THE EFFECT OF LAND TENURE SYSTEM ON GOAT PRODUCTION IN KWANDEBELE

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M.Inst.Agrar (Animal Production)

by

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LIST OF ABBREVIATIONS

ANOVA = Analysis of variance

Av = Average

LSU = Large stock unit

Max = Maximum

Min = Minimum

mm = Millimeter

Mngt = Management

Mon = Month

No. = Number

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ABSTRACT

Indigenous goats are one of the most important sources of animal protein to many rural poor, but this is being threatened by the way they are managed and the way people utilize the land. Goats supply the rural people with meat, milk, manure (which can be used as fertilizers) and hides which can also be used for different purposes. Milk and meat have always been an important component in the normal balanced diet, providing energy, protein, calcium and other minerals and vitamins.

As the population in South Africa continue to grow, meat and milk will become more important as a source of high quality protein to reduce malnutrition especially in children. As such milk and meat production is a vital form of primary health care in both rural and peri urban areas. Donkin (1998) indicated that, in commercial enterprises, milk is usually from cows. However, the disadvantages with cows as a source of milk for the household and small holder farmer are that dairy cows are expensive, require large amounts of food, produce large amounts of milk (more than household needs), have a relatively long generation interval and when slaughtered have large carcases (posing problems of storage and distribution). In contrast, dairy and meat goats are less expensive, are easily handled by women and children, eat less, produce appropriate quantities of meat and milk for household consumption, reducing storage problems, have a short generation interval and produce more progeny. In spite of all these advantages, Bembridge and Tapson (1993) indicated that productivity from goats in the communal farming system, which is based on the extensive system is poor due to a low weaning rate, a high mortality rate and low turnover.

Goats are often blamed for veld deterioration and damage to soil subsequent to poor animal and grazing management. Goats are hardy animals, that can survive where other animals cannot (Webb *et al.*, 1998). One of the major problems at present however, is the availability of adequate grazing and the current land tenure systems. Goat farmers share common grazing land, which makes it very difficult to manage since the chief of the area holds the land in trust. This is one of the reasons why rural land is poorly managed. Our concern as researchers is how we can help rural people to sustain the productivity of these animals.

This research is focused on the fact that " some 30% of the population of South Africa are classified as ultra-poor (i.e. those who do not obtain sufficient food) and of these, 80% are blacks living in rural areas, it is understandable that the efficiency of animal production in rural communal farming systems has been perceived by some as the most important issue for animal production research".

The aim of this study was to quantify the effect of land tenure system on goat production in two rural villages, Moutse and Phooko. The analysis is based on 1998 / 1999 survey data. Surveys of landless and smallholder farmers were conducted in the KwaNdebele district of Mpumalanga in 1998 and 1999. In total 26 farmers were interviewed. The

interview was through a questionnaire which was distributed to participating farmers with the help of an extension officer from the villages.

The effect of land tenure on goat production was analysed by determining the productive efficiency of livestock in the villages, and the contribution of livestock to the livelihood of the local people. Finally farmers were classified according to categorical characteristics such as type of animal farmed with, those practicing minor management versus those who do not, and the type of farming system practiced e.g. animal or mixed farming.

The results show that all the categories mentioned i.e. type of management, type of farming and land tenure system influence animal performance to some extent. It is concluded from the results that to successful farmers, land tenure seems to be a major limiting factor. The characterization of farmers that are economically successful in terms of goat / animal husbandry shows that they have little or no land and no regular substantial off farm income. Therefore, they rely mainly on goat / animal husbandry to provide a constant income, which emphasize the importance of livestock in rural farming systems.

Although goats are less popular compared to cattle (often used for lobola), they form an important part of most rural farming systems, particularly in providing meat and milk for rural people. The results of the survey show that from the 26 farmers interviewed, 13 are farming with goats and cattle, and the remaining 13 with a combination of goats, cattle, sheep and sometimes pigs.

KwaNdebele, like other former homelands has an agricultural potential which is largely underestimated because of lack of skills and training, absence of ownership, overstocking and lack of veld management. From the result, it is concluded that it is difficult to enforce proper management and conservation measures under communal land. Although the results suggests only a slight effect on land tenure on animal performance, land tenure does have an effect on the implementation of conservation measures. In economic terms, the cultivator / farmer is said to lack incentives to carefully husband the holding he does not have property rights that internalise the costs and benefits of conserving or failing to conserve the land (Basset and Crummey,1993)

CHAPTER 1

1.1 INTRODUCTION

If the people of the poor countries are to be fed, the food will have to come from their soil, their resources and their farming systems (Food and Agriculture, 1976). Very few of the developing nations give evidence of having understood that food independence is an internal affair and that if agricultural development is given priority, it can lay the foundation for modernizing an entire economy.

The importance of goats in arid and semi-arid areas has long been acknowledged. Goats are especially popular among poor rural households. According to Peacock (1998) " goats have been disparaged as the poor man's cow, derided as a lecherous tin-can eating pest and demonised as a horrid destroyer of the environment, but thanks to the activities of the international goat association and its members, this image is being effectively countered." Over the last decade or so, a more positive message about the goat is being articulated. The goat is an important source of food, security and income for many rural people in developing countries, but these benefits are underreported because the goat is less likely to enter commercial channels or attract the attention of policy makers than other types of livestock.

The goat is emerging as an attractive livestock option for small scale farming systems in rural areas under intense population pressure because of the goat's small size and its ability to utilize a broader range of vegetation than other ruminants, notably cattle. Combination of goats, which are predominantly browsers, with cattle and/or sheep, which are grazers, give better utilization of vegetation in savanna and bushveld areas.

The adverse effects of goats on the environment generally have been overstated. Improved and appropriate management can often control the potential for environmental damage by goats. In fact, the goat can contribute significantly to sustainable agriculture and reduced environmental degradation when properly managed. They are particularly important and effective in preventing bush encroachment into grassland. The goat can be an effective tool for development among the rural poor. Benefits include improved childhood nutrition, augmented family income and empowerment of women.

The constraint facing rural people seem to be the unavailability of land together with denied access and tenure rights. It has been argued that security of tenure affects both incentives to invest and the availability of resources to finance investment (Feder & Onchan, 1987; Feder & Noronha, 1987; Van den Brink *et al.*, 1994). Land in rural areas is held in trust by the chief of the tribe with the underlying title vested in state. The chief allocates land the way he sees fit, i.e. according to individual's needs and potential. However no rights of ownership are given. Individuals only have usufruct rights and grazing land is communal, which is why land in many rural areas is overgrazed eroded and highly degraded. Measures of conservation are not practiced because of a lack of rights over the land. This in turn affects the productivity of livestock in many rural areas.

Recent studies of indigenous land tenure systems in Africa have tested the links between security of the tenure and farm productivity. According to Feder & Noronha (1987) the evolution of land rights (i.e. land registration and titling) increases security of tenure and is closely related to advances in farming technology and efficient allocation of resources, provided the land registration is effective and government ensures that land rights are enforceable.

1.2 MOTIVATION FOR THE STUDY

An overriding characteristic of the South African agricultural economy is the unequal distribution of land and access to resources. The principal cause of this inequality is the skewed distribution of access to markets, power and resources. The majority of the poor in South Africa reside in rural areas with no or limited access to land, despite the fact that they depend heavily on the natural resource base for their basic needs and for the survival of their livestock. Access to land as a limitation results in the overutilization of the small piece of land available to them. Most of the land in rural areas is legally held in trust by the chief of the tribe with underlying title vested on state. Lack of security of tenure in rural areas seems to have an effect on the productivity of rural people and their livestock. Yet very little information is available regarding the effect of land tenure on livestock production potential as well as the contribution of livestock (in this case goats) to the income of rural, landless small holder farmers. For this reason a research project was initiated to investigate rural livestock production in Mpumalanga and to develop some guidelines regarding the livestock production potential. More often rural small-scale farmers are not regarded as farmers but peasant farmers.

The government white paper on agriculture (White Paper on Agriculture, 1995) defined a farmer, irrespective of his/her race, gender or scale of production as a land user who engages productively in agriculture, either on a full-time or part-time basis and regardless of whether agriculture forms the principal source of income. This definition shows that rural small-scale producers are indeed farmers and are therefore entitled to all the benefits accredited to commercial farmers. Rural small scale producers have an agricultural potential provided that they gain access to all the suitable resources i.e. land tenure rights, credit, subsidies and extension services. The fact that they have so little access to resources and yet they are so productive is challenging. Their lack of resources has led them to select only those animals adapted to their conditions so as to avoid complications and minimize risk. The challenge to researchers is how to help them and provide them with relevant resources so they can prosper.

Despite changes in land tenure, increase in human population, growing economic pressure and heavy grazing, pastoral lands have maintained animal populations in the developing world for centuries and provided a stable mode of subsistence. Land-less farmers are deprived of such benefits as credit, subsidies, extension services and marketing support, a

situation which has a negative impact on their performance. They farm on leased land, for which no one is responsible in terms of conservation. By contrast, land tenure and titling can encourage farmers to properly manage natural resources and thereby improve their potential as farmers. Lack of access to land can lead to serious inefficiencies and negative environmental effects such as the use of marginal and unstable land, lack of conservation measures to maintain land quality, over-utilization and abandonment of used land and exposure of land to all forms of degradation. In addition to the lack of access to land and resources, it is generally true that the poor do not own resources or reap the benefits of conservation and thus have few incentives to conserve the natural resources.

There is a continuing debate about whether the indigenous African land tenure systems are a constraint on land productivity and performance of livestock. Authors such as Place and Hazel (1993) see indigenous tenure as a constraint, providing insufficient security to induce farmers to make land-improving investment or to induce lenders to finance such investment. Most of the research done in the past was conducted in the interest of large-scale commercial farmers (mainly white). The needs of the resource poor small-scale farmers (mainly blacks) were largely ignored.

Goats are very popular in rural areas among poor household. Yet little is known about the economies of the goat husbandry systems to rural people. Goat husbandry contributes to the income of small holder farmers and its economic success depends on the availability of resources available to farmers e.g. land, livestock, labour and off-farm income. In the Sahel, for example livestock raising is one of the best investments despite severe droughts and claims of environmental deterioration (Breman & De Wit, 1983). There are a number of reasons why poor rural people keep goats:

- They are cheaper to buy and quicker to raise than cattle.
- They reach maturity early and breed readily to increase their number.
- They reach slaughter weight quickly so money can be recovered quickly from selling them for meat.
- Drought conditions are known to result in high mortality in cattle, but goats can survive better and build up the numbers again quickly. This is partly because goats, as browsers, can utilize shrubs, which survive droughts better than grass.
- Goats play an important role in cultural and religious ceremonies.

If goats are managed correctly to avoid overgrazing and veld deterioration, they play an important role in improving the quality of life of rural people and can be used to control bush encroachment.

1.3 INCOME OF RURAL PEOPLE

People in rural areas get their income from the formal and informal sectors, pensions, other social transfers, remittances and unreliable marginal sector income. Inequality of income within the rural areas is a serious problem. Abbott and Makeham (1990) indicated that 50% of the families in rural areas receive less than 13% of rural income, while the top

9% receive 50% of the income. They further showed that land-holdings average little more than 1ha and much less than this in the hill areas where 60% of the population live. Land tenure is very insecure for many people with the majority of hill land being pledged against loan in cash or in kind by private money landers.

Panin and Mahabile (1997) in their studies in Botswana found that livestock is a major source of income and employment for most rural dwellers who are the majority of the estimated total population of 1.5 million people in the country. In addition, livestock, and in particular beef cattle is a main source of foreign exchange generated by the agricultural sector. However the distribution of cattle ownership is very skewed, with 30 to 40% of rural households without any cattle. In contrast, almost every household owns at least one small ruminant. Indigenous goats are poorly researched and receive little institutional support despite the fact that they are extremely popular and that the production systems are suitable for the prevailing harsh climatic conditions in the country. Lack of information on the profitability of small ruminants and their income contribution to rural households is assumed to be a principal reason for the non-recognition of their importance by policy makers and relevant institutions.

CHAPTER 2:

LITERATURE REVIEW

2.1 INTRODUCTION

For many developing countries, small ruminants fill small niches. As viable links in the agricultural production chain, these ubiquitous creatures generate income and employment for women, children and the elderly. Outnumbering cattle in many regions, they also fit a niche inhabited by the urban poor. Their role in sustaining agricultural production systems in many ecozones clearly shows that small ruminants are vital to economic development. As sources of meat or quick cash, these drought resistant animals cannot be ignored any longer (Basset and Crummey, 1993).

Many environmentalists are convinced that a sustainable livestock system is an oxymoron (Basset and Crummey, 1993) because the word livestock brings to mind overgrazed hillsides or compacted tropical soils. In countries with well-developed economies, livestock is often associated with human health problems that are a result of overconsumption of animal fat. Livestock is blamed for both their direct and indirect negative impact on the environment, but even livestock critics admit that, if managed correctly, livestock can play an important role in agricultural development without any negative impact on the environment. The fact is that in many countries the largest part of the country is suitable for extensive livestock production only. For South Africa it amounts to more than 80% of the country.

We are concerned about the reproductive performance of indigenous goats in Southern Africa. There seem to be very little which is being done to ensure improvement in their productivity. In this literature survey we will look at different factors affecting their productivity, the way in which goats are managed and how the allocation of land affects their productivity. More often goats are poorly managed and this is attributed to their ability to survive under harsh conditions and also because most people in rural areas rear goats for their subsistence i.e. to support their families. For this reason they do not usually consider the possibilities of increasing production either through cross breeding or artificial insemination. A very important aspect in this regard is the awareness of resource poor farmers of risk and their emphasis on minimizing it. Under such condition animals' which are hardy against the vagaries of droughts, diseases and poor management are more attractive options than more productive breeds which are vulnerable to these conditions. Production is often poor due to inbreeding.

Historically, the South African agricultural sector is dominated by large farms that are owned and operated by a small number of individuals or companies, and this can be attributed to various policies and government actions which have reduced small scale farming in South Africa to a state where it contributes very little to the economy as a

whole and to the welfare and livelihoods of rural dwellers. The majority of the poor in South Africa reside in rural areas with no or limited access to land.

Originally the homelands were justified as areas where Africans would do subsistence farming, but much of the land was either under-utilized or over-utilized leading to degradation. This can be attributed to some of the restrictions that were imposed on blacks, and the fact that they were seen as small-scale farmers. They were overtaxed and were not allowed to join state sponsored marketing co-operatives, and without membership in these organizations it was difficult to secure credit. Restrictions on the right to own land also reduced small-scale farmer's performance. Security of tenure affects both incentives to invest and the availability or resources to finance investment. Security of tenure can be defined as the individuals perception of his or her undisturbed rights to a piece of land on a continuos basis and the ability to reap the benefits of labour and capital invested in the land.

The misperception is that "small scale" is often viewed as the non-productive, non-commercial subsistence agriculture found in the homelands. However, the evidence is that small-scale agriculture has the potential to generate employment and income opportunities in rural areas irrespective of their limited access to land and credit. The challenge facing South Africa is to remove the structural constraints that inhibit the growth of the smallholder sector. This paper is meant to address the effect of land tenure systems on the productivity of small-scale livestock farmers. Land tenure and titling influences the ability and willingness of farmers to adopt new technologies that will improve their production, and therefor should never be underestimated. Land is a scarce resource, which needs to be conserved.

2.2 BRIEF HISTORICAL BACKGROUND

2.2.1 Introduction

The dual structure of agriculture in South Africa and the comparatively low productivity of small African farms observed today, is not the result of genuine economies of scale in the large farm sector, but of decades of government policy that was guided in large by measures of the general political and economic philosophy of white domination known as apartheid (Van Zyl *et al.* 1996). Van Rooyen *et al.*, (1993) found that the net effect of this discrimination has been that black farmers (1.2 million) are at present confined to farming in the homelands, which constitute 13% of the total land. The white farmers (55 000, employing 1.1 million black workers) are also served by a comprehensive agricultural support system, including physical infrastructure, extension, fencing, co-operatives and political lobbying power. The results of these policies include distortions in land and labour markets, output and input markets, infrastructure, agricultural credit and services and the creation of large-scale farms. The black farmers are not nearly as well served.

African family farming was viable and successful in responding to the increased demand for agricultural products emanating from the mining centre in the latter half of the 19th century. During that period, African owner-operated or tenants farming proved to be as efficient as large-scale farming based on hired labour. African farmers adopted new agricultural technologies, entered new industries and outcompeted large-scale settler farming in some of the emerging agricultural markets. Moreover, the ineffectiveness of colonial government to intervene in agricultural markets on behalf of settlers, combined with the reluctance of manorial estate owners who relied on African tenant farmers for the operation of their farms to support anti-African agricultural policies, resulted in a situation in which African farmers were able to accumulate agricultural capital, wealth and farming skills.

The formation of a stronger, richer and unified settler state in 1910 (the Union of South Africa), ushered in a policy environment which suppressed and isolated African farmers from mainstream agriculture in order to facilitate their transformation into rural and urban labourers. The process by which the transformation of African farmers to labourers was effected involved the progressive closure of African access to most markets (land sale and rental, agricultural capital, input and output), the exception being a racially segmented labour market. Currently, African agriculture is associated with the economy of the former homelands where it represents only a minor part of total income and in general fails to provide even the basic subsistence needs of the population.

2.2.2 Farming in the 19th Century

"Between 1850 and 1870, African farmers supplied the major towns of the English colony of Natal with grain and exported the surplus to the Cape. In 1860, over 83% of the nearly half million hectares of white owned land was farmed by African tenants. Their accumulation of capital and wealth caused the Native Affairs Commission (1852-3) to comment that Africans were becoming wealthy, independent and difficult to govern. Many settler farmers agreed with this view because they were unable to compete with African farmers who produced higher grain yield/ha and cultivated more land than they did. Influenced by European settlers the government restricted black African land rights very early and created reserves that were too small to support independent African agriculture. The Glen Grey Act of 1894 was a further measure introduced in this regard and restricted farm ownership in the reserves to one parcel of no more than slightly above 3 ha. It also levied a labour tax on all men living in the reserves who did not own land, and banned the sale, rental and subdivision of land by introducing a perverted form of communal tenure. The intention was not only to restructure land use patterns but also to create a landles class dependent on wage labour" (Van Zyl *et al.*, 1996).

The law was called "a law made for the mining houses". According to Davenport (1987), the law was also intended to curb black farming practices at a time when white farming was beginning to pick up, to check black sharecropping and to prevent the purchase of land by syndicates of blacks who were beginning to move ahead fast: The immediate effect of the law was to force African families who were formerly independent farmers on

sharecropped land to accept wage labour and give up their equipments. The longer-term effect was to end African farming above the subsistence level and to degrade reserves to 'dormitories' for a cheap African labour (Van Zyl *et al.*, 1996). The restriction on black agriculture led to tenant farming being the main mode of production accessible to black Africans.

Rhodes (House of Assembly debates, 1894:381-2) quoted by Mini (1995) stated "we must prepare these people for change. Every black man cannot have three acres and a cow, or four morgan and a commonage right. We have to face the question, and it must be brought home to them that in future nine tenth of them will have to spend their lives in daily labour". The emergence and rapid growth of an African working and ladles class led to deterioration of peasant agriculture. This represented the transformation of African villages from self supporting peasant areas to labour reservoirs.

African farmers achieved their success not in an ideal competitive market or a supportive policy environment, but in a hostile society determined to undermine them. A series of levies and fees imposed on African farmers between 1903 and 1905 forced them to pay higher income taxes than whites. The state, however, did more than hinder black farming; white farmers received substantial support from the government in the form of subsidies, grants and other aid for fencing, dams, houses, veterinary and horticultural advice, as well as subsidized rail rate, special credit facilities and tax relief during the period 1890-1908.

2.2.3 Land Acts

'Awakening on Friday morning, June 20, 1913, the South African native found himself not actually a slave, but a pariah in the land of his birth' (Van Zyl *et al.*, 1996). On that date, the Natives Land Act No. 27 of 1913 drew a firm line between white and black land holding, prohibiting each from entering into any agreement or transaction for the purchase, hire or other acquisition of any such land (in the area allotted to the other) or of any right there-to, interest there-in, or servitude there over. The Land Act of 1913 segregated Africans and Europeans on a territorial basis by establishing codified native reserves, referred to as 'scheduled areas'. Independent black agriculture and cattle raising could now only be undertaken in the native reserves. Van Zyl *et al.* (1996) showed that about 7.8% of the country's farmland was in the schedule for the reserves. This became the only area were African subsistence farming could legally be conducted. Outside the reserves, natives owned only 0.7% of the land and lived on state and European owned lands (another 3.6%); thus the total land for native use was 12.1%.

According to Mini (1995), by the 1930s the native reserves were said to be seriously overcrowded and overstocked. Many commissions noted the severe shortage of land and subsequent overcrowding in the reserves but recommended that the land should be added on condition that those Natives accept livestock restrictions on their holdings. Rural environmental deterioration was largely attributed to overstocking.

In 1936 the government passed the South Africa Development Trust and Land Act because it believed that good farming methods were almost impossible to enforce with lasting results under communal land tenure and that there was a danger of further soil deterioration throughout the reserves unless the system of land tenure was changed. The Act's main objectives were:

- To provide security of tenure of arable land under trust conditions, to limit stock in any area to the carrying capacity and to relate stock holding to arable land holding as a means of improving farming practice.
- To allocate individual rights in arable areas and to allow communal grazing areas as economic units, and where this was not possible due to overpopulation to prevent further fragmentation of land and to provide for the aggregation of fragmentary holding into economic units.

These aims were to be achieved through better planning. To prevent overgrazing, it was made illegal for anyone to own livestock who was not legally in possession of arable and grazing rights. Land released under the South African Development Trust and Land Act remained the property of the state, and Africans were only allowed rights of occupation there.

The facts above indicate that Africans originally were good farmers but were marginalized even long before the apartheid policy came into effect after 1948. They were discriminated against, badly treated and were never given a chance to improve and show their skills as farmers. If given a chance they can successfully compete with the large farmers.

2.3 USEFULNESS OF GOATS IN RURAL AREAS

Goats are important ruminants in temperate and tropical agricultural areas. They provide milk, meat and hide for people in may parts of the world. They are better adapted to arid tropics than cattle because they produce fiber as well as meat and milk.

Moody (1991) indicated that 80% of all goats could be found in tropical and subtropical areas. Temperature and appropriate forms of vegetation for these animals have influenced this production. Goats are frequent objects of neglect and even prejudice, yet have usefully served mankind with meat, milk, hair, leather and products including manure. Goats have a large impact on the economy and food supply for people in tropical countries. Because of their small size and affordable nature, goats can be a source of high quality protein for rural families. In many rural countries people consume more goat milk than cow milk. Goats are also an important meat source. They are small enough so that the carcass can be consumed within a short period of time and this reduces the risk of meat spoilage. Compared to larger animals, the lower cost per animal makes the goat more practical to the small landholder. Goats also serve as a financial reserve to fall back on in case of failure of cash crops. Since the goat is so opportunistic and selective in what

it can and will eat, it survives when other animals perish. When properly managed, goats can serve and ecological function in the control of brush and other undesirable plants and can be a great help in agricultural development and food production.
Trollope (1978) has supported the importance of goats as controllers of bush encroachment. In his findings he indicated how bush encroachment became a problem in the Ciskei only after the introduction of "planning and betterment schemes". The initiation of these schemes led to the encroachment of trees and shrubs into some of the grassland areas of the Ciskei. Trollope showed that this has been caused by the elimination of the previous system of heavy continuous overstocking which prevented any tree or shrub from surviving and/or reaching a fully developed stage. The encroachment has also been aggravated by a significant decrease in the goat population of the affected areas. He further indicated that bush encroachment became a problem in areas where the grass component is overutilized while the bush component is under-utilised. Furthermore, a critical assessment of the recommended stock ratios for the sweet and mixed veld areas of the Ciskei, where bush encroachment is occurring leads to the conclusion that the recommended ratio of goats to other stock is too low. This statements shows how useful goats can be in controlling bush encroachment provided that proper management and stocking rates are followed.

2.4. GOAT PRODUCTION IN THE AMATOLA BASIN, CISKEI: A CASE STUDY

2.4.1 Role of the goat in the Amatola Basin

"Goats have played a very important role in the lives of the Amatola Basin Community. Goats are multi purpose animals producing meat, milk and hair. Their primary function is meat production. Mention must also be made of the varied and numerous miscellaneous functions the goat serve which include their value as a source of investment against the failure of cash crops, the prestige inherent in their ownership and their place in custom, religion and festive occasions. It is claimed that goats are of considerable value in controlling bush encroachment and could play a significant role in this regard should the correct veld management system be implemented" (Steyn, 1982).

2.4.2 Current status of the goat industry

The goat industry in the Amatola Basin can be described as a small-scale enterprise, which has never been as important as other livestock enterprises. As far as financial returns and contribution to the subsistence sector were concerned, goat production was important form both the social and the economic point of view. As compared with large sized livestock such as cattle, goat rearing had several advantages. The goat is small in size; even with limited feed resources, either in quantity or in quality, which would not be sufficient for one large stock unit, these could be utilized by goats because of their capacity to browse.

Goats do not demand a labour input in respect of both time and intensity to the same extent as cattle. In addition goats utilize a large range of feed resources which may not be appropriate for cattle. Thus, goat production can be carried out in conjuction with cattle production with only small opportunity costs. The fact that the initial investment and risk loss are considerably lower than in the case of cattle also emphasize the relative importance of goats as a source of additional income for low income economic units because of their high reproduction rate (i.e. short kidding interval and a litter size greater than one). Thus, a fast build-up of a herd of goats is easier for goat farming. Goat farming therefore ensures fast economic returns and can cope with a changing supply of input. The high reproduction rate also compensates for a possible high mortality rate. The above mentioned characteristics of goat farming call for a closer consideration of goat production. Goats have been neglected to a large extent not only in formulating development programmes, but also in research.

2.4.3 Management of goats

The most common system of management found among the goat owners was the semi-extensive system. In this system the time of confinement of the goats was limited to night-time and a part of the day. Animals are let out of grazing during a restricted period. Goats are generally herded during the day, especially during the cropping seasons. Herdboys are responsible for 60% of the herding, husbands for 20% while other relatives were responsible for 20% of this task. Kids were kraaled permanently to prevent accidental losses and also ensure better supervision of the kid crop. The period ranged from 1-4 weeks or longer.

The advantages of goats in feeding strategy must be weighed against its disadvantage. Being a browsing animal it stunts tree growth and prevents the generation of forests and thus should not be used in areas desired for forests. Goats could be very useful in areas where regrowth of bush and trees is not desirable. The management strategy for goats should be different from that of cattle, hence people accustomed to one may have difficulty with the other. The small size of goats made them targets for theft and predation by dogs so that it is necessary for someone to herd them whenever they are not in tight corrals.

2.4.4 Socio-economic role of livestock

The goal of the traditional pastoral enterprise in Africa is an unlimited increase in the number of animals a person owns (Nestel, 1974, cited by Steyn, 1982). This goal is not part of an investment strategy to boost income or increase the quality of the herd but is persued for reason of prestige, i.e. the more animals one can have the more important one is. In pastoral areas, cattle raising have been the major activity and are the only means of raising the living standards of the people. To rural people, cattle are often not only an economic investment but also a source of status and an important feature of the communities' socio-cultural activity.

According to Pino (1970) "livestock" (in Africa) are a multiple value, not a single value. They do not merely stand for and are not always readily transferable into a money value but can represent variable combinations of power, prestige, prerequisites of adulthood, marriage or parenthood, means of establishing social relationship and forms of self identification. It follows that in substituting a cash economy, the cash substitute has to perform all these other roles which cattle fulfil in the herding society.

2.4.4.1 Food supply

In many communities animals play a major, through their significant role in the survival strategies of families. Such a survival strategy usually contains a form of diary production under the most extensive farming conditions. There is very little surplus within such systems for release into the cash market. This is especially true if the high risk of drought and the need to retain reserve production capacity for times of shortage is considered.

2.4.4.2 Manure

Apart from being used as a source of food, livestock also play a very important role as suppliers of manure. This is very useful to small-scale rural producers since no additional cost is involved. Animals can be left to graze in the fields and their dropping will help increase the fertility of that field. In such cases no transport is needed for the transporting of manure.

2.4.5 CONSTRAINTS LIMITING ANIMAL PRODUCTION

2.4.5.1 Overstocking

Malpractices such as overstocking and poor pasture management has led to the destruction of natural vegetal cover in large areas of the Amatola Basin. This has caused severe soil erosion and the encroachment of undesirable plants, resulting in a marked reduction in grazing potential.

2.4.5.2 Livestock husbandry methods

In a community such as the Amatola Basin where the older and less educated people are cattle owners, a certain amount of resistance to change is evident. The cattle owner seldom actively participates in the management of his livestock for it was established that in the majority of instances is it left to the younger children to herd and dip livestock.

2.4.5.3 Limitation of knowledge and skills

Management programs to develop the livestock industry in the Amatola Basin have been very slow for a number of reasons. Among these are the severe shortages of efficiently trained and motivated personnel. In the study it became evident that there was very little

extension contact. There is also a proportion of livestock owners who are inhibited by personal institutional and socio-psychological constraints from becoming efficient livestock producers.

2.4.6 METHODS OF IMPROVING ANIMAL PRODUCTION.

2.4.6.1. Population redistribution

In order to substantially increase production in tribal areas it is essential to relieve pressure on the land. At present many people are farming on a subsistence basis mainly due to lack of job opportunities and to retain security of tenure. This subsistence orientated system is at present taking large areas of land that would otherwise be utilized profitably by the "master" type of farmer.

2.4.6.2 Veld management

In view of the evidence at hand, it is considered that drastic action should be taken to ensure that effective veld management is implemented. Any other aspects of improved animal husbandry, such as improved breeding schemes will be worthless and ineffective until grazing control is fully operational. There is a need for a re-appraisal of the present communal grazing system aimed at co-operative control and management by the tribal authority, with technical assistance provided by the state.

2.4.6.3 Extension programmes

To bring about change in the management required to conduct successful livestock production programmes, farmer participation will be essential. In this regard a considerably greater amount of training of the livestock owner through intensified extension programmes will be essential. The training at farmer level should be aimed at labour intensification, and success will be achieved if visible results are obtained in a short space of time. In these extension and development programmes it is vitally important to consider the people's point of view concerning the problems which they experience in connection with their subsistence economy, so that the programmes can be directed at the satisfaction of 'primary needs' of subsistence and survival, before attempting to solve the problems related to the satisfaction of 'secondary needs' in respect of a cash economy. It is not the characteristics of farmers as much as it is the characteristics of development agencies and strategies, which will determine future access.

According to Bembrige (1979) it is the lack of opportunities rather than resistance to change which is the bottleneck to development of the livestock industry in these areas. It is essential therefore to overcome institutional constraints, particularly land use before any extension program will be successful.

2.5 TYPES OF ANIMAL PRODUCERS IN RURAL AREAS

In rural areas there are at least four types of animal producers (Webb 1999).

2.5.1 Subsistence rearing

This is the sole activity of the herder and his family. They raise animals to support their families and the surplus is exchanged in order to procure household necessities and the use of money is reduced to the minimum. Animals have a social role e.g. loaning, passing them on as an inheritance, gifts, lobola etc. create a web of obligation of dependent relationships which assures the cohesion of families and social group and from the hierachies between different groups. Capital growth comes about because of excess herd growth which remains to ensure the subsistence of the stockman and his family after sales or exchange have been made.

2.5.2 Rearing solely to build up capital

This is carried out by farmers and people working in the tertiary sector who invest there saving in herds. The protection of their herds is entrusted to stockman who the investors are related to or more generally to salaried or migrant share herders from pastoral ethnic groups who have left their original group.

2.5.3 Rearing for profit

The ultimate aim of this group is monetary gain and in which techniques aim to obtain (at the best cost or least effort) animal products, which are saleable at the best price.

2.5.4 Rearing or use of animal for animal traction

An unproductive animal will be maintained for as long as it remains powerful.
Here the animal is maintained for power rather than for production.

2.6 MANAGEMENT SYSTEMS

The are different management systems practiced in rural areas many of which have their benefits and limitations to production. By management system we refer to different farming practices that are practiced by different people depending on the area and the animal involved.

2.6.1 Tethering

It is practiced where control of the animal is needed to prevent it from wandering and damaging neighboring crops. In this system, goats are pegged to rope about 3m in length

and by this they are forced to browse weeds or other undesirable plants. The disadvantage of this system is that water is only provided when goats are shifted to shelter at night. Very little or no concentrate, salt or mineral licks are provided. It is only occasionally that supplements, household scraps, small quantities of grain or their by-products are given. There are some recommendations that regular changing of tether will introduce goats to new pasture and that running tether is preferable to a fixed one.

2.6.2 Intensive production

This has been defined by Kilgour and Dalton (1984) as the system in which the farmer uses technology with discretion and although livestock numbers are increased, the pattern of life animals lead does not significantly change. This is the system where goats are fed in confinement with limited access to land i.e. browse is brought to them daily. It is by definition a system with high labour and cash input. In this system, cultivated grasses and/or byproducts are fed *in situ*. Goats may be fed with cut grass with or without limited concentrates.

Kilgour and Dalton (1984) indicated that goats' behaviour may be affected by the husbandry system where lethargy and obesity may result from lack of exercise or unbalanced diet and feet problems may arise through excessively long hooves. However this condition can be prevented in inbred goats (Webb et al, 1998). Intensive system provides maximum protection from uncontrollable environmental factors and gives complete control over the destructive aspects of the goats feeding habits.

2.6.3 Extensive system

It is practiced where the land is not immediately suitable for agricultural improvement or is too difficult or too costly to fence. It involves a minimum amount of labour and expense. Probably because of cheap family labour and higher returns from this system of management, the flock tends to be relatively large compared to those in the intensive method (Gall, 1987).

Determining features are: favourable climatic conditions, short wet season, availability of browse and few predators.

2.7 FARMING SYSTEMS

2.7.1 Communal system

It is practiced mainly in rural communities where owning livestock is seen as a way of capital saving. Because of this there are a number of problems related to the reproductive ability of animals.

2.7.1.1 Role of livestock in communal lands

The relationship between communal land stockowners and their animals is not only an economic one; social security is the main objective and not productivity (Maree and Casey, 1993). Livestock is not primarily raised for meat, but as a way of capital savings and as an important source of milk and manure. Livestock are only slaughtered at special occasions such as weddings and festivals or when it is felt that they are about to die. Animals are also slaughtered for religious purposes. Normally the land or grazing area used by the herd is communal, while the livestock are owned by individuals, a family or families.

Livestock in many rural areas in the developing countries are regarded as wealth, and a man's social standing is measured by the size of his flock rather than money or other possessions (Poostchi, 1987). Many livestock herders use livestock for the payment of bride price (Maree and Casey, 1993; Poostchi, 1987). Here the bridegroom's family is socially required to present animals to the bride's family before the marriage ceremony takes place. Large numbers of livestock are kept as a form of insurance against drought and famine.

2.7.1.2 Herd size and composition

The traditional goal of almost all communal land livestock owners is an unlimited increase in the number of animals owned. Therefore, numbers and not productivity have been the main objective. Each stockowner finds that he gains by maximizing the number of his animals even though the result is deteriorating resources . Maree and Casey (1993) confirmed that each stockowner prefers to take the chance that his animals will survive rather than reduce numbers in anticipation of deteriorating conditions.

Usually stocking rate is not related to carrying capacity and livestock productivity falls far below the genetic potential. The problem as illustrated by Maree and Casey, (1993) is that where collective action to control stock numbers is socially and economically devisable, collective effort is seldom individually attractive and hence will occur rarely unless there is deliberate intervention by external agencies. Voluntary agreement to reduce stock numbers is not in the individual interest unless everyone has to do the same or there is local agreement or collective action. Malnutrition is the most important cause of low production rates and high mortality rate in communal systems. Not even the most patent and obvious need of supplementary feeding has been adopted to prevent mortalities. Very few stockowners even feed a salt or phosphate lick.

Maree and Casey (1993) found that management practices that show high rates of adoption such as tick control, vaccination and castration are those carried out as part of government health programs, whereas internal parasites control and dehorning show low rates of adoption. Upgrading of livestock through individual mating is virtually impossible and there has been little use of artificial insemination. Lack of knowledge, finance and

inability to exercise control in communal grazing systems are the major reasons for the low level of adoption of cattle and small stock management practices.

2.7.2 Nomadic System

They are based on continual movements of livestock in search of grazing and water. They are common in arid, remote areas, mainly in arid or semi-arid regions with very sparse human and animal population and where precipitation is uncertain. In other words, it is practiced where the land is not immediately suitable for agricultural improvement or is too difficult or costly to fence. The harsh conditions there determine the type of animal that can be raised and the kind of movement that can be undertaken.

Nomads utilize the seasonal production of grass and the available water in different areas. Abbott and Makeham (1990) showed that this dependence of natural grazing has various limitations. The forage available can vary greatly from one place to another and between seasons. Watering points are often few and far between. In an effort to use all the forage available and as a precaution against losses when there is drought, herders tend to overstock. This causes a progressive deterioration of the grass cover, especially near watering places. The movement of nomadic man may also upset settled farmers bordering their territory.

The major part of the nomadic herder's food and income comes from the livestock they produce. Milk and other dairy products form the major part of their diets. Meat is used sparingly in the diet and the slaughter of animals represents a reduction in the rural or nomadic family's capital assets. Normally the land or grazing area used by the herd is communal, while the livestock are owned by individuals, a family or families. Meanwhile each owner attempts to keep as many animals as possible, regardless of their quality or availability of pasture.

The low yield of grassland in the arid and semi-arid areas necessitates either nomadism, semi-nomadism or the development of a ranch system of farming. Poostchi (1987) found that variation in grassland utilization by livestock and the stability of the groups of people tending them include the following types of animal producers:

Total nomadism-Where owners of livestock do not have a permanent place of residence. They do not practice regular crop production and their families move with the herd of livestock.
Semi-nomadism - Here the animal owners have a permanent place of residence near which supplementary crop production is practiced. Farmers who live continually in permanent settlement and who own herds, which remain in the vicinity of their place of residence, characterize partial nomadism
The determining features in nomadism are similar to those of extensive system i.e. favourable climatic condition, short wet season, availability of grazing and browse and few predators. Under this circumstances goats can be used to assist in bush clearance.

Disadvantages of nomadic system

As illustrated by Nestel (1984) provision of veterinary services in these circumstances is a difficult task. Livestock owners or trusted members of tribal systems have to undertake first aid techniques and are depended upon to report potentially serious problems. Planned programs of vaccination and where necessary routine dipping or spraying of stock against ticks can be based on strategically located veterinary posts to which herds are brought on a voluntary or possibly obligatory basis when feed supplies permit.

An essential for trade purposes in such regions is the development of a network of stock routes with watering points and rest areas. Control posts can then be installed to ensure that animals being moved are appropriately protected against the most important disease problems they might carry or be exposed to *en route*. The aim is to reduce contact between groups in transit and with stock in the areas through which they pass.

2.7.3 Transhumance and sedentary pastoralism

"Transhumance is were a farmer moves his animals between two (or more) specific climatically different farms or areas according to a fixed seasonal pattern. In the Western Cape, farmers in the Koue Bokkeveld have Karoo farms to which they move their sheep in winter when it is too cold and wet in the Koue Bokkeveld. In what is now eastern Mpumalanga, livestock farmers used to have a "summer farm" on the high-veld and a "winter farm" on the low-veld. A major reason was because the nutrition value of the sour veld on the high-veld is so low in winter. The communal grazing in South Africa's former homelands are examples of sedentary pastoralism"(Laker, 1999).

2.7.4 Primitive herding

This system of Agriculture represents a step forward and is an improvement on the system of gathering. Here the product is the animal and the investment is labour which is needed to increase the supply if the product. Most primitive herding occurs in the region where shrubs, bunch grasses and short grasses grow and where humidity is low, rainfall unreliable and the climate is arid. Goats are the major animals since they can endure considerable aridity. They constitute the major herds of livestock found in the desert regions.

In the semi-arid and arid regions, the vegetation is sparse and the amount of feed available for animals and their fodder is very limited. So the search for fodder is never ending. The herdsman leave their animals in one place to graze and type of vegetation they can find until there is no more to graze, then they move to some other place where the meagre supply of forage and water provide temporary feeding until the next move, (Poostchi, 1987).

2.8 PASTURE RESOURCES OF AFRICA

The pasture resources of Africa consist mainly of steppes or savanna with varying tree strata, woodlands, more or less degraded woody formations and fallow (FAO, 1986). In general, the pasture resources of Africa would seem to be sufficient for a substantial expansion of livestock numbers and production in the future. The generally satisfactory quantitative picture however is complicated by a number of factors:

-Partially in the Sahel and in parts of East and Southern Africa, periodic drought brings drastic reductions in carrying capacity requiring very long periods for the rebuilding of herds.
-Areas with good climate, such as the cool highlands tend to attract human settlement so that there is eventually overstocking and erosion.

Poostchi (1987) showed that it is important to note that neither the hot and humid areas nor the hot and dry regions are favourable for livestock production. This is in contradiction with what he said earlier that in conditions like this goats are the one's which stand a chance of survival. He argues that the areas are not favourable because of the following points:

-In many rural areas of the tropics, sub-tropics and arid regions, animals are exposed to many serious and fatal diseases.
-Most grass species in hot and humid or warm and dry climates of the rural areas in the developing countries are found in the savannas, semi-arid regions and the fringes of deserts. These grasses mature very quickly, become highly fibrous and are very poor in phosphorus, which is necessary for the healthy growth of animals. This is due to the low levels of phosphorus in the soil of these regions. It is only for 1-2 weeks before seeds are produced that the grasses of the savanna, the arid and semi-arid regions are comparatively rich in phosphorus.
-The grassland composition of different grass and non-grass species differs enormously from one region to another. It varies according to the soil fertility status, soil moisture, rainfall distribution, grazing pressure and many other factors. The low nutritive value of grassland forage does not feed livestock sufficiently well to produce adequate supplies of meat, milk, manure and work despite the great numbers of livestock in the rural areas of many developing countries. The growth and production of livestock in these regions is slow due to poor feeding.

Perevolotsky (1991) showed that overgrazing is one the serious problems associated with livestock production and implies excessive use of forage that reduces present and future range productivity. Overgrazing involves a decline in pasture productivity combined with a replacement of palatable species by unpalatable ones, usually leading to a decrease in the livestock operation's economic return. Reduced vegetation cover can lead to soil erosion, loss of fertile soil and habitat degradation that cannot be reserved for decades or centuries.

CHAPTER 3:

LAND USE SYSTEMS

3.1 Land use

This refers to the primary or primary and secondary use of land such as cropland, woodland, pastureland etc. The availability of land either for grazing or for producing animal feed is a major determinant of the system of animal production, which is carried out in particular area. The wide range of soil and climatic conditions encountered and the complex interaction between man and his domestic stock has led to the development of many different patterns of land use. Due to improvement in disease control together with increased pressure on land resulting from an explosion the human population have together resulted in more and more domestic livestock being crowded in less and less grazing land.

The high social value which most pastoral societies associates with livestock numbers has usually resulted in the failure of government to restrict livestock numbers in order to conserve the range (Poostchi, 1987). In many pastoral areas, the increased pressure of livestock numbers is leading to destruction of the range, desertification and erosion. Because the rainfall is inadequate to produce economic yields of crops and also because of the sparse plant cover, most land in these regions are used for grazing livestock. Pastoral agriculture is therefore the dominant form of land use.

3.2 Land use and conservation

When land degradation occurs, it is sometimes characterized as the inevitable outcome of a tenure system that gives farmers no long-term interest in the land and thus encourages them to exhaust rather than conserve it. In economic terms, the cultivator/farmer is said to lack incentives carefully to husband the holding, he does not have property rights hat internalise the costs and benefits of conserving or failing to conserve the land (Basset and Crummey, 1993). Enhanced individual tenure offers the freedom of action and economic incentive to conserve resources. If the freedom conferred by ownership is coupled with ignorance of proper land use practices and ecological stress, it provides only the opportunity to degrade the resources.

3.3. Land and agricultural potential

Agriculturally speaking South Africa is poorly endowed. Erasmus (1994) argued that only 13% of the surface area is suitable for crop production and of this area only 1.5m ha are irrigable. High potential arable land comprises only 22% of total arable land. Natural grazing is deteriorating and nature conservation areas are threatened. The most important limitation to agricultural production is the availability of water i.e. precipitation is very low. Rainfall is distributed unevenly over the country. South Africa is periodically afflicted by severe and prolonged droughts, which are often terminated by severe floods.

Animal products show a self sufficiency index of below 100 implying net imports of mainly red meat and industrial milk products (Erasmus, 1994).

3.4 Sustainable utilization of natural resources

"Sustainable agriculture means that a person can farm infinitely on a piece of land and that the three components of sustainable agriculture are balanced. The three components are: natural resources, economic resources and human resources. Sustainable agriculture is not possible if one of these components is missing. In planning an agricultural enterprise the human factor is often neglected. The best management programmes will fail if the person who is responsible for it is not sufficiently committed to it" (Coetzee, 1998).

In the government white paper, (Department of Agriculture,1995), the minister of agriculture has stressed that all South Africans are custodians and should accept responsibility for the country's natural resources. The natural resources of the country constitute national assets, which are essential for the economic welfare of present and future generations. All citizens of the country, both rural and urban, who use and benefit from these resources, are its custodians. It is the responsibility of the government to ensure that policy and economic climate encourage efficient and sustainable resource use.

In the former homelands, poor living conditions and overpopulation mainly caused resource degradation. Poverty is further exacerbated by lack of ownership. It will be the government's responsibility to ensure that in areas where there have been open access to the natural resources, an institutional framework with full property rights are established. All farmers must be made aware of and accountable for the sustainable utilization of the natural agricultural resources. South Africa is poorly endowed with high quality agricultural land and water resources. Agricultural developments depend on how these two assets are conserved. Farmers, both large and small scale, are the principal users and primary custodians of these resources. It is the responsibility to produce food for the nation.

3.5 Land rights

This refers to any interest acquired in or permission obtained to use land, buildings, structures or other improvements. It includes the acquisition of land by free title or certain designated right to the use of land by perpetual easement. According to Poostchi (1987) the rights to own land is influenced by laws, traditions and customs governing inheritance in each country or region of a country. Thus in regions where land is inherited by the oldest member or heir of the family and is not sub-divided, the pattern of holding is less fragmented than when the custom is to divide holdings equally or in certain proportions among all heirs of the remaining members of the family. In many countries of the world the individual has the right to own, buy, sell and accumulate land. But this right might be constrained, limited or restricted in the public interest.

Van Zyl, Kirsten and Binswanger (1996) found that granting settlers' usufructuary rights rather than ownership or long term transferable leases hindered their economic success in 3 ways:

-The restricted right reduced incentives for long term improvements in land. If people don't have the right to own land, they won't put their effort in improving its productive value. They feel like they will be doing the improvement for the benefit of somebody else.
-The absence of ownership rights prevented the emergence of rental market and precluded specialization and dynamic adjustment to life cycle phenomena or differentials in the settler's abilities.
-Without land title, settlers could not obtain commercial credit, the credit they were able to get from the state was limited to the minimum required by foreign donors. Farmers used the donor-funded credit for short- term consumption and the repayment rate was poor.

Abbort and Makeham (1990) in support of the above said that lack of access to credit can be a serious obstacle to agricultural growth in regions where farmers have very small landholdings or lack of secure title to the land they work. This is a problem because conventional banks are reluctant to lend without collateral and any small loans they make will by virtue of their smallness be expensive to appraise, to administer and to supervise.

3.6 Land ownership

Land is a basic resource for most agricultural production and for many farmers a key concern is how to obtain and maintain access to an adequate land base. Ownership or control of land provides an opportunity for employment and a place to raise the family. Therefore land has social, community and family dimensions and implications as well as being a source of income. Compared to many other resources used in farming, land is relatively fixed in supply and is a non-renewable resource.

Taking a worldwide, system of agricultural land ownership and tenure are both diverse and complex. Comparison will be made between traditional and modern systems. Under traditional systems the ownership of land may be either communal or private. Under communal or tribal ownership, farmers have individual rights of cultivation, but not necessarily exclusive use of land. Communal tenure in the homelands is officially defined by the Proclamation R188 0f 1969 as 'unsurveyed land' or 'permission to occupy' (de Wet, 1987 cited by Van Zyl *et al* 1996. Under this proclamation, a male person holds rights to various land allotments for residential use, arable farming and grazing. Land access is usually by virtue of membership to a community, no through sale, lease or rent. Only men are entitled to inherit land rights. People do not legally own their residential and arable allotments. Rather, they are allowed the right of occupation and cultivation, subject to conditions stipulated by the homeland authorities. Grazing rights are often held in common. In traditional and customary tenure system, the basic or sovereign ownership of land is in the control of local groups or tribes while individuals have usufructuary rights. These rights may be claimed by individuals on account of their membership of the group.

Moreover, any member of the group is entitled to inherit a share of the family land as a birthright and does not lose this right by living away from the home village where the group is located. Strangers and newcomers to the system may receive land allotment but do not have the same privilege and their children will not inherit a part in the land. Under this system, land cannot be sold or mortgaged and is seldom looked upon as commodity and is considered as community property and operated in kinship unit.

Under private ownership, the right of ownership and cultivation may either be exercised by the same person (farm owner) or separately by landlords or tenants. In the traditional mode, the landlord /tenant system has generally been feudal in character with tenants paying and landlords receiving rent in the form of either a share of the crop or labour services. Under modern systems of land ownership, the dichotomy is capitalism versus socialism. In the capitalist model, landownership is private, with landowners exercising the option of either farming the land themselves or letting it to a tenant usually paying fixed cash rent. In the socialist model, the land is owned by the state, although the responsibility for cultivation is often given to co-operative groups or collectives. The collective farmers are required to meet the production norms and delivery quotas set by the state.

3.7 Land tenure

This refers to the holding of land and the right that goes with such holding, including all forms of holding from free simple title embracing all possible rights within the general limitations imposed by the government to the various forms of tenancy or holding of land owned by another.

Land tenure is much more of a political issue, which date way back when the government favoured white farmers over black farmers. White farmers are seen as large-scale producers while blacks are grouped under small-scale producers. Today most people would have to agree that South African agriculture is abnormal, inequitable, inefficient and unsustainable because of the racial basis of land ownership, the level of poverty and hardship in the countryside, farmer debt and rates of soil erosion. Agriculture is currently facing a crisis, which is often blamed on past, present and future government policy.

Erasmus (1994) showed that a fundamental requirement for an equitable, efficient and sustainable agriculture is that all entrepreneurs should have fair access to the means of production, to product markets and to farmer support services. Equal access to land is important, as agriculture is the backbone of the rural economy. The commitment to increased production, sales and investment is directly related to land access, complimented by access to resources, institutional support, infrastructure and agricultural services. This should however be balanced against the relative scarcity of high potential agricultural land in South Africa.

To a large extent, the diversity of agriculture in South Africa relates to the different milieu in which agricultural activity occurs. White commercial farming is comprehensively

supported by specialized institutions such as the South African land bank, financial institutions, marketing boards, the co-operative movement, organized agricultural and input supply institutions as well as a strong political lobby. White farmers gain access to high potential land where there is enough grazing. They are the larger-scale producers, so the incentives they receive from the government is much greater as compared to those given to small-scale producers. Small holder farming in developing areas operates largely outside this comprehensive institutional support system. Decision making in the small farming sector is largely governed by household economics and social security considerations. Small holders were allocated marginal land which was neither suitable for crop production or animal production, yet many of this holders today, many of which are found in the rural areas are trying their best with goat farming as it is the only livestock which can thrive under this harsh conditions. Although few own cattle, goats dominate.

The neglect of this small farmer development strategy has left undeveloped many opportunities small farmers would have found attractive since their development would have required heavy labour input.

3.7.1 Problems experienced by small farmers

The problems experienced by small farmers include: insecure and fragmented land rights, non viable and small farm units, overstocking and deterioration of land and general lack of support infrastructure, water supplies, a transport network, financial support and extension and support services. Legislative policy and institutional development have been inequitable and have aggravated the plight of the disadvantaged. These problems contributed to low levels of production and under utilization of arable land resources, despite the relatively high agricultural potential of some of these areas. This was supported by IFAD (1992) which stated that traditional " African" land tenure systems lead to under-utilization of high potential land, thus putting pressure on marginal land which then degrade rapidly. This has resulted in black rural areas becoming more dependent on food imports. The solution to the problem of tenure will be land reform, which will be discussed briefly later.

A change in tenure does not guarantee an improvement in productivity of rural farmers as it was shown by Van Averbeke and De Wet cited by Laker (1999) that by 1994, the majority (which can amount to 80%) of the high rainfall belts in the now Eastern Cape region was already in the hands of black small farmers yet yields in these areas are extremely low

3.7.1.1 Security of tenure and investment in the holding

A farmer will be disinclined to make long term investment in his holding unless he is secure in his expectation of reaping the benefits. Insecurity of tenure in African systems is usually attributed to rights having short duration and terminating automatically on cessation of cultivation and to farmers being subject to ousting by Chiefs or other

community land administrators (Basset and Crummey, 1993). Security of tenure is a very real need and should not be underestimated.

3.7.1.2 Exclusivity of tenure and farm management

Insecurity of tenure hinders farmers from having a full freedom to make management decisions concerning their farms. Some ways in which indigenous tenure systems so limit farmers are:
Community sanctioned land use practices may require the participation of all landholders. An example is the turning of the community's livestock onto the fields after harvest to graze crop residues. Because a farmer's livestock is free to range with all the others, it may be considered unfair for him to intensify use of his land in a manner that requires exclusion from such grazing. Communities of cultivators sometimes make similar arrangements for serial use of land with groups of pastoralists, or between groups of pastoralists. These relationships may be peaceful and symbiotic but tend to be fraught with tension ad conflict in periods of change. Planting trees or fencing land may be seen as an attempt by the landholder to allocate to himself rights inconsistent with those of the community. Planting trees may tie down the use of land for longer than is appropriate, and fencing might exclude his neighbour's rights of commons outside the cropping season. The community may thus seek to prohibit these activities and in this way constrain innovation.

3.7.1.3 Land secured credit

Traditional land security arrangement tends to place control in the hands of the creditor until repayment of the loan and is therefore not a good finance for agricultural investment. Crops provide adequate security for most credit needs of traditional farmers but not for the needs of emergent or commercial farmers for substantial loans for major improvement in their holdings. A banker will not loan to a farmer who does not have a secure expectation of continuing in possession to reap the returns in his investments. However, this security of tenure is only one of the necessary conditions for land used as security for loan. As banks do not wish to become farmers, the land must also be readily transferable to someone who does want to use it, for a price that will satisfy the debt. This requires not only ready transferability and mortgageability of land at law but also the existence of a market and the reliable, effective demand on which it is based (Basset and Crummey, 1993).

Tenure is hardly the only reason commercial banks hesitate to lend to small and emergent farmers. The farmer must be "credit worthy". Banks prefer lending against a reliable income stream to lending against an asset for which the market is uncertain. Beyond this, commercial banks look for larger opportunities than those the small farmer can provide, opportunities in which administrative cost are low in proportion to the size of the loan and which the capital lent can be recovered more quickly than from a farm.

3.7.1.4 Efficiency in resource allocation

Critics often fault indigenous tenure systems for their reluctance to recognize sales. They claim that they impose unacceptable transaction costs that is, risk of loss of the purchased land because of uncertainty as to whether the sale will receive legal recognition. They argue that the distribution of land arrived at through allocation by indigenous land administrators, by inheritance or by some combination of these is inefficient. They suggest that land would be more productively distributed if it were a marketable commodity. They assume that the market would transfer it to those with the capital and skills to utilize it most effectively. This market they conceive as large, relatively impersonal and permitting permanent rather than temporary transfer of rights. Critics also suggested that investment in land be discouraged in relation to other potential investment if it cannot be converted to liquid assets by sale of the land (Basset and Crummey, 1993).

3.8 Land tenure systems

These are legal or customary relationships between government, society groups and individuals, concerning rights and duties in the use of land. They have developed over time to meet the practical needs of crop and livestock producers in the way preferred by the dominant element in a particular society.

According to Abbott and Makeham (1990) land tenure systems are important to economic development because they influence the application of labour, capital and entrepreneurship. For example, without some security of tenure, land users will apply only those inputs that bring immediate benefits, they will have no interests in preserving soil fertility or building up equipment to make the land increasingly productive which would add to the capital resources of the country. Improvement in the maintenance of farm buildings and a variety of similar tasks may often be undertaken in what might otherwise incentives to stimulate production and productivity.

There are four major issues concerning tenure (Van Zyl *et al.*, 1996).

-Whether to allow individual holdings of arable land or insist on a collective method of farming.
-Whether to grant permanent ownership, rights or only usufruct rights
-Whether to allow sale and rental of land or constrain land transaction.
-If land sale to outsiders are unrestricted, whether or not to issue title
Further on they indicated, as in the socialist world, where collectives are being abandoned, the record shows that with few exceptions, collective forms of land use in developing countries where a farm is managed as a single large scale unit and members receive labour points and profit shares are associated with failure as compared to those where beneficiaries were given individual plots.

3.9 Basic concepts in tenure systems

- To contribute to efficient use of human and physical resources: The intention to make more efficient use of land, labour and capital engaged in production of farm products.
- Tenure should promote stability of resources : An inadequate tenure system is one of the causes of economic depression. When high rent, rates, taxes and rigid tenure arrangement exist, the tenant tries to increase production despite a declining market which further depresses prices. Ideal tenure systems should make allowance for a direct relationship between product and overhead costs, thus stabilizing the economy.
- Ensure equality of access to land resources. In many traditional farming communities, access to land is through inheritance.

3.10 Land reform

Land reform appears to be the only possible solution to land tenure problems. Land reform can be defined as a means to provide land to landless or a comprehensive program for the transformation of agricultural economy, or as an integrated program of measures designed to eliminate obstacles to economic and social development, arising out of defects in the agrarian structure (Poostchi, 1987). Such a program involves changes of land tenure as well as improvement in agricultural support services and institutions.

Land reform in its slow and traditional sense has taken place over many years, primarily in response to demand for greater equality by the landless, by the peasants and for social justice. Land reform also refers to changing and restructuring land tenure rules and procedures in order to make land tenure systems consistent with an overall requirement of economic development.

In non-industrialized communities, societies and countries, land constitutes the principal form of wealth and the main source of economic and political power, while the land tenure system reflects social class structures and relations. If these rules and procedure are to be restructured in any society, it involves changes in the social and economic power of several groups within a society (Poostchi, 1987). Land reform also involves intervention in the prevailing system, levels and patterns of agricultural land ownership, control and usage in order to change the structure of landholdings, improve land productivity and widen the distribution spectrum of the benefits culminating from such reforms.

In land reform and restitution, the system of land tenure will be vital. Persons who do not have security of tenure just implement exhaustive cropping/ farming, they do not care about conservation or providing adequate inputs (Van Averbeke and De wet, cited by Laker, 1999).If this is the case for high potential land, it is a measure problem because unbearable pressure is put on vulnerable marginal land. Emphasis was also made that, during reform too many people must not be settled on the land so that each has an area that is too small. In some cases this leads to under-utilization of the land, but in most cases to over-exploitation (in an attempt to survive) and severe land degradation.

In Tanzania, "the fact that people do not own the land and because individuals had too small areas of land in the high potential areas they over exploited it, leading to extreme degradation. Now they are moving into the marginal areas and very quickly degrading it. Pressure is even put on the rangelands, creating a real danger of conflict between the crop farmers and pastoralist" (Dumea, cited by Laker 1999).

3.10.1 Factors influencing land reform

A complex series of factors and their interactions influence the pattern of land holding and land use. In general terms and when viewed more realistically, land reform is normally implemented in response to political pressure, resulting from socio-economic change. This in turn is caused by increased population pressure on a limited land base or different political ideologies, religious beliefs of the peasants, small holders and rural people, their culture, economies and climatic conditions. Laws, traditions and customs governing inheritance in each country or region of a country also influence distribution of land.

The most obvious motivation for land reform is the unsustainability of the present distribution of ownership of agricultural land. Large farms that are owned and operated by a small number of individuals or companies dominate the South African agricultural sector. As a result of a history of distortion, this minority owns about 86% of South Africa's agricultural land. The equity and equality case for land redistribution rests on the history of racial and economic policies which favoured white commercial farmers relative to the landless and smallholders. The majority of the poor in South Africa reside in rural areas, often with no or limited access to land. Land reform could therefore be one strategy to alleviate the present crushing poverty situation in South Africa. It should be kept in mind that the relationship between rural poverty and access to land is complex. Many factors are involved, including differences in land quality, the availability of complementary inputs, access to credit and markets and opportunities for off-farm employment. It should be remembered that when land quality is poor and access to water, and inputs and access to markets is limited, access to land in itself does not significantly reduce poverty. The motivation should therefore rests on increased efficiency, increased growth and poverty reduction.

CHAPTER 4:

REPRODUCTION OF INDIGENOUS GOATS

Reproduction is the ability of animals to produce and reproduce offspring. The level of reproductive performance depends on both genetic and environmental factors and how they interact. The heritability of reproductive effectiveness is only approximately 10% and therefore 90% is due to management, climate, feed and other environmental factors. This survey will focus at the reproductive performance of African indigenous goats under various management systems with emphasis on females.

4.1 Puberty and age at first kidding

Puberty is the age at which females first express oestrus without ovulation (Bearden and Fuquay, 1997). Females reach puberty between 4-6 months and they can be mated at this time but a high proportion may experience difficulty with parturition. So in some farming situations mating may be delayed until 10-20 months to ensure that pregnancy does not concide with the period when the doe is actively growing.

In a study by Wilson (1989) it was found that goats give birth for the first time at about 17 months of age. The age at which the animal is allowed to conceive and give birth for the first time will determine the lifetime reproductive performance of the animal. Management decisions concerning the age at which females should be mated for the first time may be based on a minimum age, minimum weight or on a combination of both criteria. For example, in another controlled breeding study Wilson (1989) found that does in Rwanda must be more than 12 months or heavier than 20kg before they can be mated for the first time. The disadvantage is that since there is one breeding season per annum, the animals that are not mated are older and heavier prior to first mating.

In uncontrolled breeding systems in Ethiopia, about 95% of ewes conceived for the first time before the age of 15 months, whereas in Rwanda only 30% of ewes had conceived by that age, and the rest evaded the control system. In a situation where goats and sheep are reared together and have similar weights at maturity, does have a lower weight than ewes at first conception in relation to adult weight. In spite of this difference, there is no difference between the species in ages at first or second parturition. So if a decision has to be made regarding weight at first mating, it should not be related to the same proportion of expected mature weight for both species (Wilson, 1989).

Although reproductive control of animals in relation to first parturition is practiced in traditional systems, it is rarely affected by separating males from females. Environmental factors seem to have an effect on the age at first parturition. For example, in his study Wilson (1989) found that in Rwanda the age at first parturition in goats and sheep depended on the year in which the doe or ewe was born. Also in Rwanda, first parturition in females of twin litters occurred later than in females of single litters although this may

have been due to the interaction of the slower growth rate of the twins and the management and imposed weight restriction. Actual parity influenced the age at which does, but not ewes, first gave birth. The age of goats and sheep reared in different flocks varied at first parturition and this might indicate that individual management practices are important variables to consider.

4.2 Oestrus cycle

Oestrus cycle is defined as the time between periods of oestrus. The duration of the cycle is about 18-21 days and oestrus duration is about 24-36hrs but variation does occur. Seasonal variation may have an effect on oestrus depending on the type of breed and the region it is reared. African small ruminants do not normally experience the total seasonal anoestrus of temperate breeds. Kilgour and Dalton (1984) confirmed this in their findings that in the tropics, local breeds show oestrus throughout the year while introduced breeds like the Angora show a persistent three-month breeding season. Temperate breeds are seasonally polyoestrus.
Ovulation occurs towards the end of oestrus and therefore mating is better arranged at that time i.e. 12hrs after observed oestrus. Time of mating can affect the number of kids born, so double mating is better with the second service following 24hrs after the first.

4.3 Gestation period

This is the period when the female is pregnant. The average is 146 days with a range of from 145-148 days and may vary due to size of litter and sex. It may also vary between years, seasons and sires and interaction between year and season.

4.4 Litter size

This refers to the number of kids born per litter. Wilson (1989) in his research found out that African does average 1.38 kid at each parturition. Litter size among does vary between 1.08 and 1.75. He further indicated that small ruminants in the more arid regions appear to produce smaller litters than those in humid zones. Environmental factors have a greater influence on this trait than they do on age at first parturition.

The utilization of the most prolific breeds to improve the performance of those with small litters could result in general increase in the size of litters of African small ruminant, while at the same time conserving their innate adaptation to harsh environmental conditions. Manipulating the period of conception can increase litter size.

4.5 Fertility and prolificacy

A fertile animal is one that produces normal spermatozoa or ova capable of fertilization. A prolific animal is one that can produce numerous offspring in one litter and through her reproductive cycle /life. Fertility could be calculated as the number of live birth in the year in relation to the average number of females in the year.

Fertility is a similar parameter to annual reproductive rate (ARR). ARR is the product of litter size and the number of days in a year divided by the parturition interval, i.e. (litter size x365 / parturition interval). This reproductive rate peaks at about the fourth or fifth parity, then remains stable and may even decline. Thus prolificacy may increase with age and weight. Dam's weight influence litter size. Therefore heavier dams tend to produce larger litters per birth. But this may be true within breeds and may differ between breeds. Although prolificacy is a useful indication of the maternal ability of the doe, the number of kids reared to weaning is of greater importance since a doe, which although prolific, fails to raise her kids is worthless.

Multiple birth, provide increased selection and production potential only if the offspring live and reproduce themselves. Under limited feeding conditions, multiple birth can be a disadvantage because it increases stress on the dam, reducing her productive life.

4.6 Parturition interval

This is the period between two consecutive kidding and is composed of a service period i.e. (period between kidding and conception) and a gestation period. Service period may affect kidding interval. Thus its duration depends on how soon the doe conceives again after kidding which in turn depends on the resumption of the oestrus cycle. The breed of goat and the environment as well as management may affect this. Environmental variable may significantly affect parturition interval, the most important being the season or month during which the last parturition occurred and the flock in which the animal was raised.

4.7 Mortality and longevity

It refers to all pre-natal and post-natal death encountered in the process of reproduction. Mortality is confined to periods between birth and maturity since death is highest at this period. Losses at birth may be due to one of the following:

- Birth weight –lighter kids are more susceptible that heavier kids to disease and early death
- Inexperience of the doe and their weight at first kidding –does at first kidding have lighter weight than on their subsequent kidding and this can be a source of loss.

The number of young produced during the lifetime of breeding female is of major economic importance in Africa, as indicated by Wilson (1989). Productivity of small ruminants during their lifetime could be improved by lowering age at first parturition and by increasing litter size provided that parturition intervals are less than a year. There is a time in the life of the animal when the advantage of producing more progeny becomes an inconvenience. Parturition intervals become longer with age and litter size remains stable or is reduced. It then becomes profitable to cull the aged animals so as to enable a larger number of young animals to be kept in the flock.

4.8 INBREEDING

Dalton (1984) defined inbreeding as the mating of animals that are more closely related to each other than the average of the population i.e. mating animals that have one or more ancestors in common. Due to the fact that goats grew in harsh climate, and other unfavourable environmental conditions, the animal evolved with a capacity to survive. This resulted in a genetic makeup that leads to slow growth and maturity rates and only enough milk to assure the survival of offspring.

The manners in which goats have been managed have resulted in increased inbreeding. This is because breeding is usually left to the forces of nature and mating takes place indiscriminately between males and females that come together on communal grazing land. Therefore improvement in growth and milk yield is limited by the genetic capacity.

Inbreeding shortcomings:

- It reduces the number of gene pairs that are heterozygous in the population and increases the proportion of gene pairs that are homozygous regardless of whether they are good or bad.
- Inbreeding depression results in reduced performance or fitness of animal for its job. This is the gradual lowering of performance with increased inbreeding and is seen especially in characters like fertility, survival and size.
- As inbreeding increases, vigour is often lost. The first sign of this loss of body vigour is usually seen in the decrease of mothering qualities of the dam i.e. diminished fertility and poorer milk production so that the young grow slowly in the early stages.
- If inbreeding is undertaken, then such things as fertility could decline, embryonic mortality could increase, progeny survival decline, growth rate be lessened, milk yield decline whereas carcass traits might be affected.
- Inbreeding poses problems for individual breeders and the higher the level of inbreeding, the greater the risk.

4.9 CONCLUSION

The potential for a higher productivity can be achieved through the manipulation of different farming, production and management systems and the equal rights to land. Some of the essential elements in increasing productivity especially among small scale farmers will be the acceleration in the rate of land and tenancy reform, better access to credit, assured availability of water, expanded extension facilities backed by intensified agricultural research, greater access to public services, new forms of rural institutions and organizations that will give as much attention to promoting the inherent potential and productivity of the poor as is given to promoting the power of the privileged and better access to market

From the discussion it is evident that high reproductive efficiency of indigenous goats can be attained. Many of the research showed the high performance of these animals under

various management systems and environmental conditions. Research on land tenure and how solutions can be implemented as well as on the effect of inbreeding still need to be done.

Historically, the South African agricultural sector is dominated by large farms that are owned and operated by a small number of individuals or companies. This can be attributed to various policies and government actions which have reduced small scale farming in South Africa to a state where it contribute very little to the economy as a whole and to the welfare and livelihoods of rural dwellers.

Originally the homelands were justified as areas where Africans would do subsistence farming but much of the land was under-utilized or over-utilized leading to degradation. This degradation of land can be attributed to some of the restrictions that were imposed on blacks and the fact that they were seen as small-scale farmers. The truth is that small scale can be very successful if given a chance and incentives given to large-scale producers. The misperception is that, small scale is often viewed as the non-productive, non-commercial subsistence agriculture found in the homelands. The evidence is that small-scale agriculture has the potential to generate employment and income opportunities in rural areas even though their access to land and credit is limited. The challenge facing South Africa is remove the structural constraints that inhibit the growth of small holder sector. Further research is needed to find out how we can improve from where we are and maintain that.

CHAPTER 5:

MATERIALS AND METHOD

5.1 DESCRIPTION OF THE STUDY AREA

This research was conducted in two villages of the former KwaNdebele in Mpumalanga Province. The villages were Moutse and Phooko.

5.1.1 Moutse

This village is divided into Moutse East and West. The research was done at Moutse East, which is further divided into 21 small villages. Moutse has a population of about 97000 people. More than half of the rural households have traditionally been landless or in possession of only marginal amounts of land. Many of the arable lands are no bigger than 4ha. The total arable land that is in use is about 2727ha. The residential area occupies about 10455 ha and is used for both dwelling and kraaling of animals at night. The grazing land amounts to 43062 ha. Grazing land is communal with no specific allocation to a single farmer and is open to all households. This means that individuals do not have the right to revoke land allocations if the land is not used for a designated period. Individuals are awarded exclusive rights to arable land.

However, for grazing land, binding restrictions on individual use and access to the commons, which are necessary for efficient management of a common property resource are not in effect. The form of tenure on grazing land can be described as open access. The land is overused with the result that the natural resource base is degraded and yield from animal production is low.

The area receives an average rainfall of approximately 800 mm/annum and an average temperature of 27.2 °C max and min. of 10.54 °C with great variation between seasons. Table 5.1 indicates the rainfall pattern of the survey site and Table 5.2 shows the temperature regime during the survey period.

Table 5.1 Rainfall

Month	mm	Month	Mm
Jan	250	July	0.3
Feb	68	Aug	00.0
March	116	Sept	17.0
Apr	36.3	Oct	123.0
May	52.7	Nov	108.5
Jun	58.5	Dec	128.5
Average = 800.25 mm			

Table 5.2 Temperature

Month	Max	Min	Month	Max	Min
January	30.9	12.9	July	22.1	2.5
February	31.7	17.1	August	25.5	3.9
March	27.5	16.1	September	28.1	10.9
April	26.1	9.2	October	28.1	12.5
May	23.5	5.7	November	29.7	14.3
June	22.5	1.5	December	30.7	19.9

Average = Max 27.2
Min 10.54

The area has mixed veld, which is mostly in good condition and can provide enough feed for the livestock provided that the veld is not burned. If the veld is burned, farmers experience problems at around September –October . Apart from this, animals have enough feed. Most of the farmers are doing well although they don't own the grazing land. Many depend on these animals as their source of income and survival. The animals are sold only when there is a need for cash. Selling depends on visual appraisal and not on age or weight. The elderly, those on pension and a few of the young unemployed people dominate farming.

5.1.2 Phooko

Phooko lies about 35km from Moutse East. It has a population of about 1000 people with 1216ha of land available to them. The difference between the two villages is that, this village has no chief to allocate land and as such there is no communal grazing land. People bought about 8ha of land each from the department of land affairs. This means that they have title deeds. However, not all of the 1000 people own the land as some have been given a piece of land to reside on by those owning the land, and not all of these people are farmers. Each farmer uses his own piece of land for residence, cultivation and grazing, or in a way he sees fit depending on the type of farming practiced. Information regarding rainfall and temperature could not be obtained due lack of record keeping, but reference can be made on information from Moutse since these villages are about 35km apart although a slight difference may occur.

Although they are in total control of their land, one would expect it to be well managed but overgrazing still occurs due to overstocking and lack of management practices being followed. But to them overgrazing resulting from overstocking and mismanagement is not an issue, land is. Another contributor to the land shortage is the fact that sometimes more than two families both with livestock are sharing that small piece of land. Others agree to share their land provided that the newcomer has no animals at all or if any he agrees to sell them all. This is done to avoid competition by animals for the little forage, which is available.

Most farmers in this area, like in Moutse depend on farming as a source of income. Some are farming not because they love it but because their fathers were farmers so they inherited it. Veld type is mixed and is also in good condition.

5.1.3 Research methodology

This research was pursued because of a continuing debate about whether the African indigenous land tenure systems are a constraint on land productivity and performance of livestock. There are those who believe that land tenure is a constraint to farming, as it does not encourage farmers to make land-improving investment. A survey was conducted in KwaNdebele (Mpumalanga province) in order to quantify the effect of land tenure on small-scale livestock procedures in rural areas as well as to quantify the importance of indigenous goats as a source of income in rural areas. This was supposed to be a goat research project but other livestock such as cattle, sheep and pigs were included since many of the farmers involved in the survey were farming with more than one type of livestock.

A questionnaire was distributed to randomly selected farmers in Moutse East and Phooko villages. They were individually interviewed although some answered the questionnaire on their own. The interview was carried out by researchers from the University of Pretoria with the help of an extension officer from the research area. The research was aimed at quantifying the effect of land tenure on goat production, however other animals were included.

The first part of the questionnaire aimed at finding information relating to animal production, productivity and performance. Included in the questionnaire was the following:

Species composition and type

- Type of species they are farming with i.e. whether goats, sheep, cattle, pigs or combination of two or more.
- Type of animal – indigenous or crossbred.

Information regarding livestock they are farming with

- Age of females at the time of the survey
- Age at first production
- Previous production performance
- Incidence of twins or triplets
- Gestation period
- Litter size i.e. number of offspring born/pregnancy
- Birth weight
- Sex of the offspring born

- Weaning weight
- Mortality rate of offspring and causes

For the management practices mentioned, who render the services

- Condition score of females
- Herd composition and size
- Number of males and females in the herd
- Number of young males and females in the herd

Since land tenure seems to be core for this survey, it's effect on livestock production can not be quantified unless the affected people are interviewed. So to obtain such information the second part of the survey was aimed at finding out the following:
Land tenure information:

- Views of farmers concerning indigenous land tenure systems. Do they see it as a constraint
- Would they like tenure systems to change? If so to what?

Land allocation rules and practice

- Who allocates land and to whom
- Criteria for land allocation. Who qualifies
- What is the land used for? Either for grazing, cultivation, residential or a combination of the three
- Size of land per farmer/household
- Number of hectares allocated to grazing since grazing land is communal
- Constraint to land access

Management of grazing land

- Management practices followed e.g. rotational grazing
- Carrying capacity of the veld i.e. number of animals that can be supported by the veld

Finance

- Access to financial institution. Are there any constraints
- Constraint attached to finance.

An informal interview with selected farmers was conducted in order to obtain the following information from them:

- Number of farmers who depend on farming as a source of income
- How often do they sell, how do they sell and to whom
- Type of animal they are farming with and why

- What are they used for or why do you keep livestock
- What did you do before you decided on farming
- What attracted you to farming especially with a particular type of livestock e.g. goats, cattle, sheep or pigs?
- What influences production. Management, nutrition, land tenure or an interaction of all this factors
- Number of animals that a farmer can own. Are there any limitations?
- Management

- Castration of unwanted males
- Dehorning
- Inoculation
- Culling of unwanted animals
- Dipping

CHAPTER 6:

RESULTS AND DISCUSSION

6.1 GENERAL

Twenty-six farmers participated in the survey. The majority farm with a combination of more than one species. The animals included in the survey are cattle, goats and sheep. The only difference is that some have goats, cattle or sheep as their main herd. The majority of the farmers interviewed said they depend on farming as a source of income. However, they did work in cities before becoming farmers, although some inherited it from their fathers. They love farming because they can rely on the sale of animals whenever a need for cash arises. However, selling of animals is not their number one priority. Only oxen not used for ploughing, old and sometimes young animals, if there is a need are sold. Animals are not slaughtered unless there is a funeral, wedding or for ancestral worship. Sale of animals is to the community and local butcheries. Selling depends on visual appraisal. There is reluctance in discussing the prices they charge. Many are afraid that those asking might want commission from them.

6.1.1 Problems experienced by small-scale rural producers

6.1.1.1 Poor veld management

This is a serious problem under communal grazing than in privately owned land. Under communal grazing it is very difficult to apply appropriate management skills. In Moutse fences have been erected with the aim of practicing rotational grazing but were cut off mostly by those who are not farmers and sometimes by farmers themselves so they won't have to wait for the right time to introduce their animals into the fresh pasture. Although veld management was practiced once, now it is almost impossible.

6.1.1.2 Availability of water

Shortage of water is a problem for livestock owners especially when the rainfall is low. Only a few farmers can afford it to have wells dug at their homes to try and solve the problem while the rest depend on infrequent bursts of rainfall.

6.1.1.3 Theft

Livestock theft seems to be a problem throughout the country. During this research many farmers indicated that they have lost a number of animals through theft. Other farmers, neighbours or butchery owners steal the animals. Farmers complained that once the animal is stolen it is very difficult to get it back as you can again be accused of stealing. Most of the animals stolen were those that stay out in the veld for some days. Kraaling only helps to reduce the problem since stealing does not only occur at night but even in broad daylight.

6.1.1.4 Finance

At Moutse, absence of title deeds makes it difficult for farmers to obtain loans from the bank since the bank needs security against any loan. When farmers fail to provide that, their applications are turned down. The situation is different at Phooko. Here farmers have title deeds to the land they are using. The problem is they are afraid to go to the bank for loans because failure or poor performance hinders their progress and therefore loan repayment becomes a problem. As a result they prefer helping each other or suffer the loss of animals through death due to starvation or diseases. Loans can help them improve their farming with the use of proper equipment.

6.1.1.5 Level of education, skills and training

In rural areas, mostly the illiterate members of the community practice farming. Because of their level of education, it is not easy to convince them to adopt proper farming methods. Their level of education dictates to them what to adopt and what not. They believe that the knowledge they gained from their fathers still prevails. An example is the belief that the more animals an individual owns the more important he is to the community. Even today, it is hard for them to practice commercial farming not because they can't afford to, but because they want to own as many animals as possible. So advising them to sell their animals and reduce the number during drought is like trying to move a mountain. They think that researchers give them such advice because they did not feel the pressure of raising such a big head and social status mean nothing. Many farmers do not possess skills and proper training to be farmers. They are farmers today because of inheritance. The only skills and kind of training they received is that from their fathers which is not adequate in the present situation.

6.1.1.6 Cultural value of animals

The number of animals he owns determines a man's wealth and position in society. The more he has, the more important he is. The value controls the selling of their livestock. Selling is internal, i.e. among themselves when celebrating the return of both boys and girls from traditional schools and sometimes to butcheries in the community. Animals can also be slaughtered for the ancestors, marriage celebration, funerals and most importantly they are used for paying lobola. Apart from this, slaughtering of animals for the purpose of consumption is rare.

6.1.1.7 Distance to market

This alone cannot prevent farmers from selling their animals but is reason enough to discourage them to even consider selling their animals at reasonable prices. To them the solution is to sell to insiders where there is no need for transport. To sell to outsider's

means that they have to hire their own transport, which can be a bit expensive, so the farmer ends up with minimum returns.

6.1.1.8 Sale of animals

Selling depends on visual appraisal rather than on weight or age. Lack of equipment to weigh animals seems to be the problem. There is no pre-determined price, which every farmer should follow. Every one decides for himself. This creates problems if one farmer is selling his animals at a low price compared to others. Selling of young animals is rare unless it is sick or has some kind of disability. What is common is the selling of old animals, which will either be sick or no longer productive.

6.1.1.9 Overstocking

Africans have this belief that, the more animals an individual owns, the more powerful he/she is. Therefore, taking this belief under consideration, overstocking becomes a serious problem since stocking density does not correlate with the carrying capacity of the veld. Every farmer thinks that he gains by keeping as many animals as possible. The number of animal is not reduced even during period of drought. A farmer will rather see his animal starve to death than to reduce the number through sale. There is no restriction in the number of animals that an individual farmer can own. No single farmer is willing to reduce the number of his animals voluntarily unless everyone else is doing the same.

6.1.1.10 Overgrazing

Overgrazing is the result of veld mismanagement and overstocking. Where the veld is constantly grazed too short and not allowed to rest and form seed for new grasses, the better grasses eventually die out. Poorer, less tasty grasses replace these in turn and eventually weeds and bushes replace the grasses. As weeds do not protect the soil surface, erosion is increased because more water runs off instead of being absorbed into the soil. The country becomes drier. It becomes a serious problem since farmers are not willing to follow the appropriate management practices e.g. reduction of stock number and rotational grazing. In this research, overgrazing seems to be a serious problem at Phooko where there is overstocking due to the size of land available. Overgrazing leads to erosion, which in turn causes land degradation and bush encroachment.

6.1.1.11 Absence of title deeds.

It is often true that if there is no title deed, there is also no conservation of natural resources. Sometimes title deeds can mean that you have the right to do whatever you like with the given piece of land. This might be true since some of the people interviewed had title deeds yet no proper management was followed. Still the fact remains that no one is willing to sacrifice his energy and time on conserving the resources, because it is not guaranteed that his children will benefit. Lack of title deeds gives the landless little incentive to conserve their resources.

6.1.1.12 Lack of subsidy

The government used to subsidize farmers with fencing, vaccination, and dipping services. Today many of the management practices such as vaccination and dipping are not practiced because the government no longer provides them. Farmers have to buy medicines themselves and only a few of these farmers can afford to provide such services.

6.1.1.13 Poor record keeping

The level of literacy and training of rural farmers is poor and therefore it is not surprising that no records are kept of the performance of the animals. A lot of inbreeding occurs and it affects the productivity of animals. It is also difficult for researchers to find information and therefore it becomes difficult to help and find solution to many of the problems.

6.1.1.14 Injudicious veld fires

Veld burning can play a very important role in veld management when it is used to burn off unwanted grasses. From the survey it is evident that the site of a snake is reason enough to convince farmers or rural people to burn that piece of veld. It becomes a problem when the fire is not controlled, as the whole veld will be burned.

6.2. LIVESTOCK OWNERSHIP AND MANAGEMENT

The results of this study are based on the analysis of the effect of ownership/land tenure, land use and grazing management on the number, composition and productivity of livestock in the research area. The type of livestock kept includes goats, cattle and sheep. Most farmers in the area keep a combination of two or three flocks e.g. goats and cattle; cattle and sheep; sheep and goats; while a few farmers keep sheep, cattle and goats.

Animals farmed with in Moutse are cattle, goats, sheep and pigs. Table 6.1 indicates the type of animal and the number of farmers owning it, as well as the total number of that type as owned by different farmers. The table does not mean that, for example, 11 farmers are farming with cattle only but shows how many farmers are raising cattle, that is including single species farmers and combined species farmers. The majority of the farmers farm with a combination of cattle, goats and sheep; cattle and goats; cattle and pigs (Table 6.2) while a few farm with one species only (Table 6.3).

Table 6.1 Number of farmers in the survey and the number of livestock per species owned by farmers (Moutse village)

Type of animal	**No. of Farmers**	**No. of Animals**
Cattle	11	191
Sheep	4	73
Goats	5	40
Pigs	3	41
Totals	**23**	**345**

Table 6.2 Farmers farming with more than one species (Moutse village)

Species	**No. of Farmers**	**No. of animals**		
		Cattle	**Sheep**	**Goats**
Cattle, sheep and goats	2	19	30	10
Cattle and goats	2	33		11
Cattle and sheep	1	30	41	
Cattle and pigs	2	29	13 (pigs)	
Goats and sheep	2		2	19
Totals	**9**	**111**	**86**	**40**

Table 6.3 Farmers farming with one species (Moutse village)

Species	**No. of Farmers**	**No of Animals**
Cattle	4	59
Pigs	1	23
Goats	1	2
Totals	**6**	**84**

Farmers in Phooko farm mostly with cattle and goats as a combination and very few farm with a single species i.e. either cattle or goats. Table 6.4 shows that very few farmers devote their energy in raising a single type of animal. Looking at table 6.5, it is clear that the majority of farmers prefer raising different species together.

Table 6.4 Farmers farming with one species (Phooko village)

Species	**No. of Farmers**	**No. of Animals**
Cattle	6	72
Pig	1	23
Goats	1	2
Totals	**8**	**97**

Table 6.5 Farmers farming with a combination of species (Phooko village)

Species	**No. of Farmers**	**No of Animals**			
		Cattle	**Goats**	**Sheep**	**Pigs**
Cattle and goats	10	122	112		
Cattle, goats and sheep	3	24	22	37	
Cattle and sheep	2	37		44	
Cattle and pig	2	50			18
Goats and sheep	1		19	2	
Totals	**18**	**233**	**153**	**83**	**18**

6.2.1 Effect of land tenure/ownership on the number of livestock kept.

Table 6.6 presents an overview of the effect of land tenure/ownership on the number of livestock kept by farmers. Two land tenure systems were practiced during the research period i.e. communal and private. Under normal circumstances, the assumption is that farmers in communal systems will tend to keep many animals compared to those on private or rented land. The reason being that since communal grazing is free and accessible to all with no restriction on the number of animals that an individual farmer can have, they can own as many as possible. Surprisingly the research results show no significant difference between communal and private land regarding the number of animals kept. But numerically, it is clear that there are more animals under communal than on private land. About 65%, 41% and 78% cattle, goats and sheep respectively are found in communal system with 35%, 59% and 22% found in the private system. The percentages indicate that farmers on communal system tend to keep more cattle and sheep than goats whereas on private land goats are the dominant livestock. The reason for this trend is uncertain but one would expect to find more goats in communal land where grazing is easily available for goats .

Table 6.6 Effect of land tenure system on livestock numbers in communal and privately owned farming systems.

	Communal system Percentage Frequency (Std error)	**Private system** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significance level**
No. cattle	65% 17.363 (3.205)	35% 9.5 (1.975)	4.529	0.453	NS
No. goats	41% 8.0 (2.828)	59% 11.5 (3.327)	0.459	0.517	NS
No. sheep	78% 18.25 (8.429)	22% 5.0 (2.0)	1.088	0.355	NS

NS= not significant

6.2.2 Effect of land tenure/ownership on the composition of the goat, cattle and sheep herd.

For rural small-scale livestock producers, the ratios of male: female livestock is not a major concern. Farmers prefer to keep as many males as possible because the number of animals that an individual farmer own indicate his status in society . Males can be kept for a long period of time provided that there is no immediate need for cash or they can be kept for draught power particularly oxen. There is generally no controlled breeding season and males are allowed to run with females all year round. For this reason, calving, kidding and lambing occurs at any time of the year, which can be both advantageous and disadvantageous. The advantage will be when the newborns arrive under favourable conditions e.g. when there is enough feed and water and good management. A disadvantage will be when the animal is born in the veld where there are predators, under unfavourable weather conditions (drought) or if a number of animals have given birth at the same time, which may increase the competition for feed.

Unfortunately stocking rate is generally not related to the carrying capacity, and most farmers are unwilling to reduce the number of livestock and therefore overstocking is a reality, which significantly affect animal performance.

From Tables 6.7,6.8 and 6.9 the effect of land tenure system on the proportion of males: females and kidding rate are compared. The proportion of males: females in cattle, goats and sheep and under both systems are very irregular. Table 6.7 shows that about 63% and 37% bucks are kept under communal and private system respectively as compared to 49%

and 51% does. Numerically, farmers in communal system are keeping more bucks than does as compared to the private system where there are more does than bucks, which is scientifically more acceptable. Statistically there is no significance difference between the different systems. The table indicate that farmers in communal system keep about 21% bucks, 64% does and the kidding percentage is 15%, while 12% bucks, 68% does with 20% kidding is achieved in private system. The kidding percentage is more or less the same with communal system at 43 % and the private at 57%. The low kidding percentage is due to mortality and sometimes due to the abandonment of kids born in the veld, more than one kid born to one mother and also due to other unforeseen circumstances. Under normal circumstances, there is supposed to be 4% buck, 41% does and 55% kids.

Table 6.7 Effect of land tenure systems/ ownership on the composition of the goatherd (bucks, does, and kids).

	Communal system Percentage Frequency (Std error)	**Private system** Percentage Frequency (Std error)	**F. ratio**	**P. value**	**Significant level**
Bucks	21% 23.7 (8.981)	12% 13.9 (1.291)	1.811	0.215	NS
Does	64% 73.8 (8.163)	68% 77.6 (6.134)	0.133	0.725	NS
Kids	15% 17.65 (3.35)	20% 23.283 (1.681)	2.663	0.154	NS

NS= not significant

Table 6.8 presents an overview of the composition of the cattle herd. Male: female ratio is generally abnormal in both systems in KwaNdebele. The communal system have on average 16% bulls, 64% cows and 20% calving and virtually identical figures of 16% bulls, 65% cows and 19% calving under private system. There is no statistical difference between the two systems. Normally the percentages should be 4% bulls, 60% cows and 36% calving. The survey results suggest that the calving % of both systems is very low. Further analysis suggest that most communal systems have about 48% bulls as compared to 52% in private systems, and there is 49% cows in communal and 51% in private systems. Calving percentage is generally poor in relation to the number of females kept. Although not statistically significant some numerical differences were found for calving percentage between systems.

Table 6.8. Effect of land tenure systems/ ownership on the composition of the cattle herd (bulls, cows and calves).

	Communal system Percentage Frequency (Std error)	**Private system** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significant level**
Bulls	16% 17.25 (3.954)	16% 18.6 (3.00)	0.074	0.792	NS
Cows	64% 67.45 (3.696)	65% 70.7 (4.368)	0.317	0.585	NS
Calve	20% 20.344 (3.84)	19% 20.275 (1.76)	0.000	0.988	NS

NS=not significant

In Table 6.9, there is a significant difference between communal and private system with regard to the composition of the sheep herd. The percentage of males: females in communal system is reasonable (14% rams and 86% ewes) unlike in the private system where there are 38% rams and 62% ewes. This is rather an abnormal ratio. When the two systems are compared, the percentage of rams is 77 % in private and 23 % in communal systems. There was no significant difference in the percentage of ewe with the private system keeping 52% and communal system 48%. Both systems are running at a loss with zero percentage lambing. The reason may be that they are not practicing commercial farming and mortality also plays a role either due to disease or predators.

Table 6.9. Effect of land tenure systems /ownership on the composition of the sheep herd (rams, ewes and lambs).

	Communal system Percentage Frequency (Std error)	**Private system** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significance level**
Rams	14% 11.112 (3.26)	38% 37.9 (4.9)	21.803	0.009	* *
Ewes	86% 67.70 (12.32)	62% 61.85 (4.85)	0.098	0.773	NS
Lamb	-	-	-	-	-

*** = P< 0.01 =99% confidence; NS= not significant**

6.2.3 Effect of land tenure systems/ ownership on total large stock unit [LSU) carried.

An analysis was also done on the effect of land tenure or ownership on large stock unit (LSU) carried. The comparison was based on the two tenure systems discussed previously. The results as shown in Table 6.10 indicate that there is a tendency towards significant differences between the two systems with regard to the number of animals owned. The communal system is carrying about 63% of the total proportion of LSU while only 37% is kept in the private systems. This is understandable since the communal area is much bigger and can accommodate more LSU than the private system.

Table 6.10. Effect of land tenure systems/ ownership on total Large Stock Unit (LSU) carried.

	Average Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significance level**
Communal system	63% 21.570 (4.127)	3.454	0.076	NS
Private system	37% 12.801 (2.463)			

NS= not significant

6.2.4 Effect of land tenure systems/ ownership on the number of LSU cattle, goats and sheep

Tables 6.11; 6.12 and 6.13 summarize the effect of land tenure systems/ownership on the numbers (LSU) of cattle, goats and sheep respectively. From Table 6.11, it is clear that land tenure has no effect on the LSU of bulls. Communal systems tend to carry more bulls (LSU) than the private systems. Communal systems carry about 15% bulls with the private system carrying 18%. When it comes to percentages cows and calves, communal systems have 78% cows and 7% calves as compared to 73% cows and 9% calves in private systems. The calving percentage is generally very low. However there is a significant difference when it comes to the percentage of cows because more cows are kept in communal systems than in private systems ($P<0.05$).

Table 6.11. Effect of land tenure systems/ ownership on LSU (cattle).

	Communal system Percentage Frequency (Std error)	**Private system** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significance level**
Bulls	15% 3.375 (0.769)	18% 2.250 (0.363)	1.748	0.203	NS
Cows	78% 17.138 (3.46)	73% 9.043 (1.838)	4.476	0.047	*
Calves	7% 1.538 (0.348)	9% 1.080 (0.217)	1.176	0.295	NS

NS= not significant
***= P< 0.05 = 95 % confidence**

Table 6.12 presents the effect of land tenure systems on LSU of goats. From Table 6.12, it is clear that there is no significance difference between the numbers of LSU bucks, does and kids. However, there are some numerical differences between the two systems.

Table 6.12. Effect of land tenure systems/ ownership on LSU (goats).

	Communal system Percentage Frequency (Std error)	**Private system** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significance level**
Bucks	20% 0.454 (0.106)	19% 0.551 (0.125)	0.335	0.551	NS
Does	67% 1.52 (0.558)	65% 1.848 (0.510)	0.136	0.723	NS
Kids	13% 0.285 (0.175)	16% 0.458 (0 .074)	1.192	0.317	NS

NS = not significant

Table 6.13 shows the LSU of sheep with no significance difference whatsoever between the two systems. Numerically the proportion of rams: ewes is acceptable although the lambing percentage is zero under both systems. Under communal system the proportion is 11% rams and 89% ewes whereas in private systems the proportion is skewed with 41% rams and 59% ewes.

Table 6.13. Effect of land tenure systems/ ownership on LSU (sheep).

	Communal system Percentage Frequency (Std error)	**Private system** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significance level**
Rams	11% 0.39 (0.109)	49% 0. 45 (0.230)	0.077	0.798	NS
Ewes	89% 3.256 (1.489)	51% 0. 66 (. 220)	1.811	0.271	NS
Lambs	-	-	-	-	-

NS= not significant

6.2.5 Effect of farming systems on total number of animals, composition of the cattle herd, LSU cattle and total LSU

Land is a scarce resource which needs to be utilized in a proper and profitable way to ensure that it is well conserved for both our use and future use. Although it is a scarce resource, it has the potential to be used productively in a number of different ways e.g. grazing, ranging, forestry, arable or a mixture of these i.e. mixed farming. There were two types of farming which were encountered during the survey i.e. animal farming (those who use land only for grazing and it was mainly on communal land) and mixed farming (those who farm with animals and another piece of land for cultivation). The advantage of mixed farming is that after harvest (e.g. of maize), animals can be turned into the field and utilize the post harvest residues.

Tables 6.14 to 6.17 illustrate the effect of the two types of farming systems may have on animal performance. Table 6.14 shows the effect of land use on total number of animals. From the Table 6.14 it is clear that the type of land use has a minor impact on the number of animals kept, although there is a tendency towards significance. There are more animals under mixed than on exclusively animal farming systems. About 74% and 84% cattle and goats respectively are found in a mixed farming while there are 26% and 16% cattle and goats respectively under animal type of farming. The reason for these differences might be that most people practicing mixed farming have the advantage of protecting their animals against predators, thieves and unnecessary mortalities since they

see them everyday and are kraaled at night, unlike in communal grazing were animals are left out in the veld. In addition, farmers in livestock production systems probably need to sell more animals to yield an income compared to those in mixed farming systems who can depend more on the income of cash crops or the sale of fresh produce.

Table 6.14. Effect of farming systems on total number of animals.

	Animal farming Percentage Frequency (Std error)	**Mixed farming** Percentage Frequency Std error)	**F- ratio**	**P- value**	**Significant level**
Cattle	74% 5.25 (1.436)	26% 14.95 (2.206)	3.862	0.063	NS
Goats	84% 2.333 (0.333)	16% 12.33 (2.692)	3.259	0.094	NS
Sheep	-	-	-	-	-

NS= not significant

Table 6.15 shows the effect of land use on the composition of the cattle herd. This is the percentage bulls, cows and calves. There is no significant difference between the two types of land use systems. There are 45% and 55% bulls under animal and mixed farming respectively, 53% and 47% cows and 53% and 47% calves in animal and mixed farming respectively. When farming systems are compared there are more cows than bulls in both systems. There are about 17% bulls, 64% cows and 19% calves under mixed farming and 13% bulls, 67% cows and 20% calves under animal farming. The calving percentage is similar under both farming systems.

Table 6.15. Effect of farming systems on the composition of the cattle herd (bulls, cows & calves).

	Animal farming Percentage Frequency (Std error)	**Mixed farming** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significant level**
Bulls	13% 14.9 (0.900)	17% 18.458 (2.84)	0.265	0.619	NS
Cows	67% 77.33 (9.628)	64% 67.421 (2.78)	1.810	0.193	NS
Calves	20% 22.65 (5.95)	19% 20.0 (2.342)	0.152	0.706	NS

NS=not significant

In Table 6.16 the effect of farming systems on LSU of cattle is shown. Information regarding percentage bulls could not be analysed since there were not enough degrees of freedom for the analysis. However there is a tendency towards more cows under mixed farming (73%) than in animal farming (27%). There was no significant difference in calving percentage between the two systems. There were about 69% calves under mixed and 31% under animal farming. Numerically there were 38 more calves in mixed than in animal farming systems.

Table 6.16. Effect of farming systems on LSU (cattle).

	Animal farming Percentage Frequency (Std error)	**Mixed farming** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significance level**
Bulls	-	-	-	-	-
Cows	27% 5.352 (1.474)	73% 14.506 (2.32)	3.120	0.092	NS
Calves	31% 0.645 (0.215)	69% 1.413 (0.230)	1.392	0.257	NS

NS= not significant

Land use has an effect on total LSU. In Table 6.17, it is shown that there are more animals in mixed farming (77%) than in animal farming systems (23%).

Table 6.17. Effect of farming systems on total LSU.

	Av. LSU Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significant level**
Animal farming	23% 5.960 (2.018)	6.029	0.022	*
Mixed farming	77% 19.773 (2.729)			

***= P<0.01= 99% confidence**

6.2.6 The effect of grazing management on total number of animals, composition of the cattle herd, goat herd, LSU-cattle, LSU- goats and on total LSU

It is true that South Africa is poorly endowed with agricultural land, but there is no conservation practice being followed especially with regard to grazing land. Most of the grazing land is communal and under this category there is no one responsible for the conservation of the land. Tables 6.18-6.23 indicate the effect that grazing mismanagement has on animal performance. The comparison is made between two types of grazing management systems, which were observed during the survey i.e. minor, and no management practices. Private owners were only practicing minor management. There is no significant difference between the two types of management observed but the figures indicate that those practicing minor management keep slightly more animals than those not practicing any management. There were 52% cattle and 56% goats under minor management as compared to 48% cattle and 44% goats under no management (Table 6.18).

Table 6.18. Effect of grazing management on total number of animals.

	Minor mngt Percentage Frequency (Std error)	**No mngt** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significant level**
Cattle	52% 14.2 (3.555)	48% 13.00 (2.385)	0.059	0.813	NS
Goats	56% 12.2 (2.905)	44% 9.40 (3.337)	0.290	0.605	NS
Sheep	-	-	-	-	-

NS= not significant

Table 6.19-6.20 indicates the effect of grazing management on the composition of the cattle and goatherd. There was no significant difference regarding percentage bulls, cows and calves or bucks, does and kids. The herds consisted of 52% bulls, 48% cows and 49% calves under minor management, and 48% bulls, 52% cows and 51% calves in systems with no management. Calving percentage under both systems is satisfactory. The animals show the potential to perform better with at least minor grazing management. An analysis regarding a single management system shows that the proportion of males: females are irregular in both systems. There are more bulls in each system than it should normally be. There were 19% bulls, 62% cows and 19% calves in the system with minor grazing management and 16% bulls, 65% cows and 19% calves in the system with no management . The calving percentage is similar in both systems.

Table 6.19. Effect of grazing management on the composition of the cattle herd (bulls, cows & calves).

	Minor mngt Percentage Frequency (Std error)	**No mngt** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significant level**
Bulls	19% 19.22 (5.748)	16% 17.493	0.091	0.769	NS
Cows	62% 64.88 (3.652)	65% 70.327 (3.57)	0.615	0.450	NS
Calves	19% 19.5 (1.554)	19% 20.561 (2.78)	0.042	0.843	NS

NS= not significant

The composition of the goatherd was similar in the systems with minor grazing management and no management. Numerically more goats were kept in the systems with no grazing management. There was 39% bucks, 47 % does and 55% kids in minor management compared to 61% bucks, 53 % does and 45% kids in none -management system. When a percentage comparison is made under one type of system the situation changes. Now an understandable ratio exist e.g. 13% bucks, 65% does and 22% kids under minor management, and 17% bucks, 66% does and 16% kids in the systems with no grazing management (Table 6.20). The present results suggest that systems with poor or no grazing management are associated with a poor herd composition e.g. poor male : female ratio and low lambing percentage.

Table 6.20. Effect of grazing management on the composition of the goat herd (bucks, does & kids).

	Minor mngt Percentage Frequency (Std error)	**No mngt** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significant level**
Bucks	13% 13.425 (1.97)	17.3% 20.75 (5.980)	0.920	0.376	NS
Does	65% 69.76 (7.659)	66.4% 79.62 (6.027)	0.948	0.358	NS
Kids	22% 24.25 (2.428)	16.3% 19.575 (1.87)	2.256	0.184	NS

NS= not significant

Tables 6.21-6.23 indicate the effect of grazing management on the number of cattle (LSU), number of goats (LSU) and total LSU carried. Minor grazing management seems to have no effect on the number of cattle and goats since there is no significant difference in the number of animals kept under both systems. It can be concluded that "proper" management is the solution because minor management does not improve the situation adequately. When a comparison is made for a single system, the calving and kidding % is very low. There are about 16% bulls, 76 cows and 8% calves under minor management and about 17 % bulls, 76 cows and 7% calves under none management system (Table 6.21).

Table 6.21. Effect of grazing management on LSU -cattle.

	Minor mngt Percentage Frequency (Std error)	**No mngt** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significant level**
Bulls	16% 2.750 (0.612)	17% 2.833 (0.551)	0.007	0.937	NS
Cows	76% 13.424 (3.58)	76% 12.773 (2.51)	0.016	0.901	NS
Calves	8% 1.405 (0.327)	7% 1.297 (0.264)	0.043	0.840	NS

NS= not significant

A similar situation occurs under LSU goats with 16% bucks, 69% does and 15% kids in minor grazing management, 21% bucks, 63% does and 16% kids under minor management. Numerically there are more does than bucks under both systems (Table 6.22).

Table 6.22. Effect of grazing management on LSU- goats.

	Minor mngt Percentage Frequency (Std error)	**No mngt** Percentage Frequency (Std error)	**F- ratio**	**P- value**	**Significant level**
Bucks	16% 0.440 (0.089)	21% 0.545 (0.119)	0.367	0.566	NS
Does	69% 1.898 (0.433)	63% 1.674 (0.572)	0.070	0.798	NS
Kids	15% 0.40 (0.034)	16% 0.430 (0.146)	0.040	0.850	NS

NS= not significant

Table 6.23 indicates the effect of grazing management on total LSU. There was no significant difference between the two systems. There was 55% animals under minor management compared to 45% under none management system. Many animals are found

were there is minor management. This shows that if management is emphasized in both systems then farmers can be able to keep more animals than they are keeping at present.

Table 6.23. Effect of grazing management on total LSU.

	Average Percentage Frequency (Std error)	**F-ratio**	**P-value**	**Significant level**
Minor Mngt	55% 20.180 (3.945)	0.400	0.540	NS
No Mngt	45% 16.218 (2.947)			

NS= not significant

CHAPTER 7:

CONCLUSIONS AND RECOMMENDATIONS

7.1. CONCLUSION

"If greater food production is the real issue, research priorities should be directed towards increasing the output and efficiency of intensive animal production systems ", (Cronje, 1998). Indigenous goats appear to have an innate tolerance to many diseases and parasites which more than compensate for their smaller size and weaning mass. Although better nutrition and management would reverse this situation, this is unlikely to occur under the communal system of farming.
The reason for this is that in the communal system of land tenure, all members of the community share common grazing land. Since there is no restriction on livestock numbers, the available nutritional resources are severely limited and the available nutritional resources determine as such animal performance in this system. For this reason, it can be concluded that the major constraint to more efficient animal production in the communal farming system is inadequate nutrition.

The results show that all the categories mentioned i.e. type of management, type of farming and land tenure system influence animal performance to some extent. It is concluded from the results that to successful farmers, land tenure seems to be a major limiting factor. The characterization of farmers that are economically successful in terms of goat / animal husbandry shows that they have little or no land and no regular substantial off farm income. Therefore, they rely mainly on goat / animal husbandry to provide a constant income, which emphasize the importance of livestock in rural farming systems.

Although goats are less popular compared to cattle (often used for lobola), they form an important part of most rural farming systems, particularly in providing meat and milk for rural people. The results of the survey show that from the 26 farmers interviewed, 13 are farming with goats and cattle, and the remaining 13 with a combination of goats, cattle, sheep and sometimes pigs.

KwaNdebele, like other former homelands has an agricultural potential which is largely underestimated because of lack of skills and training, absence of ownership, overstocking and lack of veld management. From the result, it is concluded that it is difficult to enforce proper management and conservation measures under communal land. Although the results suggest only a slight effect of land tenure on animal performance, land tenure does have an effect on the implementation of conservation measures. In economic terms, the cultivator / farmer is said to lack incentives to carefully husband the holding he does not have property rights that internalise the costs and benefits of conserving or failing to conserve the land (Basset and Crummey,1993)

In Kwandebele for example, fences have been erected on communal grazing land to make camps, but it has been removed or stolen. People burn the veld whenever they like

without considering the season of the year or weather conditions. Overgrazing causes bush encroachment since there is seldom a limit on the number of livestock kept. A lot of erosion has occurred but animals survive and continue to be an important source of income for rural people. Many of rural people survive on the income generated by the sale of these animals. Selling is a difficult decision for many rural farmers. To rural people, the number of livestock contributes to social status and power. The number of livestock is seen as an accumulation of wealth. This is not only a problem in KwaNdebele but amongst many rural people. They see overgrazing as a result of a shortage of land and not overstocking.

The importance of management is clear when the two systems are compared. The difference is not so great but is there. Where minor management is under practice, there are more animals than in a system where there is no management under practice. People under communal type of land tenure are reluctant to apply any management practice even if it is their advantage. They do not see the reason why they should do that while the land belongs to the "government". They lack incentives to conserve their resources.

The type of farming being practiced also affect the application of conservation measures. Where mixed farming is practiced, farmers do try to conserve the soil because it is the same soil where they will have to grow their vegetables as well as support their animals. In animal type of farming, people know that communal land is open and if a certain area is eroded and severely damaged, they have the opportunity to graze their animals in another part of land. Such kind of belief and behaviour should not be encouraged as it leads to negligence. Most part of the grazing land in KwaNdebele is under bush encroachment. The land is in its present state because overgrazing is all over where previously was the good grazing land. Even the most sensitive i.e. land not suitable for grazing is not only used as grazing land but is overgrazed.

Although a change in tenure cannot create more land, it can help motivate rural farmers to maintain, improve and conserve their scarce resources of which land is perhaps the most critical factor. The establishment of a stabilized and productive agriculture will need new tenure rules, which enhance the farmer's rights in the land to both facilitate and reinforce it. Land tenure systems should speed up the formation of capital by creating incentives for investment as opposed to consumption. Elimination of access to land through rental or sales markets leaves the poor with few land access options. They can intensify farming on good land in their holdings through labour intensive land investment, giving rise to remarkably productive and sustainable farming systems all over the world. They can farm marginal lands in their holdings or on mountainsides, usually with disastrous consequences since such land rarely warrants sufficient investment in erosion protection. They can migrate to marginal frontier areas with adverse environmental consequences. The decision lies with the people responsible for land allocation, recommendation by extension officers and researchers.

Empowering small scale farmers

Access to land through purchase

Experience has shown that the major constraint is the access to finance for land purchase rather than cost of land. If small-scale farmers are allowed to purchase land and are given title deed, they will be inspired to conserve our natural resources.

Farm credit

The formal sources of credit for farmers in South Africa i.e. the Land Bank, Agricultural credit board, Co-operatives and the commercial banking sector are not always properly geared to providing credit to emerging and part-time farmers. However, some of these institutions are now making an effort to accommodate and support small-scale farmers.

Extension, research and training

These services should be offered to all farmers irrespective of whether they own land or not. Agricultural extension workers should be employed to go to farms whenever required. They should offer advice and support to the farmers. As they are trained in modern methods, they can show farmers better and more profitable ways of farming. As far as research is concerned, we never reach a stage were we know everything there is to be known. There are always questions to be asked and new knowledge to be gained.

Other forms of access to land- use rights

The purchasing of land should not be the only form of access to land- use rights. Access to land should be supplemented by measures aimed at access to all other resources and agricultural services. In this respect it is important that the land use rights should be transferable so that the most competent user can utilise this resources.

If a goat industry has to be established, it is important that we embark on an educational approach and shows the financial value of the goat to the farmers, since many small-scale farmers see goats not as a saleable commodity but as animals of financial security. However, the increase in human population will put pressure on resources, therefore means of intensification and greater efficiency must be found to increase food and other products in order to improve the quality of life for all people in the country with special emphasis to rural people. Cronje, (1998) has indicated that the lack of any real improvement in the efficiency of animal production in communal areas (despite many research projects) indicates that the real issue to be addressed in this situation relates more to research directed at the sociology of land tenure systems than to animal science research. In an assessment of animal agriculture in Sub-Saharan Africa, it was concluded that strategies for pastoral systems should focus on the acquisition of land use rights for grazers and the establishment of locally managed and controlled land and water management systems.

7.2. Recommendations

- Further research should be directed on finding ways and means by which the existing land tenure system can be changed so as to improve the efficiency and productivity of both small-scale animal farmers and that of indigenous goats.

- More land should be allocated to the landless on a trial and based on sound livestock production planning. Thus they should be given temporary ownership with an option of obtaining full / permanent on condition that within a given time of set goals and measure success in terms of output versus production objectives, the land is under proper management and conservation. Failure to meet these goals should mean that a person would loose ownership to someone else.

- Currently the market for indigenous goats is not well established for rural people. The government or people responsible should make provision for such a market so that goat farming should also become a commercial industry for rural people.

- The ratio of male : female leaves much to be desired. In some instances there are more males than females, which is not scientifically recommended. This support the belief that Africans take pride in the number of animals one owns not considering the correct stocking or male : female ratio. Need for education and training.

- Farmers in livestock production need to add more animals to yield an income as those in mixed farming systems can depend on the income of cash crops or the sale of fresh produce.

- People of the future and children should be involved so the knowledge can be passed from generation to generation.

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MULTIFACTOR ANALYSIS OF VARIANCE

A multi-factor analysis of variance was done on the previously discussed factors i.e. land tenure /ownership, farming systems and grazing management. The results of the analysis are shown by Appendix 1 to 8.

Appendix 1: Multifactor ANOVA

Effect of land tenure/ ownership, farming systems & grazing management on total number of cattle, goats and sheep.

Cattle	Average	Std error	F- ratio	P- value	Significant level
1.Landtenur/ Ownership					
Communal	17.364	3.206	6.928	0.016	*
Private	9.5	1.975			
2.farming systems					
Animal	5.250	1.436	3.395	0.081	NS
Mixed	14.947	2.206			
3.Grazing Mngt					
Minor	14.2	3.555	1.320	0.265	NS
No mngt	13.0	2.385			

NS= not significant
* =P<0.01 = 99% confidence

Goats	Average	Std error	F- ratio	P- value	Significant level
1.Landtenure /Ownership					
Communal	8.0	2.828	0.748	0.415	NS
Private	11.5	3.327			
2.Farming systems					
Animal	2.333	0.333	3.134	0.104	NS
Mixed	12.333	2.692			
3.Grazing Mngt					
Minor	12.2	2.905	0.249	0.633	NS
No Mngt	9.4	3.337			

NS= not significant

Sheep	Average	Std error	F- ratio	P- value	Significant level
1.Landtenure /Ownership					
Communal	18.25	8.429	0.638	0.516	NS
Private	5.0	2.0			
2.Farming systems					
Animal	10.0	0.0	0.238	0.678	NS
Mixed	14.6	7.339			
3.Grazing Mngt					
Minor	7.0	0.0	0.021	0.899	NS
No Mngt	15.2	7.207			

NS= not significant

Appendix 2: Multifactor ANOVA

Effect of land tenure /ownership, farming systems & grazing management on bulls, cows and calves.

Bulls	Average	Std error	F- ratio	P- value	Significant level
1.Landtenure /Ownership					
Communal	17.25	3.954	0.013	0.912	NS
Private	18.6	3.0			
2.Farming systems					
Animal	14.9	0.9	0.184	0.678	NS
Mixed	18.458	2.837			
3.Grazing Mngt					
Minor	19.220	5.748	0.006	0.939	NS
No Mngt	17.493	2.721			

NS= not significant

Cows	Average	Std error	F- ratio	P- value	Significant level
1.Landtenure /Ownership					
Communal	67.445	3.696	0.979	0.345	NS
Private	70.700	4.368			
2.Farming systems					
Animal	77.325	9.628	1.070	0.314	NS
Mixed	67.421	2.782			
3.Grazing Mngt					
Minor	64.880	3.652	0.857	0.376	NS
No Mngt	70.327	3.478			

NS= not significant

Calves	Average	Std error	F- ratio	P- value	Significant level
1.landtenure/ Ownership					
Communal	20.344	3.839	0,004	0.951	NS
Private	20.275	1.760			
2.Farming systems					
Animal	22.65	5.950	0.099	0.761	NS
Mixed	20.0	2.342			
3.Grazing Mngt					
Minor	19.50	1.554	0.018	0.897	NS
No Mngt	20.561	2.776			

NS= not significant

Appendix 3: Multifactor ANOVA

Effect of land tenure /ownership, farming systems & grazing management on does.

Does	Average	Std error	F- ratio	P- value	Significant level
1.Landtenure /Ownership					
Communal	73.8	8.163	0.379	0.557	NS
Private	77.6	6.134			
2.Farming systems					
Animal	100.0	0.000	6.537	0.027	NS
Mixed	70.417	4.495			
3.Grazing Mngt					
Minor	69.76	7.659	1.320	0.265	NS
No Mngt	79.62	6.027			

NS= not significant
*= P<0.05= 955 confidence

Appendix 4: Multifactor ANOVA

Effect of land tenure /ownership, farming systems & grazing management on rams and ewes.

% Rams	Average	Std error	F- ratio	P- value	Significant level
1.Ownership					
Communal	11.113	3.259	5.518	0.143	NS
Private	37.90	4.900			
2.Land use					
Animal	10.0	0.000	0.026	0.888	NS
Mixed	22.05	7.110			
3.Grazing					
Minor	42.80	0.000	0.763	0.483	NS
None	15.49	5.053			

NS= not significant

Ewes	Average	Std error	F- ratio	P- value	Significant level
1.Landtenure /Ownership					
Communal	67.70	12.320	0.197	0.705	NS
Private	61.85	4.850			
2.Farming systems					
Animal	40.0	0.000	2.563	0.250	NS
Mixed	70.9	7.478			
3.Grazing Mngt					
Minor	57.0	0.000	0.118	0.767	NS
No Mngt	67.5	9.545			

NS= not significant

Appendix 5: Multifactor ANOVA

Effect of land tenure systems /ownership, farming systems and grazing management on LSU (bulls, cows and calves).

LSU-Bulls	Average	Std error	F – ratio	P - value	Significant level
1.Landtenure /Ownership					
Communal	3.375	0.769	2.644	0.123	NS
Private	2.25	0.363			
2.Farming systems					
Animal	1.25	0.00	2.824	0.112	NS
Mixed	3.088	0.481			
3.Grazing Mngt					
Minor	2.75	0.612	0.263	0.620	NS
No Mngt	2.833	0.551			

NS= not significant

LSU-Cows	Average	Std error	F – ratio	P - value	Significant level
1.Landtenure /Ownership					
Communal	17.138	3.462	6.166	0.225	NS
Private	9.043	1.839			
2.Farming systems					
Animal	5.352	1.474	2.698	0.117	NS
Mixed	14.507	2.318			
3.Grazing Mngt					
Minor	13.424	3.458	0.995	0.342	NS
No Mngt	12.773	2.492			

NS= not significant

Appendix 6: Multifactor ANOVA

Effect of land tenure systems /ownership, farming systems and grazing management on LSU (bucks and does).

LSU-Bucks	Average	Std error	F – ratio	P - value	Significant level
1.Landtenure /Ownership					
Communal	0.454	0.107	3.124	0.121	NS
Private	0.552	0.125			
2.Farming systems					
Animal	0.73	0.000	1.467	0.265	NS
Mixed	0.485	0.086			
3.Grazing Mngt					
Minor	0.44	0.089	2.305	0.173	NS
No Mngt	0.546	0.119			

NS= not significant

LSU-Does	Average	Std error	F- ratio	P-value	Significant level
1.Landtenure /Ownership					
Communal	1.520	0.559	1.072	0.325	NS
Private	1.848	0.511			
2.Farming systems					
Animal	0.480	0.000	2.706	0.131	NS
Mixed	1.967	0.424			
3.Grazing Mngt					
Minor	1.898	0.433	0.531	0.490	NS
No Mngt	1.674	0.573			

NS= not significant

Appendix 7: Multifactor ANOVA

Effect of land tenure systems /ownership, farming systems and grazing management on LSU (rams and ewes).

LSU-Rams	Average	Std error	F-ratio	P- value	Significant level
1.Landtenure /Ownership					
Communal	0.390	0.107	0.728	0.492	NS
Private	0.450	0.230			
2.Farmung systems					
Animal	0.220	0.000	0.728	0.492	NS
Mixed	0.448	0.103			
3.Grazing Mngt					
Minor	0.680	0.000	1.999	0.293	NS
No Mngt	0.356	0.092			

NS= not significant

LSU-Ewes	Average	Std error	F – ratio	P- value	Significant level
1.Landtenure /Ownership					
Communal	3.257	1.489	2.211	0.371	NS
Private	0.660	0.220			
2.Farming systems					
Animal	0.88	0.000	1.752	0.406	NS
Mixed	2.553	1.267			
3.Grazing Mngt					
Minor	0.88	0.000	0.020	0.912	NS
No Mngt	2.553	1.267			

NS= not significant

Appendix 8: Multifactor ANOVA

Effect of land tenure/ ownership, farming systems and grazing management on total LSU.

LSU-cattle,goats& sheep	Average	Std error	F- ratio	P- value	Significant level
1.Land tenure / Ownership					
Communal	21.571	4.127	5.044	0.036	*
Private	12.802	2.463			
2.Farming systems					
Animal	5.960	2.019	3.631	0.071	NS
Mixed	19.774	2.729			
3.Grazing mngt					
Minor	20.18	3.945	1.561	0.023	*
No Mngt	16.219	2.947			

***=P< 0.05= 95% confidence**
NS= not significant