1993) postulated that the smaller the herd, the less the chances were of selling animal products and making a living out of livestock farming. It was also recommended that subsistence farmers acquire a certain minimum number of cattle to satisfy household and social needs, before indulging in commercial animal production. Tapson (1990), Swanepoel and De Lange (1993) and Muchena *et al.*, (1997), found herd size to be a critical factor determining herd production efficiency and supported these findings. According to the perceptions of cattle farmers in Lebowa on the number of cattle required to make a living, 10 head of cattle/household was considered to be insufficient by 92% of the farmers. More than 30 head of cattle/household were considered to be sufficient by 55% of the local cattle farmers (Fényes & Groenewald, 1983).

The significant ($P<0.01$) difference in mean herd size between the districts of Thaba Nchu and Botshabelo, and the fact that in general, the cattle herds in

Thaba Nchu were larger than those in Botshabelo, may be explained by the historical and socio-economic differences experienced in the two areas as described in Chapter 2. Thaba Nchu has been established as an agricultural area for small-scale black farmers for a much longer period of time. Farmers in this area, have a longer tradition of cattle farming, are more experienced, have a relatively larger grazing area and better supporting services. Botshabelo was more recently established and developed from an illegal squatter camp for unemployed people coming from all over the Free State Province, from which the majority of people had no agricultural background. In Botshabelo, there is less and poorer grazing areas available and the agricultural extension services are non-existent. Farmers have to travel to Thaba Nchu for agricultural assistance.

Tables 5.2 and 5.3 present the total herd structure and the percentage of farmers farming with different cattle classes in Thaba Nchu and Botshabelo.

Table 5.2 Total cattle herd structure in the Thaba Nchu and Botshabelo areas

	Thaba Nchu	Botshabelo
Herd Structure (Distribution)	**Number (%)**	**Number (%)**
Old cows (>10 Years)	1316 (48.8 %)	890 (46.7 %)
Young cows (3-10 Years)	32 (1.2 %)	242 (12.7 %)
Heifers (1-2 years)	279 (10.4 %)	146 (7.7 %)
Calves (<1 Year)	725 (26.9 %)	461 (24.2 %)
Young Bulls (2-5 Years)	44 (1.6 %)	29 (1.5 %)
Mature bulls (>5Years)	10 (0.4 %)	126 (6.6 %)
Oxen	288 (10.7 %)	13 (0.6 %)
Total number of animals	2694	1907

From the results obtained, it is clear that breeding females make up the largest group of the total herd in both areas, accounting for 60.4 % and 67.1 % of the total herds in Thaba Nchu and Botshabelo respectively. These herd structures with a high percentage of breeding females are typical of small-

scale pastoralist farming systems, in which the herds are directed towards reproductive animals and milk producers (Seobi, 1980; Sieff, 1999). Dreyer *et al.* (1999) reported that 96.5% of Thaba Nchu and Botshabelo farmers indicated that milk production was the primary product obtained from their cattle. Such high percentages of breeding females, have been reported by several researchers in the Southern African traditional cattle production systems. Sieff (1999), reported that breeding females compose 70% of the cattle herds in Tanzania, while in the Southern part of Mozambique, this group represents 54% of the total herd size (Rocha et al., 1991).

Table 5.3 Percentage of farmers farming with different age classes cattle in their herds, for Thaba Nchu and Botshabelo

	Thaba Nchu	Botshabelo
Cattle farmers	**Number (%)**	**Number (%)**
Old cows (>10 Years)	251 (98.4 %)	264 (99.6 %)
Young cows (3-10 Years)	7 (2.7%)	131 (49.4%)
Heifers (1-2 years)	88 (34.5%)	87 (32.8%)
Calves (<1 Year)	218 (85.5%)	233 (87.9%)
Young Bulls (2-5 Years)	44 (17.3%)	91 (34.3%)
Mature bulls (>5Years)	6 (2.4%)	19 (7.2%)
Oxen	108 (42.3%)	11 (4.2%)
Total number of farmers	255	265

The objectives of milk production and reproduction is clearly reflected by the extremely high percentage of old cows kept in the herds (older than 10 years) - 70% to 81% of the breeding females were kept by 98.4% to 99.6% of the farmers in the Thaba Nchu and Botshabelo areas respectively. The same tendency was reported by Rocha *et al.* (1991) and Nthakheni (1993), who are in agreement that small-scale cattle farmers prefer to keep more mature cows than any other category of animal. These old cows, although less productive, still produce milk and calves, which the farmers prefer to get from the animal production system. On the other hand, productivity is not the main issue for these farmers, as cattle numbers and not necessarily the quality or

productivity of the animals reflect the wealth of the traditional small-scale African farmer (Magadlela & Kadzere, 1996; Gertenbach & Kars, 1999).

The proportion of young cows and heifers, from the total cattle herds (Table 5.2) and the percentage of farmers with young cows and heifers in their herds (Table 5.3) in both areas studied are very low. This can limit both productive (milk and weaner calves) and reproduction (calving percentage) rates of these herds. The low percentage of calves maintained in these herds (26.9% and 24.2% in Thaba Nchu and Botshabelo respectively), confirm the low reproductive rates of these herds. Furthermore the herd structures, particularly regarding the female breeding classes, put at risk the long-term sustainability of these cattle farming systems. A low percentage of calves in the herds of small-scale traditional cattle farmers have also been reported by several other researchers (Bembridge, 1984; Rocha *et al.*, 1991; Sieff, 1999).

The herd composition as seen in Table 5.2 and the percentage of farmers with bulls in their herds as seen in Table 5.3, clearly demonstrate a shortage of mature bulls in the herds in these areas. The percentage of mature bulls in total was 0.4% and 6.6% in the Thaba Nchu and Botshabelo areas respectively, with only 2.4% and 7.2% of the farmers having mature bulls in their herds. These tendencies are also seen in the studies done by Rocha et al. (1991) and Sieff (1999), who have reported 6.1% and 3.5% of bulls in cattle herds respectively. In contrast Nthakheni (1993) reported higher percentages of bulls for cattle herds in Venda (17.9%), however, even here infertility problems were still experienced.

The fact that fewer farmers own bulls could be attributed to the communal grazing practice, which allows bulls of some farmers to run together with the cows of the whole village. These bulls are usually referred to as "communal bulls" and many farmers do not see the need of owning their own bulls - especially if the neighbours owns one. This practice, although economically justifiable, as bulls are said to be non-productive animals, may put a lot of strain on the communal bulls. In many cases the bull to cow ratio is not

considered. This problem is aggravated by the fact that most of these communal bulls are usually not tested for fertility and venereal diseases or vaccinated against common diseases. The low number of bulls and eventual fertility problems may affect the whole herd without being detected, limiting total herd productivity.

In Thaba-Nchu, oxen constitute 10.7% of the cattle herd, which is much higher than the 0.6% for the total herd in Botshabelo. These differences are also seen in the percentage of farmers with oxen in their herds (42.3% and 4.2% in Thaba Nchu and Botshabelo, respectively). High percentages of oxen in the herd structure are indicative of the use of animal traction for ploughing and transportation of water and agricultural produce (Blench, 1987). Animal traction constitutes one of the most important reasons for African farmers to keep and make oxen (castrate males). Several reports in Southern Africa indicate the positive relationship between number of oxen per farmer, area of land used for crop farming, total farm income and farming efficiency due to the characteristic integrated agro-pastoralist small-scale farming systems (Rocha et al., 1991; Muchena et al., 1997). A possible reason for such a low percentage of oxen in the herd structure of Botshabelo, may be the fact that there is very little arable land available for crop production - when compared to Thaba-Nchu, where farmers still have relative access to arable land.

It can be concluded that the herd sizes and structures from Thaba Nchu and Botshabelo are in line with most reports for the Southern African region. However, there are some differences between the two areas that cannot be ignored. The farming conditions and individual needs of the local cattle farmers determine these differences. Historical differences, the availability and access to land for grazing and/or crop farming and technical assistance may explain some of these differences. The herd structures generally indicate that milk production and reproduction are the most important goals of most of these farmers. Some farmers, also own oxen for animal traction. The herd structures also indicates an overall low productive and reproductive efficiency and the lack of technical support for farmers to take managerial decisions, such as culling of animals. These farming systems are mainly

focussed at own consumption (milk and meat) or subsistence farming. The herd structures of both areas are not well balanced, which threatens the long-term sustainability of the system.

5.2 CATTLE BREEDS IN THE THABA NCHU AND BOTSHABELO AREAS

In the Thaba Nchu area, the data show a high percentage of farmers knowing the breed type of their animals. It is difficult to talk about pure breeds, as the general situation is that almost all the cattle found in Thaba Nchu and Botshabelo are crossbreeds. Therefore "breed type" is used to define the main genotype of animals farmed in these areas. The main cattle types found in both areas were identified and cattle farmers were classified according to the main type of animals in their herds. Table 5.4 represents the main breed types farmed within both areas and the frequency distribution and percentage of farmers farming with these breed types.

A vast majority of the farmers in both areas keep dual-purpose animals - which can be used for milk production under harsh conditions. These animals form the bulk of the total herds found in both areas. From the herd structure, there are strong indications that milk production was an important farming objective. The breed type composition of the cattle herds further reinforces these indications. Bembridge (1984) also reported a high tendency for small-scale farmers in Kwazulu Natal to keep dual purpose animals. Sieff (1999) reported that milk and to a lesser degree beef were the most important products. It provided a staple food and was an important source of protein for subsistence farmers in Tanzania.

High percentages of animals of an undefined breed type in both areas (crossbreeds of several breeds) are those in which indigenous blood makes a major contribution. Most of these cross-breeding practices are not systematic done and not supervised.

Table 5.4 Cattle breed types found in the Thaba Nchu and Botshabelo areas

	Thaba Nchu	Botshabelo
Breed type	**No. farmers (%)**	**No. farmers (%)**
Friesian	-	79 (29.8%)
Brown Swiss	73 (28.6%)	-
Jersey	-	17 (6.4%)
Brown Swiss x Bonsmara	67 (26.3%)	29 (10.9%)
Brown Swiss x Afrikaner	9 (3.5%)	30 (11.3%)
Friesian x Bonsmara	24 (9.4%)	-
Afrikaner	17 (6.7%)	30 (11.3%)
Simmental	1 (0.4%)	-
Brahman	-	19 (7.2%)
Hereford	-	1 (0.4%)
Bonsmara x Brahaman	11 (4.3%)	-
Undefined type (mixed crossbreeds)	53 (20.8%)	60 (22.7%)

Indigenous breeds are usually referred to as "unknown breeds" by the small-scale African farmer and it is sad to realize that although Indigenous breeds form the bulk of the cattle owned by the African people, these farmers preferred exotic to the Indigenous breeds (Maule, 1973). Tapson (1990) reported that throughout the developing world, farmers have placed their Indigenous cattle populations at risk by the introduction of exotic breeds and crossbreeding practices. Literature has also demonstrated the resistance and tolerance of Indigenous cattle breeds to harsh environmental conditions (Sanjabi & Govindiah, 1998).

Recently it has been realized that the use of crossbred animals with the introduction of exotic *Bos taurus* breeds has resulted in poorer reproductive performances and lower productivity under extensive cattle production systems and harsh tropical conditions, when compared to the local breeds (Vilakati, 1990; Dhaliwal *et al.*, 1998). The advantages of using Indigenous

breeds to obtain higher and more cost effective productivity in the tropics, is being realized by researchers and farmers in the third world countries (Dugmore et al., 1996). As stated by Maule (1973), Bembridge et al. (1982) and Aswathnarayana (1998), an increase in production through the introduction of improved *Bos taurus* breeds is not going to be achieved until the traditional methods of animal husbandry are modified.

The attitude of small-scale farmers towards animal husbandry and the management of the cattle will have to change in order to accommodate cattle improvement schemes. The need has been emphasized to provide better breeding material to small-scale farmers and to make them more commercially orientated in the future (Gertenbach & Kars, 1999). Communal grazing practices make herd management and breeding improvement schemes difficult to implement, as there is little or no control in the management and the movement of animals (Mokoena *et al.*, 1999).

5.3 CATTLE MANAGEMENT PRACTICES AND PRODUCTIVITY

In this section, an attempt is made to characterize and where relevant, to compare the management practices used by small-scale resource poor farmers in the Thaba Nchu and Botshabelo districts.

5.3.1 Pasture/grazing management

In both areas, cattle graze all year round on communal land, one large area, without any fences. The communal grazing system is a characteristic of small-scale traditional livestock production systems in Southern Africa (Ivy, 1991; Smalley, 1996; Kangalawe & Christiansson, 1998). This grazing system is usually associated with poor-production and non-commercially viable cattle farming.

In Thaba Nchu and Botshabelo, mixed herds of cattle, small ruminants and many times donkeys and horses are taken to the communal grazing area, where they stay and graze during the day. At night the herds are brought back to kraals near the farmer's house to prevent stock theft. The same practice has been reported in these areas by Dreyer et al. (1999). Keeping

livestock in kraals at night for security reasons is seen in most rural areas of South Africa (Marcus, *et al.*, 1996). This practice limits the grazing time of the animals. Ruminants in the tropics and subtropics have a higher tendency for grazing, which in turn affects the body condition and the productivity of the herds (Bonsma, 1980).

Very few farmers in Thaba Nchu, who have arable land and produce crops, nutritionally supplement their herds for a short period during the dry season, with crop residues left on the lands after harvesting (mainly maize). This practice is however less applicable to Botshabelo, where very few farmers have access to arable land for crop production.

Although it was not the purpose of this study to evaluate the condition of the veld in both areas, there are evident signs of overgrazing and soil erosion in both areas. These observations are confirmed by De Villiers (1998) and Dreyer et al. (1999) from their studies in these areas. The general condition (body condition) of most of the cattle seen in these areas is poor to very poor. The carrying capacity of these areas is generally 6 ha per LSU (National Department of Agriculture, 1998). In order to determine the ratio between the carrying capacity and the stocking rate of both areas, an estimation of the equivalent total large stock units (LSU) was made for both areas. These results are presented in Table 5.5.

According to Dreyer *et al.* (1999), cattle constitute 50% of the total LSU's in the livestock farming systems. This means that the total LSU equivalent units can be estimated at 3940 and 3006 LSU, in the Thaba Nchu and Botshabelo areas, respectively. Based on these values and on the carrying capacity of the natural pasture, a total of 23640 ha and 18036 ha of grazing area should be available in Thaba Nchu and Botshabelo respectively.

Table 5.5 Cattle numbers and total large stock units (LSU) in the Thaba Nchu and Botshabelo districts

	Thaba Nchu		Botsabelo	
Class of cattle	**Total number**	**Equivalent LSU***	**Total number**	**Equivalent LSU***
Old cows (>10 Years)	1316	1184	890	801
Young cows (3-10 Years)	32	29	242	218
Heifers (1-2 years)	279	167	146	88
Calves (<1 Year)	725	290	461	184
Young Bulls (2-5 Years)	44	57	29	38
Mature bulls (>5Years)	10	13	126	164
Oxen	288	230	13	10
Total	2694	1970	1907	1503

*LSU per class of animals determined according to Meissner (1982) and Ivy (1991)

No information on the total communal grazing area is presently available in Botshabelo, and the last relevant information from Thaba Nchu refers to 1993 (Erasmus & Krige, 1998). Based on this information, the total area of land available for grazing in the villages of Thaba Nchu, where this study was conducted, is presumed to be in the region of 34242 ha. Based on the estimated LSU's, there is no reasons for the widespread signs of overgrazing and soil erosion found in this study and also reported by De Villiers (1998) and Dreyer *et al.* (1999) in these areas. There are a few explanations to possibly explain these tendencies:

(i) The total LSU equivalents in the area are much higher than the one estimated in this study. This may be due to a larger contribution of small ruminants, horses, donkeys and mules than the estimated 50% (Dreyer *et al.*, 1999).

(ii) The total grazing area presently available is much lower than the area that was available in 1993. This is due to residential encroachment and the invasion of grazing areas for other purposes.

(iii) The grazing capacity of the natural pasture is much lower than that recommended (6 ha/LSU). The same carrying capacity is given for the commercial farming areas, where the natural pasture is better managed and in a better overall condition.

(iv) A combination of all above mentioned aspects. A higher stocking rate is used in smaller grazing areas, which are overgrazed, resulting in veld degradation and soil erosion and thus the lowering of the carrying capacity of the veld.

The increasing demand for residential land is generating an invasion of the grazing areas by informal settlements, without proper sanitation. According to Dreyer et al. (1999), most of the complaints from farmers in Thaba Nchu and Botshabelo are associated with the urban environment. Livestock and people co-exist in an overcrowded environment, without clear borders between farming, cropping and residential areas. The same observations were made by Marcus, *et al.*, (1996), who found that arable and grazing land is threatened almost everywhere in South Africa by residential encroachment. Land is taken out of productive use in order to accommodate people's residential needs.

During the evaluation of the veld, a considerable number of plastic bags amongst other foreign materials such as paper, rubber, pieces of rope, plastic and tins were seen scattered in the veld. This problem is more evident in Botshabelo and is due to the proximity of the residential areas to the grazing areas. These observations are also supported by Dreyer et al. (1999). These foreign materials and particularly plastic bags cause a considered number of mortalities amongst ruminant animals in peri-urban areas of the Free State Province (De Waal, 1998).

When questioned regarding the condition and stocking rate of the veld, all the farmers from both areas, recognized the fact that the grazing areas were poor in quality and quantity and overstocked. Veld fires were also mentioned by

many farmers as one of the main reasons for the poor natural pasture condition, particularly during the dry winter season. Most of the farmers (100% and 95% from Thaba Nchu and Botshabelo respectively), were aware of the existence and the need for better veld management practices. It was suggested that the only possibility to improve veld management was by individual land ownership, which could allow land to be fenced and allow a rotational grazing system. This is in agreement with Van Rooyen (1997), who stated that communal land tenure arrangements do not allow for the security of land and sustained productive use.

Communal cattle have access to ground dam water, during the rainy season. During the dry season, cattle receive water in the kraals at night. This water, coming from boreholes, is considered to be of fairly good quality (De Villiers, 1998), and is kept in tanks, mainly for human consumption. Presently, livestock and people in these areas are competing for water. This problem is more evident in the Botshabelo area than in Thaba Nchu.

In conclusion, it can be mentioned that similar to other traditional small-scale cattle production systems in Southern Africa, the communal grazing system is used by the cattle farmers in Thaba Nchu and Botshabelo. The available information on the total livestock numbers, available grazing areas and the carrying capacity of the natural pasture are not realistic and should be reassessed. In general, due to overstocking and poor pasture management practices, the pasture areas show signs of soil erosion and deterioration of the natural vegetation. The nutritional condition (body condition) of the animals is generally very poor. The increasing need of land for residential purposes, further reduces grazing land and results in higher stocking rates and a faster veld deterioration. The local cattle farmers are aware of these problems and the urgent need for better veld management practices are called for. However, the communal land tenure system makes it extremely difficult to adopt better veld management practices. Private land ownership and the fencing of land is perceived as possible ways to stimulate veld or natural pasture.

5.3.2 Reproductive management in Thaba Nchu and Botshabelo

No cattle farmer in Thaba Nchu and Botshabelo practices a limited breeding season. Bulls have access to cows, all year round. From the herd structures it was evident that very few farmers in these areas own mature bulls (2.4% and 7.2% for farmers in Thaba Nchu and Botshabelo respectively). The use of "communal bulls", or the fact that bulls from a few farmers have to breed with cows of the whole village, explains the reason why, in most of the farmers or herds without bulls, cows still calve relatively regularly. The percentage of mature bulls from the total herd was 0.4% and 6.6% for Thaba Nchu and Botshabelo respectively. These values indicate that there is an obvious lack of mature bulls in Thaba Nchu. In Botshabelo, the total number of mature bulls is much too high for the total number of cows. However, the fact that only 7.1% of the farmers have bulls, indicate the uneven distribution of bulls in the individual cattle herds. In both areas, a considerable number of younger bulls (<5 Years old) and heifers are also present. It can be assumed that a third of these young bulls and a third of the heifers are old enough to breed. Based on the estimated total number of bulls and breeding females, the bull to cow ratio is set out in Table 5.6.

Table 5.6 The estimated bull to cow ratio in the Thaba Nchu and Botshabelo areas

	Total number of breeding bulls*	Total number of breeding females*	Bull to cow ratio
Thaba Nchu	25	1441	1 : 46
Botshabelo	136	1181	1 : 9

*Estimated numbers from the total number of animals in Thaba Nchu and Botshabelo

The bull to cow ratio in Thaba Nchu is extremely low, which is contrary to that recorded in Botshabelo. In Botshabelo there are far too many bulls than the number needed to guarantee the conception of the breeding females. Bull to cow ratios varying between 1:25 to 1:30, are recommended for extensive cattle breeding systems in South Africa and for bulls tested for fertility (Crichton, 1992). A small proportion of farmers with bulls and a low bull to cow ratio was also reported by Rocha et al. (1991) and Sieff (1999) in

Mozambique and Tanzania respectively. Nthakheni (1993) reported a high percentage of bulls in Venda (17.9%). Although there was an excess of bulls in this region, fertility still remained low.

The reproductive performance of the female herd is a major factor affecting herd productivity and farmer profitability. The number of animals born determine the potential number of animals available for weaning, selection, breeding, milk production and for selling as meat (Lishman, 1992; Lebbie, 1996). Reproduction is 10 times more important than production in economical terms and has a determinant effect on the profitability of extensive farming cattle production systems (Bellows & Short, 1994).

In communal cattle farming systems there are no farm records available, which can be used to estimate the inter-calving period (ICP) in Thaba Nchu and Botshabelo. The ICP as perceived by the cattle farmers in Thaba Nchu and Botshabelo based on the results of the questionnaire are presented in Table 5.7.

Table 5.7 Inter-calving periods for cows in the Thaba Nchu and Botshabelo areas

Intercalving period	Thaba Nchu		Botshabelo	
	No. of farmers	% of farmers	No. of farmers	% of farmers
9-14 months	233	91.4%	261	98.5%
2 years	9	3.5%	4	1.5 %
3 Years	13	5.1%	-	-

A vast majority of the farmers (>91%) in both Thaba Nchu and Botshabelo, when questioned about the inter-calving period of their cows, presented a period of between 9 and 14 months. Nine months is virtually impossible, and it can be assumed that these farmers were in fact referring to the period of gestation. On the other hand, 14 months (420 days) is a more realistic ICP, which represents an annual calving rate of 84%. However the numbers of breeding cows and calves present in both areas does not support such a high

calving rate (CR).

The estimated CR and ICP, based on the herd structure and on the number of potential breeding females and the number of calves, are presented in Table 5.8.

Table 5.8 The estimated calving rates and inter-calving periods in the Thaba Nchu and Botshabelo areas

Areas	Potential breeding females	Number of calves	Estimated Calving rate (%)	Estimated ICP (days)
Thaba Nchu	1348	725	54 %	676 days
Botshabelo	1132	461	41%	890 days

According to calving rate and ICP estimations (Figure 5.8), the calving rates (54% and 41% for Thaba Nchu and Botshabelo respectively) are much lower than perceived by the local cattle farmers and the intercalving periods (676 and 890 days for Thaba Nchu and Botshabelo respectively), are much longer than perceived by the farmers. These estimations do not take into consideration the mortality rates, as no records are available. However, even if these records were available, it is unlikely that the morality rates could account for such a high difference in the perceived and estimated ICP and CR.

The calving rates estimated in this study for Thaba Nchu and Botshabelo, are in agreement with the results of Dreyer et al., (1999), who have estimated a calving rate of 45.5% for Thaba Nchu and Botshabelo (combined). These results are much higher than the 14.9% CR, reported by Nthakheni (1993) in Venda, and are within the range of most of the available literature on small-scale traditional cattle farming systems in Southern Africa. Bembridge (1984) has reported a CR of between 26 to 53% in the Transkei while Rocha *et al.* (1991), reported calving rates of between 49% and 53% in the south of Mozambique. Bembridge and Tapson (1993) quoted a mean CR of 38.7%

and 43.5% for the Transkei and Ciskei respectively, and Sieff (1999) reported a mean calving rate of 52% in Tanzania.

The low reproductive rates in Thaba Nchu and Botshabelo can be explained by a combination of management-related factors.

(i) Poor nutritional condition of the animals, due to overstocking of the natural pastures which show signs of degradation and erosion

(ii) Unbalanced herd structure, particularly with concern to the number of breeding females, with an extremely high percentage of old cows (>10 Years old)

(iii) A low percentage of farmers with bulls in their herds and an insufficient number of bulls for the existing number of cows

Regarding gestation, parturition and the early postnatal periods, farmers were asked 3 questions, as set out in Table 5.9.

Table 5.9 Problems relating to gestation, calving and the post natal period

Question/Answer	Thaba Nchu		Botshabelo	
	Yes	No	Yes	No
Do your cows complete the gestation period?	253 (99.2%)	2 (0.8%)	260 (98.1%)	5 (1.9%)
Do your cows have calving difficulties?	60 (23.5%)	195 (76.5%)	14 (5.3%)	251 (94.7%)
Do your cows give healthy calves?	252 (98.8%)	3 (1.2%)	256 (96.6%)	9 (3.4%)

According to the results in Table 5.9, it would seem as if there are very few problems during the gestation period of the cows in both areas and cows seldom abort. Only a very small percentage of farmers (0.8% and 1.9% in

Thaba Nchu and Botshabelo respectively) indicated their cows not to complete gestation and abort. This suggests that the frequency of abortion in both areas is very low. Abortions in cattle are mainly caused by under-nutrition and/or infectious diseases (Rawson, 1986).

With regard to calving difficulties or dystocia, a higher number of farmers from both areas have experienced calving difficulties with their cows. This problem seems to be much higher in Thaba Nchu area, than in Botshabelo. The main causes of calving difficulties are quoted as being (i) too big calves at birth and/or (ii) too small females at calving, resulting in fetus-maternal incompatibility. Dystocia is responsible for an increase in newborn mortality rates, prolonged post partum periods and lowered re-conception rates (Rice & Morrow, 1986). Proper bull selection for ease of calving and a controlled mating of post-pubertal heifers are two important management aspects of a reproductive management program, which could prevent the occurrence of dystocia to a large extend. Under a communal grazing system on a single area without fences, it is impossible to efficiently keep the communal bulls away from the young heifers and to determine which bulls have a higher tendency towards causing dystocia.

In general, the local cattle farmers have indicated that their cows give healthy calves. Only a very small percentage of the farmers (1.2% and 3.4 % in Thaba Nchu and Botshabelo respectively) indicated that they do not have healthy newborn calves. The mothering ability of the cow, particularly its milk production and maternal instinct to nurse the calf very soon after birth is a determinant effect on the survival of the newborn calf.

In order to improve the present reproductive performance of these cattle herds, the nutritional and the reproductive management systems must be improved. With regard to the improvement of reproductive management, there is a need for more and improved bulls, which should be tested for fertility, be free from venereal diseases and be known for ease of calving. The use of more controlled mating systems, where cows detected in oestrus are taken to a camp and then mated by improved and tested bulls – hand

mating, as it has been done successfully in other African countries, is a possibility (Vilakati, 1990). The use of artificial insemination (AI) can also be considered at a later stage, when the overall management status has improved. The use of hand mating and AI can only be implemented if the farmers are capable of detecting a cow on heat (in oestrus). For this reason, farmers were questioned about their ability to detect a cow in oestrus. The results are presented in Table 5.10.

From the results in Table 5.10, it can be seen that almost all the farmers in Thaba Nchu (98.4%) and the majority of those in Botshabelo (67.2%) are able to detect a cow in oestrus. Therefore it should be possible to introduce hand mating or even AI programmes, with the use of improved bull semen in these areas.

Table 5.10 The ability of cattle farmers in Thaba Nchu and Botshabelo to detect a cow on heat (in oestrus)

	Thaba Nchu	Botshabelo
Farmers able to detect heat	262 (98.5%)	178 (67.2%)
Farmers not able to detect heat	4 (1.5%)	87 (32.8%)

5.3.3 Weaning

There is no available information on weaning rate, as no data is recorded regarding productive and reproductive performances of the animals. The farmers in Thaba Nchu and Botshabelo do not wean the calves. The lack of fences in the communal grazing areas, do not facilitate the separation of the calves from their mothers. The local farmers report that natural weaning occurs during summer, but the age at weaning is not known. In the southern part of Mozambique, Rocha *et al.* (1991) reported most of the small-scale cattle farmers to practice natural weaning and only 8% of farmers weaned the calves at 10 to 12 months of age. This situation is in agreement with a report by Nthakheni (1993) in Venda, who also found no weaning rates to be

available and no weaning practices in his study. Weaning percentage is a good measure of productivity in cattle production and a good indicator of farming efficiency (De Klerk, 1980), and is the major single factor determining profit in a beef herd (Ferreira, 1971; Groenewald, 1975). Bembridge and Tapson (1993), reported low weaning percentages (26 to 27%) in the Transkei and Ciskei, where a high calf mortality rate reduced the calf crop. High mortality and low weaning rates in addition to low calving rates, have an extremely high detrimental effect on herd productivity and farming profitability.

5.3.4 Milking and milk production

According to the data presented in Table 5.11, milk production is one of the main reasons why small-scale farmers in the Thaba Nchu and Botshabelo districts keep cattle. This aspect has already been seen in the herd structure and breed type of animals farmed within these areas. The high percentage of mature cows, as well as the high percentage of dual-purpose and crossbreeds predominantly containing dairy genes, are strong indications that as in most of the Southern African regions, milk production is a major reason for cattle farming (Dugmore et al., 1996; Lebbie, 1996; Düvel, 1998; Gertenbach & Kars, 1999).

Table 5.11 Percentage of farmers milking cows and the mean (±SD) total daily milk production per farmer in the Thaba Nchu and Botshabelo areas

Area	Farmers milking cows	Farmers not milking cows	Mean total milk production/farmer/day
Thaba Nchu	241(94.5%)	14 (5.5%)	4.15 ± 1.3^{a}
Botshabelo	256 (96.6%)	9 (3.4%)	3.46 ± 2.7^{b}

[a, b] Means within the column are significantly different ($p<0.01$)

Although an overwhelming majority of the farmers in Thaba Nchu and Botshabelo areas milk their cows once a day (during the early morning, before the cows go to the commercial grazing area 95.3% and 96.6% respectively), no farmer sells milk. Milk generated is exclusively for home consumption.

These results agree with those of Dreyer, et al. (1999), who reported that 96.5% of the farmers in these areas milk their cows mainly for home consumption and sold surplus milk in a raw state to the neighbours. These results are also in agreement to those reported by Rocha *et al.* (1991) in the Southern part of Mozambique, but are much higher than the 46% of the farmers quoted in Mashonaland, Zimbabwe and the 60% in Transkei who also milked their cows (Bembridge, 1984; Perry et al., 1987). Although some farmers would like to sell their surplus milk, certain constraints, such as marketing places, transportation and an organized infrastructure such as milk depots are reported. The same constraints were reported by Machethe (1990), Rocha et al. (1991), Monde-Gweleta et al. (1997) and Van Rooyen (1997) in other Southern African regions.

The total daily milk production per farmer in the areas surveyed is generally quite low. Farmers in Thaba Nchu produce on average a total 4.15 l of milk/day, which is significantly ($P<0.01$) higher than the average total production per farmer of 3.46 l milk/day in the Botshabelo area. The total daily milk production per farmer, showed great variation (between 1 to 11 l and 1 to 25 l in Thaba Nchu and Botshabelo, respectively). Farmers were unable to relate to the individual daily milk production of their animals, as no records and measurements are taken regarding milk production. The number of cows milked at any time depends on the domestic daily needs, and in many cases farmers have to milk several cows to get a few litres of milk. These findings are in agreement with those of Bessel and Daplyn (1977), Chikaka and Foote (1978) and Dugmore et al. (1996), who have reported milk production as low as 0.5 to 1.7 l/cow/day in certain regions of Southern Africa.

Milk is generally consumed after some acidification, but the drinking of fresh milk is not uncommon, especially with cooked maize meal for the children before going to school in the morning. The acidification of milk is very important to preserve the milk as no cooling facilities are available. The same habits were reported by Rocha *et al.* (1991) in the south of Mozambique.

The low milk production in these areas may be due to several factors, including the poor nutritional status of the animals and the poor reproductive management, which results in low calving rates and long inter-calving intervals. This results in longer lactation periods, with cows being milked in a lactation phase in which the natural production potential is low. In addition, the breed types of the animals used, has a low milk production potential.

5.3.5 Disease control practices

With regard to the health status and disease control of cattle, farmers were questioned regarding the occurrence of disease or sick animals in their herds. Table 5.12 presents a summary of answers to this question.

Table 5.12 Percentage of farmers with frequent cases of disease in their herds

Area	Yes	No
Thaba Nchu	51 (20.0%)	204 (80%)
Botshabelo	150 (56.7%)	115 (43.3%)

A relatively high percentage of the farmers (20% in Thaba Nchu and 56.7% in Botshabelo), admitted to having frequent cases of disease or sick animals in their herds. These percentages and particularly the one in Botshabelo is high. The difference in disease occurrence between the two areas can be explained by a variety of factors existing in the two areas. Farmers in Thaba Nchu have access to basic farming infrastructures such as dipping tanks and crush pens. They are also generally more experienced in farming and have more access to technical assistance regarding animal health than those farmers in Botshabelo. In addition the farmers in the Thaba Nchu area make much more use of disease control measures such as vaccination against especially Anthrax and Black quarter and dipping against external parasites. These differences are clearly illustrated in Table 5.13.

The poor adoption of basic disease control measures such as vaccination against Anthrax and Black quarter and the dipping for external parasites in

Botshabelo can be explained by ignorance and the fact that these farmers have never enjoyed free agricultural extension services in the past. In addition, there are no basic farming infrastructures such as crush pens or dipping tanks in this area. The extension activities in Botshabelo started only recently and the animal health and extension officers visiting this area are still operating from Thaba Nchu and are faced with transport problems. An extension office was recently opened in Botshabelo, but due to lack of funds, is still not operational.

Table 5.13 Application of disease control measures (vaccination and dipping) by cattle farmers in the Thaba Nchu and Botshabelo areas

Area	Number and percentage of farmers adopting	
	Vaccination	Dipping
Thaba Nchu	243 (95.3%)	246 (96.5%)
Botshabelo	14 (5.3%)	11 (4.2%)

Farmers in Thaba Nchu have enjoyed free extension programmes offered for many years by AGRICOR. Most of these farmers have realized the advantages of disease control measures and are still implementing them, even after the Government stopped the free services. These farmers now have to buy their own vaccines and dipping remedies. These findings are supported by Dreyer et al. (1999), who reported similar results regarding the adoption of disease control measures in these two areas. Nell (1998) has also reported low acceptance levels of basic livestock veterinary technologies and disease control measures by small-scale sheep and goat farmers in Qwa Qwa. These farmers prefer treating sick animals rather than preventing diseases. Most African extension services have been geared toward solving problems and have ignored general farm management practices such as disease prevention (Spio, 1997). Poor adoption of disease control measures were also reported by many other researchers in Southern Africa (Mazengera,1993; Schillhorn Van Veen, 1993). The main reasons for such low implementation levels of disease control measures are the general lack of

funds by most governments and the inability to support and maintain an efficient operational extension service (Bembridge, 1984; Nthakheni, 1993; Tambi et al., 1999).

The farmers in Thaba Nchu, who have animal health officers in their area, believe that there are not enough. Officers still have to travel long distances to get help when veterinary assistance is needed, and there is no communication network in the area. At the present moment, there are no veterinary officers in these two districts. Farmers depend on a limited number of poor equipped and ill-supported animal health officers. Tambi et al. (1999) reported that most governments in the African continent no longer have enough funds and are unable to meet the increasing demands of farmers. The availability of quality veterinary services is rapidly declining. All the farmers interviewed referred to the need and importance of an animal health clinic and a veterinarian in their farming areas. Usually farmers have no place to go when animals are ill. Most of the farmers apply traditional herbal remedies when their animals are ill.

The importance of preventive animal health in small-scale cattle farming cannot be over emphasized. Bruckner (1995), stated that in Sub-Saharan Africa, economical losses due to animal diseases average 4 billion rand annually, which represents approximately one-fourth of the total livestock production in this region.

5.4 SALES OF CATTLE AND MARKETING

The percentage of farmers selling and buying cattle in Thaba Nchu and Botshabelo, are presented in Table 5.14. Most of the farmers in Botshabelo, and all of those in Thaba Nchu mention that cattle (only old cows, bulls and oxen), are only sold whenever cash is needed. This happens especially around January every year, when school fees for the children have to be paid. This "bank" role of cattle farming is seen all over the Southern African region, where farmers keep cattle as an investment - as cattle are easily converted into cash (Rocha et al., 1991; Monde-Gweleta et al., 1997; Low & Kamwi, 1998).

The percentage of farmers selling cattle in Thaba Nchu and Botshabelo are in line with those reported by Tapson (1990) in Kwazulu Natal, but are much higher than that reported by Nthakheni (1993) in Venda.

Table 5.14 Percentage of farmers selling and buying cattle in the Thaba Nchu and Botshabelo areas

Area	Total number of farmers	Number (percentage) of farmers	
		Selling	Buying
Thaba Nchu	255	255 (100%)	15 (5.9%)
Botshabelo	265	164 (61.9%)	7 (2.6%)

The difference in the proportion of farmers selling cattle in the two areas may be explained by the differences in the herd sizes. Farmers in Thaba Nchu have larger herds and are better positioned to sell animals. This is in agreement with the findings of Nthakheni (1993), who stated that the smaller the herd size, the less the tendency to sell animals. The price is usually determined by the condition of the animal, although some farmers complain that they have to submit to the price offered by the buyer due to limited access to transport and the outside market. In this case the buyer is usually a stock speculator or a butcher. Spio (1997) stated that the poor transport network complicates marketing and this influence the price of the animals. Stimulation and support of local initiatives to cater for required agricultural services such as marketing and transportation is suggested (Van Rooyen, 1989). To a lesser extend, the selling of some cattle is also done within the community - to anyone in need of animals in the village.

The data presented in Table 5.14 also show that the proportion of farmers buying cattle, to be very low in both areas. Only 5.9% of the farmers in Thaba Nchu and 2.6% of those in Botshabelo, reported to buy cattle. The reasons for this situation may be due to the fact that these farmers have no money or access to credit to buy more animals. Farmers usually depend on their existing animals to reproduce and increase the herd size.

CHAPTER 6

GENERAL CONCLUSIONS AND RECOMMENDATIONS

It can be concluded that the general characteristics, farming conditions and management practices of small-scale cattle farming in the Thaba Nchu and Botshabelo districts of the Free State Province are no different from those seen in other regions of Southern Africa. There are however some differences and particularities in the Thaba Nchu and Botshabelo areas, which are determined by the farming conditions and the historical background of these two areas. Farmers from Thaba Nchu are in general more experienced and have a better farming infrastructure. In the past they also had more access to extension services and technical advice than the farmers from Botshabelo.

The mean average herd size in Thaba Nchu and Botshabelo is 10.8 and 7.2 animals per farmer, respectively. The vast majority of farmers (65.8% in Thaba Nchu and and 86.5% in Botshabelo) own less than 10 head of cattle. The herds are generally poorly balanced with regard to herd structure and are composed of a relatively large number of old cows, with very few calves and replacement heifers. Very few farmers own mature bulls (2.4% and 7.2% for Thaba Nchu and Botshabelo respectively) and the general bull to cow ratio is very low.

The main reason for small-scale cattle farming in these two areas seems to be that of milk production. More than 95% of the farmers milk their cows and to a lesser extent farm for meat production. Both actions almost exclusively for home consumption. For this reason the majority of the farmers in both areas keep dual-purpose (milk and meat) crossbred type animals, which can be used for milk production under harsh nutritional conditions. The total milk production/farmer/day in these areas is however, generally low (3.46 to 4.15 litres). In these two areas, keeping cattle is also a way to accumulate wealth or savings, as cattle (mainly old cows and bulls) are sold mainly to pay school fees and other unforeseen expenses. These objectives are also in

agreement with the findings of most of the research work done on other small-scale cattle farming systems in the Southern African region.

The general management and farming practices used in Thaba Nchu and Botshabelo, such as communal grazing, uncontrolled breeding and crossbreeding, with the use of "communal bulls" all year round, natural weaning, milking and disease control are still done in a traditional and ineffective manner. Cattle graze during the day on overstocked, poor, degraded and eroded pastures, with very little nutritional supplementation (mainly crop residues). Cattle are kraaled at night due to stock theft and receive the minimum, or absolute no health care. These poor farming practices are reflected by the poor body condition and low productive and reproductive performance of the animals. A high frequency of calving difficulties, high calf mortalities and the non-sustainable use of the most important natural resource (the veld), which is deteriorating rapidly, is also experienced. Calving rates in Botshabelo and Thaba Nchu are estimated as being 41% and 54%, and the estimated inter-calving periods being 890 days and 676 days respectively. The percentage of farmers experiencing cases of dystocia is extremely high in Botshabelo (23.5%), but acceptable in Thaba Nchu (5.3%). It was not possible to access the mortality rates, but it seems to be quite high. There are very few supporting systems in place and operational - to assist the local small-scale farmers to access modern technologies, credit and markets. Most of the farmers in Thaba Nchu (>95%) vaccinate their cattle against Anthrax and Black quarter and dip their cattle against external parasites, but only 5% of the farmers in Botshabelo vaccinate and dip their cattle. These differences in the adoption of basic disease control practices amongst others, explain the difference in the percentage of farmers with frequent cases of disease in their herds (57% and 20% for the farmers in Botshabelo and Thaba Nchu respectively). These findings are in line with reports from other Southern African small-scale cattle production systems.

The available information on the communal grazing area available for grazing, the carrying capacity of the natural pasture and the total number of animals

from the different livestock species using these communal grazing areas in Thaba Nchu and Botshabelo, seem to be outdated and need urgent re-assessment. This information is essential for policy making, for extension work, planning and implementation. A vast majority of the local small-scale cattle farmers recognize the need for better veld management practices. It is perceived that private land ownership, the stopping of the practice of burning the veld and the fencing of the communal grazing area are basic requirements to improve veld management and veld condition. The need is also recognized for more readily access to extension services and veterinarians, who should be available locally.

Recommendations

In order to improve the productivity and the sustainability of small-scale cattle production systems in Thaba Nchu and Botshabelo districts, the following recommendations should be considered:

At policy making level

- To review the individual land rights on communal grazing lands, to control the stocking rate in these areas,
- To create mechanisms to give farmers more access to credit,
- To force the implementation of already defined extension policies, aiming at supporting small-scale farmers in Thaba Nchu and Botshabelo,
- To create mechanisms for controlling and punishing individuals responsible for practices that destroy the natural pasture, e.g. such as burning the veld.

At extension service level

- To implement the already existing policies and provide a more efficient service to small-scale farmers in Thaba Nchu and Botshabelo,
- To re-assess the available grazing areas, the carrying capacity of the veld and the number of animals from different livestock species utilizing the communal grazing areas in Thaba Nchu and Botshabelo,

- To promote the implementation of better veld management practices, through the introduction of fenced camps, correct stocking rates and rotational grazing,
- To introduce grazing demonstration units with correct stocking rates, where each farmer can take a few animals, learn more about veld management and understand the advantages of such measures through improved production and financial returns,
- To create basic farming infrastructures in Botshabelo, such as holding kraals, a scale, etc.,
- To promote practical disease control and implement a minimum herd health package with the basic vaccinations and control of internal and external parasites at an affordable price for the local farmers,
- To introduce improved and fertile bulls which can be used by the local farmers. When a cow is detected in oestrus, she can be taken to a "bull camp" for mating and at a later stage a communal artificial insemination station can be considered,
- To promote the use of individual identification for animals and keep basic reproductive records to assist farmers in culling unproductive animals,
- To organize regular auctions for farmers, concentrating the sales during certain periods of the year when the farmers are in need of money (i.e. to pay school fees).

At research level

- To promote research studies in different areas of the country, aimed at identifying the farming characteristics, natural resource bases and the constraints limiting the productivity and sustainability of these livestock production systems.

ABSTRACT

CHARACTERIZATION OF SMALL-SCALE CATTLE FARMING IN BOTSHABELO AND THABA NCHU DISTRICTS OF THE FREE STATE PROVINCE

by

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This study was executed in Botshabelo and Thaba Nchu districts, located in the southern part of the Free State Province. A total of 255 cattle farmers from Thaba Nchu and 265 cattle farmers from Botshabelo were individually interviewed and responded to a questionnaire designed to assess the farming characteristics in both districts. The most important farming or management practices as well as the productivity and the sustainability of these farming systems were evaluated and the most important production constraints identified.

It was found that in general, the purpose for farming, the farming practices, the productivity and the main constrains which limit cattle production in both districts are very similar and are in line with most of the other small-scale cattle farming systems from other regions of Southern Africa. The majority of the farmers have a small number of animals in their herds (<10), generally dual purpose crossbreed type of cattle (milk and meat). Farmers have an unbalanced herd structure, orientated mainly for milk production, with a high

percentage of mature cows and very few calves and replacement heifers being kept. Very few farmers have bulls and use is made of "communal bulls", - which are insufficient for the number of breeding females. Almost all farmers milk their cows and use the milk for home consumption - locally they sell very few animals (usually old cows and bulls), only when they have financial needs. The keeping of cattle can be seen as a form of capital investment or saving. Due to poor veld management, overstocking, frequent veld fires and residential encroachment, the communal grazing areas show signs of overgrazing, veld deterioration and erosion. There are very few farming support systems and the general management (nutrition, breeding, weaning, milking, disease control practices, among others) is very poor, and are still being done in the traditional and ineffective manner - which limits the productivity of these farming systems and threatens their long-term sustainability.

The milk production and the reproductive rates are very low, but comparable with other traditional small-scale cattle farming systems in the Southern African region. Available information on these districts, regarding grazing areas available, carrying capacity of the natural pasture and the number of animals utilising the veld is outdated and is in need of urgent re-assessment. This basic information is needed for future extension service intervention. The majority of the cattle farmers in both districts have recognised the need for better management practices and suggest that individual land rights and fencing of the veld are the only possibilities to improve veld management practices and veld condition. The small-scale farmers have also recognised the need for more extension services support and veterinary assistance to make their farming enterprises more efficient.

OPSOMMING

KARAKTERISERING VAN KLEINSKAALSE BEESBOERDERY IN BOTSHABELO EN THABA NCHU DISTRIKTE IN DIE PROVINSIE VAN DIE VRYSTAAT

deur

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Hierdie studie is uitgevoer in die Botshabelo en Thaba Nchu distrikte, geleë in die suide van die Vrystaat Provinsie. 'n Totaal van 255 beesboere van Thaba Nchu en 265 beesboere van Botshabelo is individueel onderhoude mee gevoer, in verband met die boerdery eienskappe en 'n vraelys is voltooi. Die mees algemene boerdery of bestuurspraktyke sowel as die produktiwiteit en die volhoubaarheid van die boerderystelsels is geëvalueer om die belangrikste produksiebelemmerings te identifiseer.

Oor die algemeen is gevind dat die doel van die boerderye, boerderypraktyke, produktiwiteit en die hoof hindernisse wat beesproduksie in albei distrikte beperk, baie dieselfde is en in lyn is met meeste ander kleinskaalse beesboerderystelsels in ander dele van Suidelike Afrika. Die meerderheid kleinskaalse boere het klein getalle beeste in hul kuddes (<10). Oor die algemeen is dit dan ook 'n dubbeldoel tipe bees (melk en vleis). Boere het 'n ongebalanseerde kuddestruktuur, gemik hoofsaaklik op melkproduksie, met 'n hoë persentasie volwasse koeie en baie min kalwers en vervangingsverse. Min boere het bulle en maak gebruik van "kommunale bulle" – wat

onvoldoende is vir die aantal teeldiere. Baie boere melk slegs hul koeie vir huishoudelike gebruik en verkoop slegs diere (gewoonlik ou koeie en bulle) as daar 'n finansiële behoefte is. Die aanhou van beeste kan gesien word as 'n metode van kapitaalinvestering of spaar. As gevolg van swak weidingbestuur, diere oorbevolking, gereelde veldbrande en residensiële uitbreiding, toon die kommunale weiding tekens van oorbeweiding, veld agteruitgang en erosie. Daar is min boerdery ondersteuningsdienste beskikbaar en die algemene boerderybestuur (voeding, teling, speen, melking, siektebeheer, ens.) is baie swak en word nog op die tradisionele, oneffektiewe manier gedoen – dit beperk die produktiwiteit en dit bedreig die langtermyn volhoubaarheid.

Melkproduksie en reproduksie prestasies is baie laag, maar vergelykbaar met ander tradisionele kleinskaalse beesboerderypraktyke in Suidelike Afrika. Beskikbare inligting oor hierdie distrikte aangaande die weiding beskikbaar, drakrag van die veld en die aantal diere wat die veld benut is onopgedateer en moet hersien word. Hierdie basiese inligting is nodig vir toekomstige voorligtingsaksies. Die meerderheid beesboere het die nodigheid vir beter bestuurstelsels aanvaar en stel voor dat individuele grondregte en omheining van die veld moontlikhede is vir die verbetering van veldbestuurspraktyke en veldkondisie. Die kleinskaalse boere erken ook die noodsaaklikheid van meer en beter voorligting en veterinêre bystand ten einde hul boerderypraktyke meer doeltreffend te maak.

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