Reproductive Performance of Cows in Sweet and Sour Veld Types Under Communal Production Systems in the Eastern Cape Province of South Africa

By

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ABSTRACT

The objective of the study was to evaluate cow reproductive performance in the sweetveld and sourveld communal grazing areas of the Eastern Cape Province, South Africa. In the first experiment, farmer perceptions were obtained using participatory rural appraisals. Farmers ranked lack of fences, tick-borne diseases, poor animal condition during winter and poor breeding practices, respectively as major constraints limiting cattle production in the Eastern Cape. Cattle, sheep and goats, in that order, were ranked as the most important livestock species and were mainly kept for meat, cash and ceremonies, respectively. The non-descript cattle breed was the most common breed found in the smallholder areas. Most farmers preferred Nguni breed because of its adaptive attributes. In the second experiment, structured questionnaires were administered, between June and August 2006, to a total of 551 farmers from 10 communities of the Eastern Cape. There was a significant association ($P<0.05$) between the use of pregnancy diagnoses and community. About 87 and 77 % of the interviewed farmers did not respond on the extent of pregnancy and calving rates in their herds. A higher proportion of farmers from Hekele (51%) and from Upper Mnxe (45.3%) communities reported low number of bulls as a major constraint to cow reproductive performance. Body condition and ovarian activity were measured in the sweet and sour veld types. Body condition score of animals was measured from March

2007 until January 2008 and ovarian activity of cows was performed by a veterinarian through rectal palpation in June, August and October 2007 and January 2008. From March to July, there was a marked decline in body condition on both veld types. In the sweetveld, body condition improved from September until January, whereas in the sourveld the improvement in body condition started in October. The cows in both veld types conceived throughout the year. Most cows in the sweetveld were cycling in January and August ($P<0.05$) whereas in the sourveld there was no distinct period when the animals were cycling. Overall, there were no differences in the proportion of cows that were cycling between the sour and sweet veldts ($P>0.05$). There were more cows cycling in sourveld in October than in the sweetveld. Reproductive performance of cows in communal areas could, therefore, be determined by levels and quality of nutrition.

Keywords: Participatory rural appraisals; Structured questionnaires; Farmer participation; Farmer perceptions; Body condition scoring; Ovarian activity; Pregnancy diagnoses.

DEDICATION

To my late father (Ben Nqeno) and most of all, my kids (Lukha and Lolo)

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CHAPTER ONE

1. Introduction

1.1 Background

Livestock production contributes significantly to the livelihoods of communal farmers in South Africa. Of the 14.1 million cattle in South Africa, 3.1 million are in the Eastern Cape (National Department of Agriculture, 2008) and about half of these belong to communal farmers (Ainslie *et al*., 2002). In 2003, the Eastern Cape Development Corporation estimated that in the Eastern Cape, over 65 % of the human population live in communal areas, where poverty and food insecurity levels are high. In most communal areas, there are various livestock species, cattle, goats, sheep. Of these, cattle is the most valued, as it provides many functions and roles in communal areas. To enhance the welfare of the poor, productivity and socio-economic contribution of cattle should be improved and sustained. Differences in cattle production systems used in different communities, vegetation types, productivity levels, roles and functions in communal areas are largely unknown. It is often wrongly assumed that the functions and production patterns of cattle in all communal areas are similar.

Communal grazing areas in South Africa are managed under a communal land tenure system where the rangeland resources are used by all members of the community (Delali *et al*., 2006). Information on the influence of different communal ecosystems on cattle production is scanty. Generally, in South Africa the season of use of veld is described by using the term sweet, mixed and sour.

Sweetveld is the one that remains palatable and nutritious even when mature, whereas sourveld provides palatable material only during the growing season and mixed veld is the intermediate

between the two extremes (Tainton, 1999).

Besides body condition score assessments and growth performance, reproductive efficiency of cows is, arguably the major determinant of cattle productivity in the communal areas of the Eastern Cape, South Africa. Cows in the communal areas take a long time to conceive. Normally a cow gives birth after every two years. This could be attributed by various factors such as the physical condition of the cow, the condition of the veld and bull fertility. For a cow to give a calf every year, she has to be in good condition, get good quality feed and get serviced by the bull at the right time. Farmers need to be reminded about the importance of these for successful livestock reproduction.

To develop cattle improvement strategies that benefit the rural people, it is crucial to actively engage the communal farmers to participate in the identification of problems they face and the possible solutions to their constraints. In other words, the often used top-down approach, where researchers design development programmes for the farmers, has widely been acknowledged to be wrong (Chambers, 1993; Francis and Sibanda, 2001). Since communities are unique in various aspects, such as culture, beliefs, size and management of grazing schemes, veld types, availability of resources and infrastructure, it is imperative to evaluate constraints in different communities and determine the factors that influence cow reproduction in the communal grazing areas.

1.2 Justification

Reproductive efficiency of the cows in communal areas is not known. It is generally accepted that productivity is low, with calving intervals of nearly two years while heifers produce their first calves between two and four years. It is, therefore, crucial to determine whether normal ovarian cyclicity of the cows in communal areas is exhibited. In addition, the trends in conception rates and pregnancy patterns in the major veld types in the Eastern Cape should be evaluated. Information on the causes of poor reproductive efficiency is essential in designing appropriate and sustainable intervention strategies to enhance cattle performance and the welfare of the farmers in the communal areas. Individual farmers should be able to evaluate the performance of their cows and determine the best and appropriate times for mating and conception. Improving reproductive efficiency will, evidently, increase herd sizes, the number of saleable animals and, may lead to increased cattle offtake from communal areas. To enhance the chances of the technologies to be adopted, the communities and farmers should be actively involved in the design and implementation of the trials.

1.3 Objectives

The broad objective of the study was to evaluate the reproductive performance of cows in the sourveld and sweetveld under the communal production systems. The specific objectives were to:

1. Establish community perceptions on cattle production in the communal areas of the Eastern Cape Province, South Africa;
2. Determine farmer perceptions on cow reproductive performance in the communal areas; and

3. Compare seasonal body condition changes, ovarian activity, season of conception and pregnancy patterns of cows in the sweetveld and sourveld areas.

1.4 Hypotheses

The alternative hypotheses tested were that:

1. Community perceptions on cattle production in the communal areas of the Eastern Cape were indifferent;
2. Farmer perceptions on cow reproduction in the different communities and veld types were not similar; and
3. Body condition scores, ovarian activity, season of conception and pregnancy patterns of cows in the sweetveld and sourveld areas were different.

CHAPTER TWO

2. Review of Literature

2.1 Introduction

Cattle production is an integral part of communal farming systems. Besides provision of food and income, it is a source of investment, employment and status for the resource-poor farmer (Tainton, 1999). Development of cattle production in the communal areas can therefore improve food security and raise income levels of the communal farmers (Berzborn, 2007). Sustainable cattle development strategies require adequate knowledge of production systems, available feed resources, animal growth and reproductive performance and farmers' perceptions on cattle production. This section reviews the characteristics of communal cattle production systems, measures of reproductive efficiency in cows and the major factors that influence cow reproductive performance in communal areas.

2.2 Characteristics of the communal cattle production systems

Livelihoods in communal areas are complex and are usually constituted from multiple activities and sources (Anseeuw and Laurent, 2007; Berzborn, 2007). Most of the communal farmers own cattle as part of a mixed livelihood strategy which changes depending on a broad range of personal circumstances including the extent and stability of other sources of income. While it is common for women to own cattle, the management of herds is primarily carried out by men (Kleinbooi and Lahiff, 2007). Efficient reproductive performance is vital for high productivity (production and reproduction) and economic efficiency in cattle farming. Optimal reproductive performance is important in producing replacement animals for the herd, and milk production for the calf and/or human consumption. Thus, evaluation of the reproductive performance is a good

starting point in any program aiming to improve productivity in cattle farming (Kanuya *et al*., 2005). In a communal environment, livestock are kept communally, cows and bulls move together all year round and there are no distinct times where breeding takes place. Areas differ in terms of how they look after the animals. In Magwiji communal area, for example, farmers keep their cattle on the mountains and only the pregnant cows are kept around the homesteads, mainly for the calf to suckle and milk for food consumption. In contrast, farmers in other communities confine their cattle in kraals at night. Even though cattle could be managed differently, bulls and cows graze together due to limitations in infrastructure and land availability. It is vital to determine whether the different management systems lead to differences in reproductive efficiencies of the cows.

Improving the productivity of cattle and crop is critical for improving rural productivity and welfare. Cattle are not only an economic investment but a source of status and an important feature of communities' socio-cultural activity. Animals provide energy for ploughing, ridging, transport and cultivation (Shumba, 1984). Farmers with large cattle herd sizes generally have large arable holdings, do more winter ploughing and apply manure from their animals as fertilisation for their crops (Shumba, 1984). These roles may differ from one community to another and across veld types. The relative functions of cattle, may, however, depend on the veld type in the community, socio-cultural characteristics, rainfall patterns and management systems used, among other factors.

2.3 Active farmer participation in communal livestock research

Technologies that benefit communal farmers should ideally be developed with the active participation of the farmers. Although communal farming systems are complex, involving the farmers increase the chance of technology adoption. Commonly used methods to ensure active farmer participation include participatory rural appraisals (PRAs) and monitoring farmer performances.

2.3.1 Participatory rural appraisals

The PRAs are an effective tool to obtain information and encourage participation in agricultural development (Chambers, 1993; Francis and Sibanda, 2001), they often ignore the differences that occur among households in the same community. Participatory rural appraisals (PRA's) recognise that indigenous people are capable of identifying and expressing their needs and aspirations amongst themselves, such that the role of researcher is reduced to that of a listener, learner, catalyst or facilitator (Chambers, 1993). Participatory rural appraisals have different tools to acquire information which include time lines, trends, Venn diagrams, seasonality, mapping, matrices, transect walks, voting and pair-wise ranking. All this is normally done in a group/ groups so as to get the general feeling and not the in-depth analysis. Various PRA methods should be applied to obtain detailed information about a particular aspect in the communities.

2.3.2 Monitoring cattle performance with farmers

Monitoring performance of cattle in communal areas is another way to further involve farmers. One of the best tools for farmers to monitor their livestock performance which is easier and does

not need any infrastructure is the measure of body condition scores. These assist farmers to understand the nutritional status of their animals and for them to decide when to intervene to increase animal performance. Body condition score is one of the tools used to measure body fat deposition of the animal. Capacity building should be conducted for farmers to perform these animal assessments on their own and should also be encouraged to keep key records on the performance of their herds. When infrastructure is available, body weights and pregnancy diagnoses should also be performed.

2.4 Measures of cow reproductive performance

The common measures of reproductive efficiency include calving intervals, pregnancy rates, ovarian activity and days open (Mukasa-Mugerwa, 1989; Gordon, 1997). Examples of some of the parameters that can be used to estimate reproductive efficiency in cows in communal areas include calving intervals, days open period, ovarian activity and pregnancy rates. Table 2.1 shows levels of some of these parameters reported by Matiko *et al*. (2008) in communal areas of Tanzania. These communal farmers hardly keep records on the efficiency of their herd. These parameters are, therefore, largely unknown, yet they directly affect herd sizes and can assist the farmer to identify the presence of any abnormalities among the cows in the herd.

Table 2.1: Reproductive performance in Zebu cows assessed biweekly using progesterone samples in a communal herd in Tanzania

Reproduction parameter	Proportion of cows	
	N	(%)
Resumption of ovarian activity	98	62
Cessation of ovarian activity	61	12
Pregnancy	98	44
Abortion	43	16

Source: Matiko *et al*. (2008)

2.4.1 Calving interval

Calving interval is defined as the number of days between two successive calvings. To have a 12-month calving interval, a cow should rebreed within 60 to 80 days after calving (Peters, 1984). Calving intervals in communal cattle are usually longer than 13 months. In on-station studies, APRU (1991, 1992) reported calving interval for Simmental × Tswana crosses of between 385 and 400 days. The mean calving interval reported for White Fulani (Bunaji) cows in Nigeria was 15.3 months and 13.7 months for Sahiwal cows in Kenya (Matiko *et al(*2008*)*. However, longer calving intervals have been reported for Fulani cattle (22.1 ± 6.7 months) in Mali and by Madibela *et al*. (2001) for Tswana (576 ± 11.3 days) and Tswana crossbred (584 ± 22.3 days) cows under the communal management system in Botswana. The long calving intervals were attributed to the prolonged postpartum anoestrus period. In addition, high rates of abortions/embryo losses, nutrition and poor management could have contributed to prolongation of the calving intervals.

2.4.2 Days open

The days open period measures the number of days from calving to conception. Abeygunawardena and Dematawewa (2004) observed the average interval from calving to onset of ovarian activity of 171 days. In the same study, the authors reported that the days open period was lower in cows that had lost only one point body condition score. Cow reproductive performance is, therefore, markedly influenced by body condition. Cows should have a body condition of 3, be able to give a healthy calf every year and be able to maintain the body condition. Monitoring of body condition on a regular basis throughout the lactation period could, therefore, be a useful approach in the identification of cows with prolonged anoestrus in the

agro-pastoral and communal production systems. When cows in poor body condition are identified, intervention measures could be taken early enough to correct for energy, protein and mineral deficiencies or health-related disorders to reduce marked adverse effects on reproductive efficiency. The major reasons for long re-conception periods include nutrition, reproductive diseases and heat stress (Gordon, 1997).

2.4.3 Ovarian activity

Ovarian activity is a measure of whether the cow is undergoing oestrous cycles regularly (Matiko *et al*., 2008). The activity in the ovary is determined through rectal palpations for detection of the ovarian follicle and corpus lutea by a veterinarian. Presence of corpus lutea is an indication that the cow would have ovulated. Another method of determining ovarian activity is the use of progesterone assays. The levels of progesterone can be measured in plasma or milk (Oldham *et al*., 1985; Abeygunawardena and Dematawewa, 2004) or in faeces. Ovarian patterns and factors that influence ovarian activity of cows in the communal areas of South Africa are not well understood.

2.4.4 Pregnancy rate

Pregnancy rate refers to the number of cows pregnant as a proportion of those in the herd that were mated. Generally pregnancy diagnoses are rarely conducted in communal areas as there is scarcity of veterinarians and also farmers do not consider it as an important practise, and thus, pregnancy rates are largely unknown. Matiko *et al*. (2008) observed a pregnancy rate of 44% in Tanzania, which is low. In commercial beef herds, pregnancy rates should be in excess of 70% (Peters, 1984; Gordon, 1997). There is reason to understand the pregnancy rate of communal

cows as a measure of cow performance. The pregnancy state of animals is important as it provides the farmers with knowledge of the reproducing animals in his herd.

2.5 Factors affecting reproductive efficiency of cows

Reproductive performance is, arguably, the major factor determining productivity of cattle herds, with a goal of obtaining one calf per cow per year. Factors that influence reproductive efficiency of cows include nutrition, management practices, diseases, breeds, parity and age at puberty (Kanuya *et al*., 2006; Matiko *et al*., 2008) . The physiological effects of these factors and their extent and significance on reproductive efficiency of cows on communal rangelands, especially of the Eastern Cape, are poorly understood.

2.5.1 Nutrition

Nutritional deficiencies or imbalances are one cause of low reproductive performance (Rae, 2002). During lactation, for example, the demand for nutrients to support maintenance and milk production is high. Thus, in lactating cows, reproduction takes a “back seat” until these demands for maintenance and milk production are met. The key to getting cows to re-breed is to provide a well balanced diet composed of quality forages, grains, minerals and vitamins (Rae, 2002). Energy is the most common nutrient limiting reproduction (Lotthammer, 1982). Cows that lose excessive amounts of body condition or fat stores during early lactation have longer intervals to first ovulation and first oestrus, lower first service conception rates and more days open (Graves and McLean, 2003). Heifers that are not fed adequate amounts of energy reach sexual maturity later and raised on low-quality hay or grazed on late summer pastures often are energy-deficient (Rae,2002).

Protein deficiencies in lactating cows may increase the incidence of silent heats and lower conception rates (Otto *et al.*, 2000). Protein deficiency in heifers is observed by lack of skeletal growth especially in pelvic area. Cows deficient in calcium have an increased incidence of dystocia, retained placentae and prolapsed uterus (Lanyasunya *et al*., 2005). Phosphorus deficiencies decrease feed intake, conception rates, ovarian activity, and causes anoestrus (Lopez, *et al*., 2004). Deficiency in selenium lead to retained placentae, in addition to embryonic deaths, increased metritis, poor fertility, and birth of weak calves (Rae, 2002). Nutritive value of communal rangelands varies and during dry season the nutrient content is low, leading to deficiencies of the majority of the nutrients (Botsime, 2006). In other words, the nutrient requirements for maintenance and production are hardly met by the available forages. Forage quality decline in the dry season and during drought periods (Botsime, 2006).

Table 2.2 illustrates that during the dry season the mineral concentration of serum is less than required. There is a need to have animals supplemented, the exception here is manganese (Grace, 1983; van Niekerk, 1996). Cows that calve in the dry season are at an advantage because early in the dry season there is an abundance of crop residues, improved re-growth to meet the maintenance, growth and reproduction requirements. Unlike during the rainy season, pastures are mature and fibrous, heavily infested with ticks and other parasites, thus impacting negatively on the reproductive processes (Rae,2002). Supplementary feeding, thus can improve reproductive performance (Nottle *et al*., 1997; Molle *et al*., 1997).

Table 2.2: Least square means of serum mineral concentration in Horro cattle

	Season			
Variable	Wet (ppm)	Dry (ppm)	SE	Critical level for cattle (ppm)[3]
Calcium	337.5	153.3	14.4	80-120
Potassium	248.8	139.5	9.2	180-220
Magnesium	23.5	17.25	1.3	18-30
Phosphorus	141.3	141.3	11.1	40-65
Iron	3.27	1.36	0.20	1.1-2.2
Manganese	0.11	0.26	0.02	0.03
Copper	1.38	0.66	0.10	0.8-1.2
Zinc	1.45	0.91	0.10	<0.8-1.2

According to Grace, 1983

2.5.2 Reproductive diseases

Uterine infection implies adherence of pathogenic organisms to the mucosa, colonization or penetration of the epithelium, and/or release of bacterial toxins that lead to establishment of uterine diseases (Azawi, 2008). Development of uterine diseases depends on the immune response of the cow, as well as the species and number (load or challenge) of bacteria. Clinical signs of uterine infection vary with the virulence of the causative organisms and the presence of factors that predispose to the disease (Azawi, 2008). Prevalence of uterine infections is regarded to be low in indigenous cattle (Narasimha Rao, 1982), and this may be related to the low incidences of dystocia (Vale-Filho *et al*., 1986; Muchenje, 2007).

2.5.3 Breeds

In most communal areas of South Africa, most of the cows are non-descript, as there has been uncontrolled crossbreeding with imported breeds. Pure indigenous Nguni cows are, therefore, uncommon, although they are regarded as resistant and adaptable to the local conditions. Very little information is available on the reproductive efficiency of these breeds under communal conditions.

The interval from calving to resumption of ovarian activity in non-descript cows was observed to be considerably longer than the 72–78 days interval reported for White Fulani zebu cows (Matiko *et al*., 2008). Walkden-Brown *et al*. (1999) found that 40% of the Afrikaner cows were anoestrus 100 days postpartum. These findings highlight possible breed differences on cow fertility. Prolonged postpartum anoestrus is one major constraint responsible for lowered reproductive efficiency in cows.

2.5.4 Parity and age at puberty

Generally, nulliparous females have lesser oestrous and ovulatory responses than multiparous females that are exposed to males (Mukasa-Mugerwa, 1989; Gordon, 1997; Musa *et al*., 2006). Cows in higher parities produce more milk for their calves, and do not lose much body condition than the first calvers (Musa *et al.,2006)* Old cows, however, should be culled. It is not clear at what parity communal farmers in the Eastern Cape cull cows due to old age.

2.5.5 Bull stimuli

Bio-stimulation describes the stimulatory effect of a male on oestrus and ovulation through genital or pheromonal stimulation. Izard (1983) and Berardinelli and Joshi (2005) indicated that priming pheromones from males induces puberty, terminates seasonal anoestrus and shortens postpartum anoestrus periods. Even sterile or teaser bulls also improve fertility, just like bulls (Berardinelli and Joshi, 2005). Evaluation of the effects of bull stimuli under communal conditions is difficult (Murtagh *et al*., 1984).

2.5.6 Management practices

Levels of management influence the reproductive efficiency of cows. Record keeping, feeding management, disease control programmes and oestrus detection all influence reproductive performance of cows. The levels of management in communal areas are generally low. For example, in the Eastern Cape, cattle are grazed in the mountains and are handled infrequently, such as, when there is a national disease control or vaccination programme or when the farmer needs oxen for draught power purposes. Under such systems, it is, therefore, difficult to monitor oestrus and keep records.

2.6 Summary

Reproduction performance levels, such as calving intervals, pregnancy rates, ovarian activity and days open, are not known in the communal areas of the Eastern Cape Province. In-depth knowledge of factors that influence reproductive efficiency is fundamental in designing strategies that can lead to optimal reproduction performance. The objective of the study was, therefore, to describe reproductive performance levels of cows found in communal areas of the Eastern Cape Province, South Africa.

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CHAPTER THREE

3. Community Perceptions on Cattle Production in Different Veld Types in the Eastern Cape Province, South Africa

Abstract

Participatory rural appraisals were conducted in 10 communities in the Eastern Cape to determine community perceptions on cattle production objectives and constraints in different veld types in the Eastern Cape. Farmers ranked lack of fences, tick-borne diseases, poor animal condition during winter, poor breeding practices and low market prices, in that order, as major constraints limiting cattle production in the Eastern Cape. Cattle, sheep and goats, in that order, were ranked as the most important livestock species and were mainly kept for meat, cash and ceremonies, respectively. The non-descript cattle breed was the most common breed found in the smallholder areas. Most farmers preferred Nguni breed because of its adaptive attributes. There were no meaningful relationships among objectives of keeping cattle, constraints faced by farmers and rangeland types. The relative ranking of poor cattle condition in all the communities was high. Constraints related to poor cattle condition in winter and low cow reproduction were reported in all the communities.

Keywords: Constraints; Cattle management; Fencing; Meat consumption.

3.1. Introduction

In South Africa, beef production is the most important livestock enterprise, followed by sheep and goats (Ainslie *et al*., 2002; National Emergent Red Meat Producers Organisation, 2004). South African cattle population is estimated at 14.1 million, of which 22% is found in the Eastern Cape Province (National Department of Agriculture, 2005). The outputs and objectives of keeping cattle are diverse and include draught power, meat, milk, dung, cash income and capital storage (Chimonyo *et al*., 1999; Shackleton *et al*., 1999). Cattle are reserved for special socio-cultural purposes such as marriage, weddings, funerals, circumcision, installation and exorcism of evil spirits (Shackleton *et al*., 1999). These objectives and their relative importance are not clearly understood and could differ from one rangeland type to the next. It is assumed that livestock functions in communal areas are similar, however, differences in resources that the communities have influence the relative importance of animals and the livestock enterprises in an area. It is essential to capture differences among communities and design appropriate development strategies that are specific to each community.

As cattle production in rural areas contributes marginally to formal agricultural output (Ainslie *et al*., 2002), improvement of cattle production may considerably contribute towards poverty and food insecurity reduction. However, little effort has been channelled towards the use of cattle as a vehicle of rural development in South Africa. In the Eastern Cape, development efforts to improve cattle have been initiated but are chiefly limited by lack of feed, suitable breeds, poor health management and poor infrastructure (Bester *et al*., 2003; Muchenje *et al.*, 2007; Ndlovu 2007). Previous efforts to address constraints that rural farmers face often ignore farmers' perceptions and experiences (Chambers, 1988; Francis and Sibanda, 2001). Since rural

households have access to indigenous knowledge systems, the local circumstances, cultures and traditions, they are better equipped to optimally design and develop intervention strategies in their farming systems (Chambers, 1988). Thus, establishing farmer objectives, constraints and priorities is fundamental in designing rural development strategies. To solve these constraints, approaches that guarantee effective and active participation among stakeholders, who have a complex knowledge base and widely dispersed expertise, are essential (Chawatama *et al*., 1998).

Participatory rural appraisals (PRAs) are one of the effective tools used to obtain information and encourage participation in agricultural development (Chambers, 1988; Francis and Sibanda, 2001). Unlike the use of structured questionnaires to individual households, PRAs instil sense of ownership and responsibility on how farmers manage their resources (Chambers, 1988). They offer farmers the opportunity to rank and prioritize their constraints as a community, and not individually (Francis and Sibanda, 2001). Use of PRAs ensures active participation of farmers in solving their constraints and increases the chances of adoption of introduced technologies (Conway, 1986). A study was conducted in the communal areas of the Eastern Cape using participatory rural appraisals to determine community perceptions on cattle production objectives and constraints in different veld types in the Eastern Cape.

3.2. Materials and Methods

3.2.1 Study site

Participatory rural appraisals were conducted in a total of 10 communities from the Eastern Cape. As shown in Table 3.1, communities with various sub-types of the sweet, sour and mixed veld types were selected to represent each of the major vegetation types in the Eastern Cape.

Table 3.1: Veld types and climatic descriptions of the communities

Veld type	Community	Annual rainfall (mm)	Altitude (m)	Mean annual temperature (°C)
Themeda-Festuca Alpine veld	Tugela	400-600	1400-2000	10
Themeda-Festuca Alpine veld	Magwiji	400-600	1400-2000	10
Dohne sourveld	Kolomana	650-1000	600-1400	16
Dohne sourveld	Mgwali	650-1000	600-1400	16
Dohne sourveld	Upper Mnxe	650-1000	600-1400	16
Dry grass bushveld	Hekele	650-1000	600-1400	14
Dry grass bushveld	Nxamnkwana	650-1000	600-1400	14
Mesic bushveld	Mnyameni	800-1000	200-300	20
Valley bushveld	Lashington	300-500	400-600	18
Forest and coastal thornveld	Wesley	600-800	200-300	22

Sources: Acocks (1988) and Bredenkemp *et al.* (1996)

The communities interviewed were drawn from Ukhahlamba (Magwiji, Tugela), Chris Hani (Upper Mnxe) and Amatole districts (Mgwali, Nxamnkwana, Lashington, Kolomana, Wesley and Hekele). Only Mnyameni community represented the mesic bush grassveld. The climatic descriptions of the study sites are shown in Table 3.1. Most of the communities have shallow soils, which are largely unsuitable for crop production. However, Lashington, Mnyameni and Wesley are characterised by deep sandy soils.

3.2.2 Secondary data collection

Secondary information on the resources available in each community and traditional cultural practices of people were obtained from local traditional leaders (chiefs and headmen), political leaders (ward councillors and community development officials) and Department of Agriculture officials (veterinary and extension officers). In some cases, heads of schools, non-governmental organizations (NGO`s) and project leaders present in the area provided other secondary data. The information gathered was used to develop a checklist of questions which was administered in each community.

3.2.3 Participatory rural appraisals

All livestock farmers in the selected communities were invited to a central point by the local agricultural extension officers in each area. Focus group discussions using a pre-prepared checklist were conducted separately to youths (less than 30 years both males and females) and, adults (≥30yrs). The PRAs were conducted in November 2005. The number and gender of farmers who attended each meeting are shown in Table 3.2.

Table 3.2: Distribution of farmers who attended meetings from each community

Veld type	Community	Number of farmers	Youths	Women	Men
Themeda-Festuca Alpine veld	Tugela	18	8	2	8
Themeda-Festuca Alpine veld	Magwiji	26	6	10	10
Dohne sourveld	Kolomana	52	5	18	29
Dohne sourveld	Mgwali	22	2	6	14
Dohne sourveld	Upper Mnxe	29	10	5	14
Dry grass bushveld	Hekele	60	5	25	30
Dry grass bushveld	Nxamnkwana	43	9	24	10
Mesic bushveld	Mnyameni	40	6	4	30
Valley bushveld	Lashington	20	3	14	3
Forest and coastal thornveld	Wesley	11	0	2	9

The checklist used contained discussion topics on major livestock species kept, cattle genotypes kept, health management and constraints, marketing channels.Ranking of constraints on livestock productivity were done by consensus among all the farmers present.

3.3. Results and Discussion

3.*3.1 Major constraints faced by communities*

The major constraints that the farmers mentioned across all the communities were lack of fencing (for homesteads, arable lands and rangelands), soil erosion, high unemployment levels among the youth, lack of finances for development projects, unavailability of appropriate breeding animals, poor infrastructure (dams, dipping tanks, cattle handling facilities), lack of organised marketing facilities, inadequate arable lands, shortage of farm implements, invasion of rangelands by alien plants and lack of agricultural technical skills. The ranking of these constraints differed with communities, as shown in Table 3.3.

The lack of fencing was ranked as the major constraint in most of the communities (Table 3.3). Soil erosion and land degradation were ranked second in three communities. Only one community (Tugela) mentioned youth unemployment and lack of finances for projects as major constraints. Mnyameni and Upper Mnxe communities highlighted bush encroachment as a major constraint. Hekele and Lashington communities reported shortage of grazing land as the chief constraint, whilst Magwiji reported lack of dipping facilities as a major constraint. The Eastern Cape Department of Agriculture also regards lack of fencing as one the constraints to cattle production in the province (Ainslie *et al*., 2002; Delali *et al*., 2006).

Table 3.3: Ranking of the agriculture-related constraints faced in each community

Constraint	Name of community									
	Tugela	Magwiji	Kolomana	Mgwali	Upper Mnxe	Hekele	Nxamnkwana	Mnyameni	Lashington	Wesley
Lack of fences	1 [a]	1	1	1	1	3	1	1	3	1
Soil erosion	2	- [b]	2	2	-	6	-	-	6	3
Unemployment of youth	3	-	-	-	-	-	-	-	-	-
Lack of finances for projects	4	-	-	-	-	-	-	-	-	-
Breeding animals	5	-	-	-	-	-	-	-	-	-
Lack of dams	6	-	3	3	-	5	2	2	5	2
Lack of dipping facilities	-	2	-	-	-	-	-	-	-	-
Lack of handling facilities	-	3	-	-	4	-	4	4	-	-
Lack of adequate grazing land	-	-	-	-	-	1	-	-	1	-
Lack of adequate arable land	-	-	-	-	-	2	-	-	2	-
Lack of knowledge	-	-	-	-	-	-	5	5	-	-
No tractors and farming implements	-	-	4	4	3	4	-	-	4	-
Youths not interested in agriculture	-	-	6	6	-	-	3	-	-	-
Bush encroachment	-	-	5	5	2	7	-	3	7	-

[a] Rank 1 indicates the most important constraint within a community.

[b] Constraint not mentioned

Livestock-related constraints received different rankings in different communities (Table 3.4). Inadequate veterinary services and high incidence of tick-borne diseases were the highest ranked constraints in all the communities. Poor animal condition was mentioned as a major constraint in the majority of the communities (Table 3.4). Long calving intervals were ranked lowly in all the communities. Despite the secondary informants (agricultural extension officers) indicating the low reproductive efficiency of the cows in communal areas, the low ranking of reproductive efficiency by the communities seems contradictory. It is, highly likely that the communities could have regarded poor animal performance, which they ranked higher than calving intervals, as the major cause of low reproductive performance.

3.3.2 Livestock ownership and use

As expected, farmers kept different livestock species for different purposes (Table 3.5). Lashington and Hekele communities ranked cattle, sheep and goats, in that order, as the most important livestock species. Magwiji, Kolomana and Tugela communities ranked sheep, cattle and goats, in that order, as the most important livestock species according to their socio-economic contribution to the rural households. Only Mgwali community reported that goats were more important than sheep. No community ranked goats as the most important species. These findings concur with NERPO (2004) and NDA (2005), which indicated that cattle were the most important livestock species in the Eastern Cape, followed by sheep and goats. In Tugela, Magwiji and Upper Mnxe communities, cash fetched the highest importance ranking among livestock uses. The farmers claimed that since they are not employed, they rely on their livestock for income to pay school fees, debts, medical and funeral expenses.

Table 3.4: Cattle production constraints as ranked by farmers in each community

Constraint	Name of community									
	Tugela	Magwiji	Kolomana	Mgwali	Upper Mnxe	Hekele	Nxamnkwana	Mnyameni	Lashington	Wesley
Inadequate veterinary services	3	3	4	2	3	1[a]	1	5	3	5
Long calving intervals	2	6	6	6	4	6	6	6	4	6
Tick-borne diseases	1	1	5	1	2	4	4	2	2	2
Poor animal condition in winter	5	2	3	3	1	5	5	1	1	3
Inappropriate breeds	7	7	8	4	8	-[b]	-	-	-	-
Inadequate bulls	4	-	2	7	6	7	7	7	7	7
Lack of markets	6	4	7	5	5	3	3	3	6	4
Lack of dip tanks	-	5	1	8	7	2	2	2	5	1

[a] Rank 1 indicates the most important constraint within a community.

[b] Constraint not mentioned

Table 3.5: Livestock species kept and their uses as ranked by farmers in 10 communities in the Eastern Cape

	Cattle		Sheep		Goats		Horses		Pigs	
Community	Rank	Uses	Rank	Uses	Rank	Uses	Rank	Uses	Rank	Uses
Tugela	2	ABDE	1[a]	ACD	3	ABD	-	-	-	-
Magwiji	2	AEB	1	ACB	3	AB	-	-	-	-
Kolomana	2	DFB	1	DCB	3	DB	-	-	-	-
Mgwali	1	DFB	3	DCB	2	DFB	-	-	-	-
Upper Mnxe	2	AEGDFB	1	ACDB	-	-	3	G	-	-
Hekele	1	DB	2	DCB	3	DB	4	DG	-	-
Nxamnkwana	1	DBG	2	DCB	3	DB	4	G	-	-
Mnyameni	1	DFB	3	DCB	2	DB	-	-	-	-
Lashington	1	DEB	2	DCB	3	DB	-	-	-	-
Wesley	1	HDFB	-	-	2	DB	-	-	3	DB

Key: A= Cash; B= Ceremonies, C=Wool; D=Meat; E= Draught power; F= milk; G= transport; H= Breeding purposes

[a] Rank 1 indicates the most important livestock specie within a community.

Meat was ranked as the most important use of cattle by six communities (Table 3.5). These communities also reported tick-borne diseases as a major constraint. Instead of seeking advice from veterinarians, farmers slaughtered sick animals for consumption. They sell the meat within their neighbourhood. In Wesley, the farmers kept the Sussex beef breed, funded by Heifer International. In Hekele, Kolomana, Mnyameni, Wesley and Mgwali communities, the farmers did not use their animals for draught power, probably because the farmers had small portion of arable land. The farmers reported shortage of labour during the cropping season as most of their children attend school. The major constraint in Lashington and Mnyameni was lack of markets for their wool. Some farmers even reported that the wool sometimes overstays and rot due to the lack of markets and marketing information. There is, therefore, need to design capacity building programmes to enhance marketability of the wool produced from communal areas. Cattle and goats were used for ceremonies in all the communities. These ceremonies include marriages, circumcision and funerals.

Youth involvement in agriculture in all communities was minimal. For example, in Mnyameni, the youth reported to be uninterested in agriculture and agribusiness. These enterprises are considered dirty and old-fashioned and to be less lucrative than urban-based employment. In areas such as Magwiji and Upper Mnxe, the youths participated and raised income through shearing of sheep. This indicates that the youths are concerned with raising income and this can be demonstrated to other youths and make them realise that there is good money out of agriculture. All the communities suggested that training workshops should be conducted with the youths in rural areas in order to raise awareness on career opportunities in agriculture and change their mindsets. There is, therefore, need to determine strategies for commercialising livestock

agriculture in rural areas to increase the viability and sustainability of livestock enterprises.

3.3.3 Common cattle breeds

Most of the communities kept non-descript breeds. All the farmers concurred that pure indigenous animals were getting fewer as compared to the previous decades. The breeds, however, were largely crosses between exotic and indigenous Nguni breeds (Table 3.6). This is because current national breeding policies encourage farmers to crossbreed indigenous breeds with imported ones (Hereford, Sussex, Friesians). The farmers reported that crossbreeding is mainly practised to combine the hardy characteristics of indigenous cattle with high beef-producing qualities of the imported breeds. Crossbreds are viewed as having superior growth performance and producing bigger carcasses at slaughter. However, it should be emphasised that such crossbreeding programmes are a risk of loss of genetic diversity and reduced hybrid vigour in later generations of the crossbred cattle (Cunningham and Syrstad, 1987; Moyo, 1995; Nitter, 2000).

Efforts are being made to re-introduce indigenous breeds in the communities. For example, the Upper Mnxe community obtained Nguni cattle from the University of Fort Hare and the Department of Agriculture. In an effort to repopulate the Eastern Cape with indigenous Nguni cattle, these institutions conducted a community profile of available resources and willingness of the community to cull or castrate all bulls to upgrade the animals to Nguni (Mapiye *et al*., 2007).

Table 3.6: Breeds of cattle kept by farmers

Community	Major breeds
Tugela	Nguni, Brahman, Non-descript
Magwiji	Non-descript
Kolomana	Brahman, Nguni, Afrikaner, Jersey
Mgwali	Non-descript
Upper Mnxe	Nguni, Brahman, Non-descript
Hekele	Non-descript
Nxamnkwana	Non-descript
Mnyameni	Non-descript
Lashington	Non-descript
Wesley	Sussex, non-descript

In Wesley, farmers acquired 20 Sussex bulls through funding from Heifer project international. However, most farmers preferred Nguni breed because of its attributes that enable it to survive in rural production systems. These attributes include resistance to common nematodes and other internal parasites, ticks and tick-borne diseases, high growth and fertility rates, good walking and foraging ability, good mothering ability and low feed requirements. These attributes have also been identified in literature (Scholtz, 1988; Muchenje *et al*., 2007; Ndlovu, 2007). Farmers in all the communities reported they required government support to restock the Nguni cattle breed in their herds.

3.3.4 Veld and feeding management

Most of the communities reported that they practiced communal free ranging system and mentioned the absence of fences as one of the major constraints that discouraged them from practicing controlled grazing. All communities viewed the lack of fencing as a major veld management constraint. This can be partly due to a reduction in available labour as more and more young people are unwilling to serve as cattle herders. Fencing was there previously in most communities, but has been vandalised. Farmers proposed that committees be put in place first before fences are erected in order to come up with rules and regulations for managing and maintaining fences. Other communities, such as Mgwali were proposing the reinstatement of government rangers. Fence was seen as the best way of controlling stock theft by restricting livestock movement. Fencing is essential in controlling grazing, breeding, theft and trespassing (Mapiye *et al.* 2006). There were no communal regulations on how to manage rangelands. Farmers were not empowered to make disciplinary decisions on members of the community who misuse rangeland resources. At Mgwali, for example, farmers could not discipline fellow

community members who vandalised fences or cause rangeland fires.

Although, it is generally agreed that fencing makes the management of rangeland resources ease, rotational grazing and resting could, possibly be practised without the availability of fencing facilities. Fences are easier to manage if they are individually owned, rather than communally owned. If communities identify means of substituting fencing, the resources could be channelled to other constraints. It is, arguably, the prioritisation of constraints that is lacking in many communities of South Africa.

Livestock theft was a common problem in most communities interviewed. Farmers partly attributed difficulties in controlling stock theft to the absence of fences which permit animals to move for long distances from homesteads and end up being stolen, lost or impounded. At times stock is deemed lost whilst there are groups of farmers, individuals or youths who sell stock for slaughter to abattoirs. In Magwiji, farmers have shepherds who herd their animals and guard them against livestock theft and other dangers. In other communities, such as Upper Mnxe, the farmers reported that they kraal their animals at night, whereas in Magwiji, they kraal calves and lactating cows.

As indicated in Table 3.1, livestock are grazed on six major rangeland types in the Eastern Cape. Most of the communities (70 %) reported that the condition of their rangelands was poor during the winter and the dry season, especially in the sourveld and animals lost condition. This led to reduced growth and fertility rates (Ainislie *et al*., 2002). This is chiefly attributed to crude protein levels which are lower than 7 % (Acocks, 1988). Communities in the sweetveld (33 %)

reported that their rangelands were in good condition and their animals rarely lose condition during winter. Most communities in the sweetveld and sourveld were, respectively, heavily infested with *Acacia mearnsii* and *Acacia karroo* invader species.

3.3.5 Animal health and disease control

Most respondents reported that they rarely observed the health status and condition of their cattle and, in most cases; animals were treated late or died unnoticed. The most common cattle diseases were the tick-borne diseases (redwater, heartwater and gall sickness). Most communities (70%) had communal dip tanks, which were, however, in poor condition. Thirty percent of the communities had no dip tanks. These findings are comparable to earlier reports by Scholtz (1988) and Muchenje *et al.* (2007) that tick-borne diseases are a serious constraint in the Eastern Cape. Veterinary extension officers recommend farmers to dip their cattle weekly during the rainy season and fortnightly in the dry season. However, in most communities, veterinary services are poor and farmers do not afford to purchase veterinary drugs and vaccines, thus they resort to cheap and locally available ethno-veterinary medicines. Sometimes cattle spent long periods without being dipped due to either the unavailability of water or dipping chemicals. Documentation of ethno-veterinary medicine used by farmers to control ticks and tick-borne diseases and determination of their effectiveness and dosage rates is essential for improving cattle health and productivity in rural areas.

3.3.6 Marketing management

Poor marketing management was ranked as one of the most important constraints to cattle production in all the communities. Farmers sold cattle when they need to pay for school fees,

medical bills and other crucial household expenses. Cattle sales were reported to be rare and this was attributed to long distances to the market, low prices offered by buyers and multi-functions of cattle. Farmers sold their cattle mainly to auctioneers, speculators and community members. Most of the cattle traded in these markets were primarily mature animals (cows, oxen and bulls). However, auctioneers and speculators argue that they cannot pay competitive prices for animals that are in poor condition, old aged or not ready for the market (Makhura, 2001; Musemwa *et al.,* 2007). Supplementation prior to selling, construction of sale pens, provision of scales at sale point, group marketing of animals and educating farmers on marketing aspects could assist them to bargain for a market-related price.

3.3.7 Breeding management and reproductive performance

0ver 90 % of the farmers practiced uncontrolled breeding. Most farmers did not own bulls. Decisions on the implementation of breeding seasons in communal areas should, therefore, consider that open season breeding increases mating chances for cows. Farmers kept bulls for too long, even up to 12 years in Upper Mnxe, and this increased the likelihood of bulls mating with their relatives (daughters and grand-daughters). This leads to inbreeding and production of progeny of inferior quality (Moyo, 1995). Farmers were advised to rotate available cluster bulls among communities after every two to three years. An open nucleus breeding scheme could be advocated for, particularly in the communal areas where cattle populations are small, within-herd selection is ineffective and no accurate progeny records are kept (Cunningham and Syrstad, 1987; Nitter, 2000). These strategies could ease the possible negative effects associated with inbreeding.

No community reported constraints related to bull infertility. No tests on bull fertility have been conducted in bulls in all the communities. Most communities (90%) indicated that calving intervals are long and are about two years in the majority of the cows. A calving interval of two years was, thus regarded as acceptable among the community members. The farmers reported that the causes of long calving intervals within a breed include poor nutrition after parturition, low bull: cow ratios and absence of systematic weaning. Late bulling can result in the birth of calves in the winter months when the nutritional status of the rangeland is at its poorest condition. Abortion and dystocia problems were common in most communities. Generally, farmers were not satisfied with the performance of their cattle. It is, therefore, important to generate accurate information on the extent of reproduction efficiencies among cows and bulls to identify causes of infertility.

3.4. Conclusions

The communities ranked lack of fences, tick-borne diseases, poor animal condition during winter, poor breeding practices and low market prices, respectively as major constraints limiting cattle production in the Eastern Cape. Cattle, sheep and goats, in that order, were ranked as the most important livestock species and were mainly kept for meat, cash and ceremonies, respectively. The relative ranking of poor cattle condition in all the communities was high. Constraints related to cow reproduction were mentioned in all the 10 communities. Most communities indicated that their cows had long calving intervals. The causes of long calving intervals were reported to be poor body condition, especially after parturition.

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CHAPTER FOUR

4. Farmer Perceptions on Cow Reproductive Performance in Different Veld Types in the Communal Areas of the Eastern Cape, South Africa

Abstract

The objective of the study was to determine farmer perceptions and constraints to cow reproductive performance in the communal areas. Structured questionnaires were administered between June and August 2006, to a total of randomly selected 551 farmers from 10 communities from the Eastern Cape. The aspects covered in the questionnaires included household demography, socio-economic status and constraints to cow reproduction in each community. There was a significant association ($P<0.01$) between the use of pregnancy diagnoses and community. A higher proportion of farmers from Hekele and Upper Mnxe communities reported that low numbers of bulls was a major constraint to cow reproductive performance. Bull fertility was not indicated as a major constraint by the majority of farmers (60 %). Lashington had the highest number of farmers who reported that cow fertility was a major constraint to cattle performance. Upper Mnxe, Nxamnkwana and Wesley had the least number of farmers with cow fertility problems. Magwiji had about 40 % of farmers complaining about bull numbers. Over half of the farmers in Mnyameni reported calf mortality problems. Despite determining farmer perceptions on cattle reproduction, it is essential to closely monitor cattle

reproductive performance for the development of appropriate mitigation measures that enhance reproductive and productivity of cattle herds in communal areas.

Keywords: Structured questionnaires; functions of cattle; cow reproduction.

4.1 Introduction

Although PRAs are an effective tool to obtain information and encourage participation in agricultural development (Chambers, 1988; Francis and Sibanda, 2001), they often ignore the differences that occur among households in the same community (Allsopp *et al.*, 2007). The PRAs give more weight and importance to the collective decisions made by a group of community members or focus groups (Chambers, 1988). Thus, apart from conducting PRAs to establish general community perceptions and priorities, structured or semi-structured questionnaires should be administered to a representative sample of the individual households from the communities. Besides reducing the chances of getting outliers in the data set, PRAs also increases the quality of the data collecting process by identifying possible stratification variables. Conducting individualised interview sessions takes the diversity among households into consideration (Francis and Sibanda, 2001). For example, households with different cattle herd sizes usually value and rank cattle functions different from those with small herd sizes.

Although cow reproductive performance is a critical component of herd productivity, aspects relating to cow and bull reproduction were not adequately addressed in Chapter 3. The reasons for the low ranking are not clear, but could be confounded with animal condition, diseases and breeding practices used. The objective of the study was, therefore, to determine farmer perceptions and constraints to cow productivity in the communal areas.

4.2 Materials and Methods

4.2.1 Study site and households selection

Ten communities in the Eastern Cape, where participatory rural appraisals had been conducted, as described in Chapter 3, were used in the current study. Sixty households that owned cattle were randomly selected in each community for the administration of structured questionnaires.

4.2.2 Questionnaire administration

The interviews were conducted using a pre-tested structured questionnaire between June and August 2006. Ten trained enumerators were used to conduct the interviews in the vernacular Xhosa language. The questionnaires were administered to households who were willing to participate and were available on the day of the interview. Where possible the head of the household or the spouse was targeted for the interview. Aspects covered in the questionnaires included household demography, socio-economic status, cattle ownership, cattle herd size and constraints to cow reproduction. A total of 551 respondents participated.

4.2.3 Statistical analyses

A chi-square test (PROC FREQ) procedure of SAS (2003) was used to determine the association between village and veld type with cattle diseases (SAS, 2003). The effect of veld type, village on herd size were analysed using PROC GLM (SAS, 2003). Where F-tests were significant, mean separation of the least square means were performed using PDIFF procedure. Kendall's W test was used to rank the uses of cattle (SAS, 2003).

4.3 Results and Discussion

4.3.1 Household demography

Most of the respondents (77 %) were the heads of households. It was only in Magwiji where 40.4 % of the respondents were youths. The age of the respondents varied from 13 to 63 years old and between 37 and 76, confirming that people involved in farming were old. Household size varied from six to eight members in a household. In almost all the communities, 80 % of cattle were owned by the male head of the household, five percent by other members of the family and 15 % by boys. Chawatama *et al*. (1998) and Chimonyo *et al*. (1999) also reported that males owned the bulk of the cattle in communal areas.

Employment level varied among the communities. Overall, 80 % of the people interviewed were unemployed and of those 35 % were farmers and 15 to 30 % were pensioners. Forty-five percent of the respondents had received education up to Standard 9, while about 35 % had no formal education qualifications. Only 10 % of the respondents attained some form of a tertiary qualification, with the bulk of them being teachers and police officers. Knowledge on the levels of education of the farmers enables the use of appropriate packaging and dissemination of information on developed technologies.

*4.3.2 Livestock species k*ept

The farmers kept cattle, sheep, goats, donkeys, pigs and horses. They varied in herd and flock sizes, as shown in Table 4.1. There were few farmers with pigs, probably due to Classical Swine Fever outbreak in the Eastern Cape Province in August 2005. For all the livestock species kept, the standard deviation of the mean values was markedly larger than the means, indicating large

differences in the herd sizes among farmers in each community (Modiselle, 2001).

Table 4.1: Livestock summary statistics in the 10 communities interviewed in the communal areas of the Eastern Cape (n = 551)

Type of livestock	Mean	Standard deviation	Minimum	Maximum
Cattle	6.9	9.80	1	69
Sheep	8.0	25.57	0	230
Goats	3.6	8.62	0	80
Donkeys	0.1	0.58	0	7
Pigs	0.2	0.69	0	9
Horses	0.2	1.06	0	12

The large variation could be characteristic of livestock sizes in many communal areas (Chimonyo *et al*., 1999). The variation highlights the complexities that exist when designing and implementing development policies in the smallholder areas (Ainslie *et al.*, 2002).

Cattle, sheep and goats are the most common livestock species kept by the communities and this is in line with the findings of Chimonyo *et al*., 1999), who stated that Borana pastoralists in Southern Ethiopia preferred cattle and sheep to other animals. Thirty percent of the farmers reported that there were no significant increases in their livestock numbers, most of their stock numbers remained constant or their animals died of tick-borne diseases, especially redwater and heartwater. Abortions were also reported, and were perceived to be caused by poor livestock condition. Livestock numbers were reported to be low and cattle populations were remaining constant. This was largely due to land shortage, rangeland degradation and droughts.

Eighty percent of the farmers in all villages benefited from their animals through selling them privately or in auctions rather selling to butcheries. Musemwa *et al*. (2008) reported that a total of 5 324 cattle (4 909 at auctions, and 415 at the permit sale) were sold, while 467 cattle were withdrawn from the auctions. The fate of the withdrawn animals varied; some were sold to private individuals who offered higher prices, re-sold at future auctions when sellers were not happy with prevailing prices or transported to Meatco (Pvt), located about 300 km away where

animals were likely to fetch higher prices if transport cost was minimized. Similar findings were reported by Kassahun *et al*.,2008.

4.3.3 Cattle herd characteristics

Table 4.2 shows average cattle numbers per village. Communal farmers are subsistence-oriented, own 5-10 cattle and have limited use of technology and external inputs (Bester *et al*., 2003; Mapiye *et al*., 2007). Previous studies reported average herd sizes ranging from 5 to 10 cattle per household in the communal areas (Musemwa *et al*., 2007).

Figure 4.1 illustrates the number of cows and heifers per village. The markedly more cows than heifers in all villages indicates either low calving rates and long calving intervals or high calf mortalities. However calf mortality was never indicated as a major constraint in all the communities. These findings agree with Musa *et al*. (2006). The variation in cow to heifer ratio is due to lack of a clear breeding season, female cattle taking long time being unproductive and failure of bulls to detect heat in cows as the animals are left unattended.

4.3.4 Cattle functions and uses

Table 4.3 indicates ranking of uses of cattle. In all the 10 villages cash was ranked as the most important use of the cattle and other uses varied across villages. The high ranking for sales was in contrast to the findings from the PRA meetings (Chapter 3), and could, probably indicate the unreliability of using group meetings or that although cattle were rarely sold, the incomes realised during the infrequent sales is marked and has a huge impact in the welfare of the

households.

Table 4.2: Cattle herd sizes for each community

Village	Veld type	Mean cattle herd size	Standard deviation
Nxamnkwana	Dry grass bushveld	4.0	5.72
Hekele	Dry grass bushveld	8.5	12.17
Kolomana	Dohne sourveld	11.4	14.01
Lashington	Valley bushveld	9.5	9.12
Magwiji	*Themeda festuca* Alpine veld	8.5	11.43
Mgwali	Dohne sourveld	7.7	8.26
Mnyameni	Messic bushveld	5.2	4.98
Tugela	*Themeda festuca* Alpine veld	3.9	7.75
Upper Mnxe	Dohne sourveld	7.4	7.22
Wesley	Forest and coastal thornveld	6.8	13.60

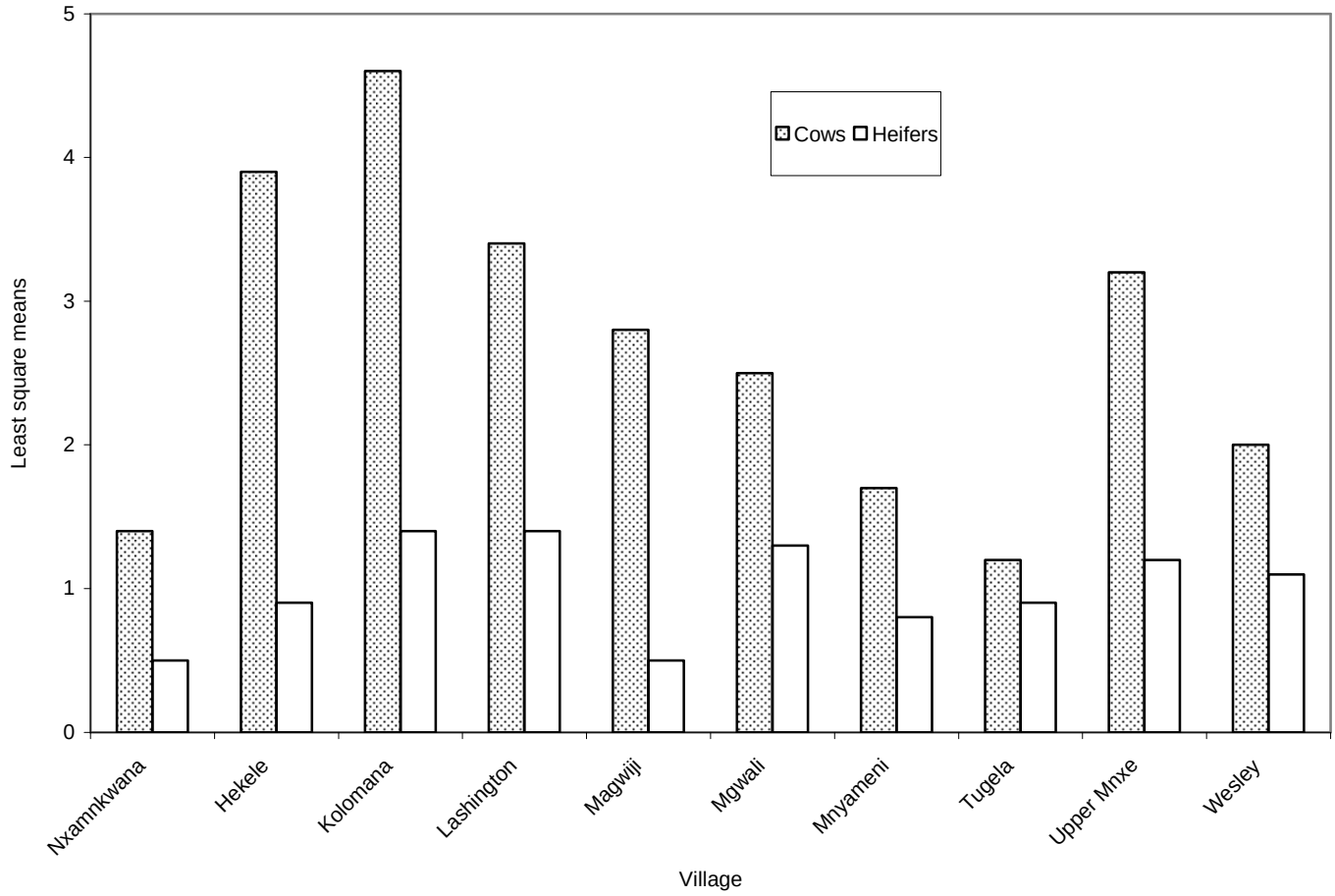

Figure 4.1: Least square mean number of cows and heifers in the communities of the Eastern Cape

Table 4.3: Ranking of uses of cattle

Community	Cattle uses (mean rank)						
	Meat	Milk	Manure	Draft power	Investment	Sales	Ceremonies
Nxamnkwana	2 (3.61)	6 (4.31)	3 (3.76)	7 (4.38)	4 (4.21)	1 (3.43)	5 (4.30)
Hekele	5 (4.09)	7 (5.18)	6 (4.22)	3 (3.74)	2 (3.70)	1 (3.12)	4 (3.97)
Kolomana	2 (3.67)	7 (5.34)	3 (3.86)	5 (3.93)	4 (3.87)	1 (3.21)	6 (4.12)
Lashington	4 (4.03)	7 (5.24)	6 (4.20)	3 (3.81)	5 (4.14)	1 (2.94)	2 (3.64)
Magwiji	2 (3.48)	6 (4.33)	3 (4.10)	4 (4.22)	7 (4.48)	1 (3.14)	5 (4.24)
Mgwali	5 (4.18)	7 (5.14)	4 (4.03)	2 (3.58)	3 (3.84)	1 (3.02)	6 (4.22)
Mnyameni	4 (4.21)	7 (4.67)	5 (4.32)	6 (4.41)	3 (3.90)	1 (2.96)	2 (3.56)
Tugela	3 (3.74)	4 (4.00)	2 (3.73)	6 (4.28)	5 (4.10)	1 (3.63)	7 (4.50)
Upper Mnxe	2 (3.46)	6 (4.45)	3 (3.60)	5 (4.19)	7 (5.00)	1 (3.17)	4 (4.14)
Wesley	3 (3.77)	7 (4.54)	2 (3.69)	4 (4.03)	5 (4.12)	1 (3.59)	6 (4.26)

Rank 1 indicates the most important use within each community. Values in parentheses indicate the Kendall's mean rank.

It is important to quantify the contribution of cattle to household economies in the communal areas. Bayer *et al*. (2004) and Kassahun *et al*. (2008) found that cattle were kept for breeding, milk, meat, social security while Dreyer *et al.,* 1998 reported that communities keep cattle for milk, cash income, culture, social status gift and estate. These reports differ from the current findings where milk was lowly ranked and sales were the main use of cattle. This could be due to the fact that objectives of livestock keeping differed from community to community. Most Butana and Kenana breeders consider the primary reason for keeping cattle to be generation of income from the sale of milk and animals, milk for home-consumption or as insurance against financial problems (Dreyer *et al.,* 1998; Musa *et al.*, 2006).

4.3.5 Common cattle diseases

There was a significant association between village and disease occurrences. The most common diseases reported were tick-borne diseases, high worm burdens, respiratory diseases and bloat.

Tick-borne diseases, especially redwater, gallsickness and heartwater are of economic significance in the Eastern Cape Province (Mbati *et al.,* 2002). Ticks reduce growth rates and transmit diseases from infected cattle to healthy ones (Mbati *et al*., 2002).

Ticks transmit a greater variety of pathogenic micro-organisms than any other arthropod vector group, and are among the most important vectors of diseases affecting animals (Jongejan, 2007). Chawatama *et al.* (1998) showed that cattle owners ranked tick borne diseases as the first problem followed by eye infestation. Specific reproductive diseases were not reported as major constraints in all the 10 communities, indicating that these diagnoses for these diseases were never conducted or the farmers had little knowledge on reproductive diseases. It is, thus

important to determine the role and contribution of reproductive diseases in cow performance in communal areas.

4.3.6 Farmer perceptions on cow reproductive performance

Table 4.4 shows the proportion of farmers who hired veterinarians to perform pregnancy diagnosis. There was a significant association ($P<0.01$) between the use of pregnancy diagnosis and village. Mgwali and Upper Mnxe communities had the highest number of farmers who practised pregnancy diagnosis in their cows due to high income levels and farmers understanding importance of their stock. Seasonality of calving was also commonly reported among the 10 communities, with most cows reportedly calving during the rainy season. About 87 and 77 percent of the farmers did not respond on the extent of pregnancy and calving rates in their herds. The farmers, however, reported that pregnancy rates were low. It, therefore, is fundamental to enlighten farmers on the importance of keeping records on reproductive parameters of their cattle. Such records are critical in the efficient evaluation of cow performance prior to either culling of non performers or instigation of mitigatory measures to improve cow performance. This will ultimately lead to an overall improvement of cow performance.

Table 4.4 also shows the proportion of farmers who felt that the low reproductive performance of their cows was caused by the low number of bulls within each community. A higher proportion of farmers from Hekele and Upper Mnxe communities reported that low numbers of bulls was a major constraint to cow reproductive performance. None of the respondents indicated that bull fertility examination and breeding soundness evaluation had been determined.

Table 4.4: Percentage of farmers who applied pregnancy diagnoses, reported seasonality of calving, the constraint of low bull numbers and bull fertility (n = 551)

Village	Pregnancy diagnosis	Seasonality of calving	Low bull numbers	Bull fertility
Nxamnkwana	12.5	20.8	20.8	18.8
Hekele	19.6	41.2	51.0	15.7
Kolomana	2.1	53.2	29.8	31.9
Lashington	4.0	52.0	22.0	26.0
Magwiji	16.7	33.3	41.7	10.4
Mgwali	30.5	42.4	37.3	35.6
Mnyameni	0.0	36.5	40.4	26.9
Tugela	6.0	24.0	32.0	10.0
Upper Mnxe	31.3	31.3	45.8	25.0
Wesley	20.3	29.6	29.6	18.5
Overall	14.3	36.4	35.0	21.9
Significance	$P < 0.05$	$P < 0.05$	$P < 0.05$	$P < 0.05$

Lashington had the highest number of farmers who reported that cow fertility was a major constraint to cattle performance (Table 4.5). Upper Mnxe, Nxamnkwana and Wesley had the least number of farmers with cow fertility problems. Over half of the farmers in Mnyameni reported calf mortality problems. Few farmers in Wesley (5.6 %) and Magwiji (17 %) reported calf mortality problems.

4.4 Conclusions

Most households own more cows than heifers. Low reproductive performance was reported in all the 10 communities as a major constraint in cattle productivity in communal areas of the Eastern Cape. Seasonality of calving was also commonly reported among the 10 communities, with most cows reportedly calving during the rainy season. Lashington had the highest number of farmers who reported that cow fertility was a major constraint to cattle performance. Over half of the farmers in Mnyameni reported calf mortality problems. It is essential to closely monitor cow reproductive performance for the development of appropriate mitigation measures that enhance reproductive and productivity of cattle herds in the communal areas.

Table 4.5: Proportion (as a percentage) of farmers who reported challenges in cow fertility and calf mortality in the 10 communities

Village	Cow fertility	Calf mortality
Nxamnkwana	14.6	29.2
Hekele	23.5	35.3
Kolomana	27.7	34.0
Lashington	44.0	40.0
Magwiji	25.0	16.7
Mgwali	32.2	28.8
Mnyameni	32.7	51.9
Tugela	14.0	30.0
Upper Mnxe	16.7	14.6
Wesley	16.7	5.6
Overall	24.7	28.6
Significance	$P < 0.05$	$P < 0.05$

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CHAPTER FIVE

5. Reproductive Performance of Cows in Sweet- and Sour-Veld Types in Communal Areas of the Eastern Cape

Abstract

Cow reproduction in the communal areas is marginal and, therefore, requires improvement if optimal cattle production is to be achieved. A study was conducted in Cala and Sterkspruit communal areas to monitor body condition and ovarian activity of cows in the sourveld and sweetveld areas. Ovarian activity and pregnancy patterns of cows were determined by a veterinarian through rectal palpation in June, August and October 2007 and January 2008. There was a marked decline in body condition of cattle on both veld types from March to July. In the sweetveld, body condition improved from September until January, whereas in the sourveld the improvement in body condition started in October ($P<0.05$). The cows in both veld types conceived throughout the year. Most cows in the sweetveld were cycling in January and August ($P<0.05$) whereas in the sourveld there was no distinct period when the animals were cycling. Overall, there were no differences in the proportion of cows that were cycling between the sour and sweet rangelands ($P>0.05$). Most animals were pregnant in August (40 and 42%) in Sour and sweetveld respectively. There were significantly more cows cycling in the sourveld in October than in the sweetveld. Conception rates were higher ($P<0.05$) in the sourveld compared to the sweetveld and were highest in December. Cows in the communal areas are cycling and being pregnant throughout the year.

Keywords: Body weights; Nguni cattle; Ovarian activity; Pregnancy patterns.

5.1 Introduction

Veld is the most economically important feed resource base for ruminants in the communal areas of Southern Africa (Tainton, 1999). In the communal areas of South Africa, the veld is managed under a communal land tenure system, where all community members have free access to the veld resource. The veld is heterogeneous in both nature and utilization. Pedo-climatic conditions are the major determinants of herbaceous biomass and composition on the veld (Ainslie *et al.*, 2002). In South Africa, veld is classified into two major types, namely the sweetveld and sourveld, based on the amount of rainfall received and the existing tree and grass species (Ellery, 1995). The sweetveld is characterised by low rainfall (200-500 mm per annum) and grasses remain nutritious and palatable throughout the year (de Waal, 1990). In the sourveld, rainfall is high (600-1200 mm) and the nutritive value and palatability of grasses are poor, in winter, leading to loss in condition of animals with access to such veld during winter (Botsime, 2006). However, the effect of veld type on communal cattle production has rarely been quantified. Understanding the influence of veld type on body condition of cows is crucial for the development of communal feed management strategies.

Generally, information on the reproductive performance of livestock in communal areas is limited. Information on the growth and reproductive performance of cows on veld is essential to develop mitigation programmes that enhance cow fertility and increase the potential of getting animals for sale and meet other socio-cultural functions in the community. Such information also enhances the development of sustainable rangeland management strategies that optimize cattle production in communal areas. It is necessary to identify and make use of measures that assist in assessing performance of cattle. One such measure is body condition scoring. Body condition

scoring is easy to apply under communal areas as no sophisticated and costly equipment (such as heavy-duty scales) is required. It is, therefore, crucial to establish relationships among body condition of the cows and reproductive performance parameters such as ovarian activity, conception and calving rates. The objective of the current study was to determine:

i. the effect of veld type and month on body weight and body condition,
ii. ovarian activity and pregnancy/ conception pattern of cows in communal areas of the Eastern Cape Province, South Africa.

5.2 Materials and Methods

5.2.1 Study sites

The study was conducted in two communities; one from a sourveld (Upper Mnxe) and another from a sweetveld (Magwiji). Upper Mnxe is positioned 31^{o}33′ S and 27^{o}36′ East and altitude of 1441 m above sea level. It receives an average rainfall of 600-800 mm between November and April, and 200 mm from May to October. Mean minimum and maximum day temperatures are recorded in July (11^{o}C) and January (20^{o}C), respectively. The soil depth and pH range between 501-700 mm and 6.5-7.5, respectively. Soil clay content range from 15 to 25 %, silt content from 20 to 30 % and organic matter content is low (1-2 %).

Magwiji is situated 30^{o}37′ S and 27^{o}22′ E at an altitude of 1507 m above sea level. It experiences semi-arid climate with most of the rain falling between November and April (500 mm) and about 200 mm fall between May and October. Ambient temperatures fluctuate between 10 and 20^{o}C, with minimum and maximum temperatures being recorded in July (9^{o}C) and January (22^{o}C),

respectively. The area is generally sloppy (3.1-5.0 %) and has shallow (501-700 mm), infertile (0.6-2 % organic matter) sandy soils (15-20 % silt content) with pH of between 6.5 and 7.5.

5.2.2 Selection of farmers and experimental animals

Selection of farmers was based on cattle ownership and willingness of the farmer to participate in the study. Farmers with at least two healthy female cattle (cows and heifers) were chosen. Thirty-one and 25 households were identified in Upper Mnxe and Magwiji communities, respectively. Farmers were identified with the assistance of the local traditional leaders, councillors and agricultural extension officers.

5.2.3 Measurements

5.2.3.1 Body weight and body condition scores

Body weight measurements and body condition scores (BCS) were collected monthly from 200 cows between March 2007 and January 2008. Cattle weights were estimated using a weigh-band. Body condition scores were visually appraised by a veterinarian using a 5-point scale (1-very thin and 5-very fat).

5.2.3.2 Ovarian cyclicity and pregnancy diagnoses

Ovarian function and pregnancy status were assessed in March, June, October and January through rectal palpation by a veterinarian. Cows that had corpora lutea present were considered to be cycling.

5.2.4 Statistical analyses

To normalise the data, square root transformations were performed on BCS. The effect of veld type, month, parity and their interactions on BCS and body weight changes were analysed using PROC GLM for repeated measures (SAS, 2003). A chi-square test was used to determine the association between veld type and month with ovarian function and pregnancy status.

5.3 Results and Discussion

5.3.1 Herd characteristics

Veld type had no influence on the overall herd size ($P>0.05$). Only nine percent of the households, across the two communities, had large cattle herd sizes (greater than 20 head of cattle). The similarity in the herd sizes between the two veld types was unexpected since veld condition in the sweet-veld is expected to remain constant throughout the year without animals losing body condition. This principle, therefore, is likely to have little impact in communal areas, where farmers raise their cattle communally and grazing resources are shared. As shown in Table 5.1, most of the households in Upper Mnxe and Magwiji communities owned less than 10 cattle. The farmers in the respective communities also indicated that grazing land was limiting. Similarly, Chawatama *et al.* (1998) and Allsopp *et al.* (2006) reported that livestock numbers in communal areas are influenced by size of the rangelands. It could, however, not be ascertained whether land availability was a serious constraint, or rather it was the long distances between the homesteads and grazing areas. In Magwiji, for example, cattle graze in the mountains, which are about 10 km away. The farmers rarely go and fetch the animals, except when there is a special need for them, for example, national vaccination programmes and dipping.

Table 5.1: Proportion of households (%) in Upper Mnxe and Magwiji communities with different cattle herd sizes

Herd size	Upper Mnxe	Magwiji	Overall
Less than 10	77	68	72.5
11-20	13	24	18.5
Greater than 20	10	8	9.0

5.3.2 Changes in body weights and body condition scores

There was a significant interaction between veld type and month on body weights ($P<0.05$). The body weights declined from March to October and then increased between October and January ($P<0.05$; Figure 5.1). Cows in the sourveld markedly lost weight in August more than in the sweetveld. The sample sizes dropped markedly as parity increased, indicating that most of the cows were culled when they are still fairly young. Although body weights generally increased with parity (Table 5.2), there was a significant interaction between veld type and parity of the cow on body weights ($P<0.05$). Surprisingly, cows in parity 3 were lighter than those in the second parities, in both veld types, a finding which is difficult to explain.

Body weights are traditionally used to monitor nutritional status and growth of animals (Chimonyo *et al.*, 2000). However, body weights do not accurately reflect the nutritional status of the animal, as a large framed animal might have low body reserves than a small body framed animal (Oulun, 2005). Changes in body weight are more informative than body weights themselves. Variations in bodyweight may occur as a result of gut fill and bladder fill, pregnancy and parturition (National Research Council, 1996). The higher body weights in cows in the sourveld than sweetveld could be because most of the animals in the latter had Brahman blood, which contributed to the large frame size, whereas in Magwiji, farmers were using Nguni bulls. The bulls had been provided by the University of Fort Hare, in a drive to re-populate communal areas with indigenous breeds (Mapiye *et al.*, 2007). The breed influence on reproductive performance could, thus not be ascertained in the current study. The observation that cows in both communities lost body weight reflects the changes in the availability and quality of forages in the veld (Chimonyo *et al*., 2000).

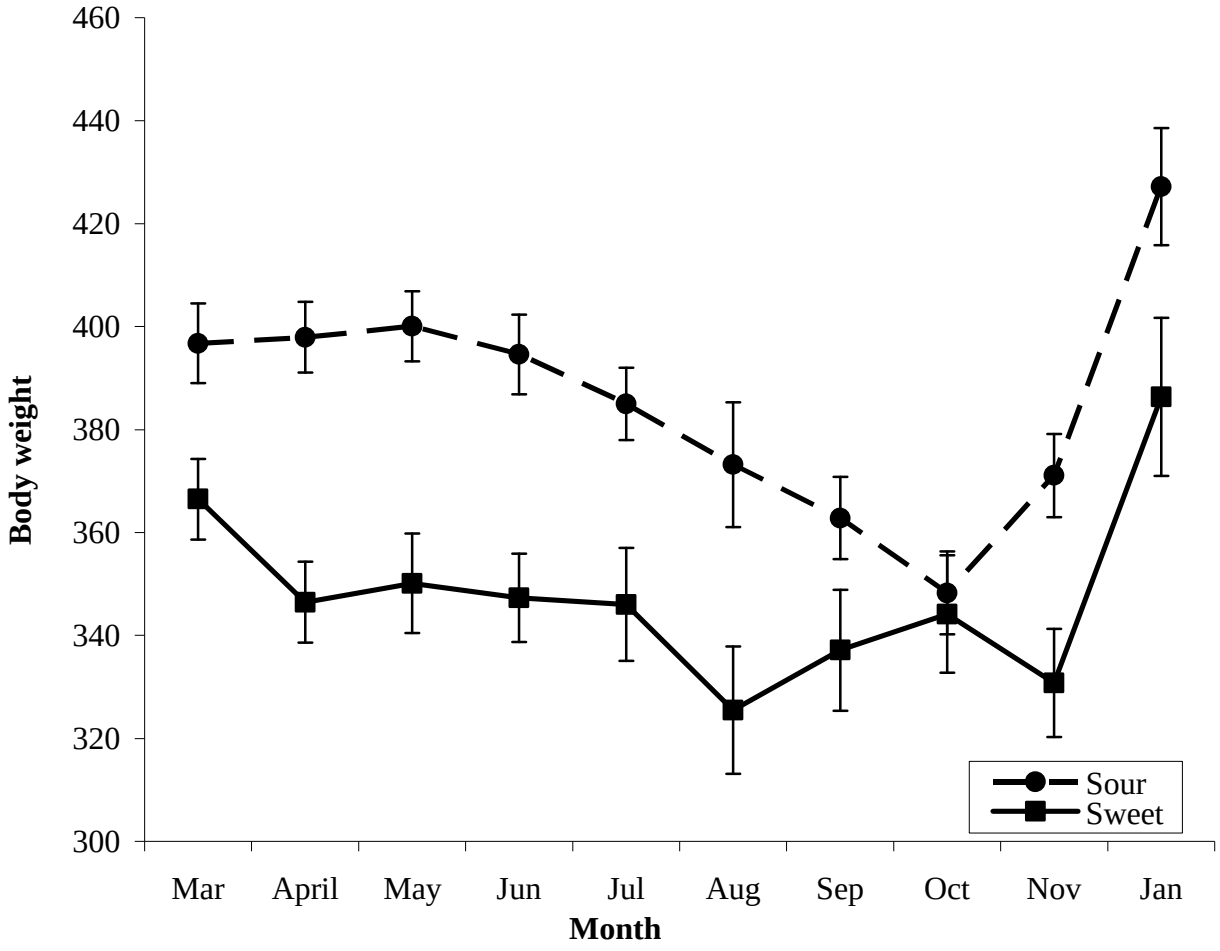

Figure 5.1: Monthly changes in body weight of cows in the sweet and sour rangeland areas of the Eastern Cape

Table 5.2: Effect of parity and veld type on body weight in the Eastern Cape

	Sourveld		Sweetveld	
Parity	N	Mean ± SE	N	Mean ± SE
0	230	312 ± 4.4[b]	74	277 ± 8.4[a]
1	212	371 ± 3.9[e]	150	342 ± 4.9[d]
2	144	399 ± 5.7[f]	99	343 ± 4.5[d]
3	127	380 ± 4.6[e]	37	331 ± 5.8[c]
4	33	409 ± 7.8[f]	12	336 ± 5.5[cd]
5 and above	11	412 ± 23.4[f]	15	365 ± 12.4[e]

[a,b,c,d,e,f] Values with different superscripts differ ($P < 0.05$).

As shown in Figure 5.2, there was a significant interaction between veld type and month on body condition scores. In general, body condition scores were high in the sourveld and declined from March to October ($P<0.05$). Body condition scores for cows in the sourveld were higher in parity 2 to 5 compared to their counterparts in the sweetveld ($P<0.05$) (Table 5.3). In the sweetveld, however, cows in parities 2 to 4 had lower body condition scores than the heifers and cows in parities beyond 5.

During the dry season, cows in the sourveld took a longer time to recover lost body condition than cows in the sweetveld. During the dry season, grasses in the sourveld are expected to have low nutritive value (Tainton, 1999; Nsoso *et al*., 2003; Botsime, 2006), and therefore, could not meet the nutrient requirements of the cows for maintenance and growth. The sourveld provides palatable and nutritious forage for between six and nine months of the year (Luginbuhl *et al*., 2002; Botsime, 2006). It is important to note that the maintenance requirements for walking the long distances in search for food were expected to be high in the communal areas studied.

The current study indicates that the cows in the sourveld had better condition scores than cows in the sweetveld. Matiko *et al.* (2008) also reported a similar pattern in body weights and body condition scores. The body condition of the cows in the sourveld continued to drop from September till October as the veld type is still on re-growth. Furthermore, it takes long for animals to recover due to their large body size. Even though in October veld quality is improving, the quantity of grass for the animals needed for maintenance, growth and reproduction requirements is not enough.

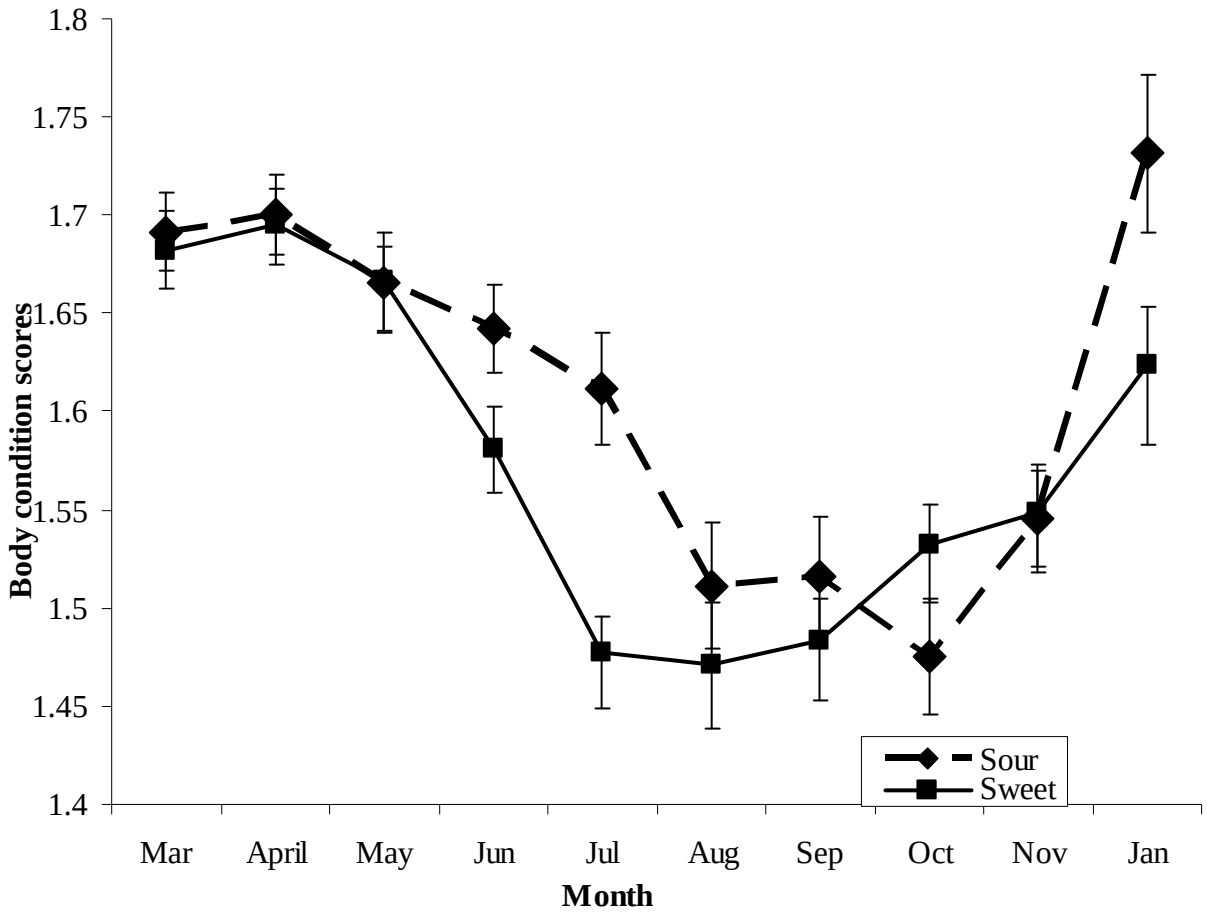

Figure 5.2: Monthly body condition scores (square root transformed) in the sourveld and sweetveld

Table 5.3: Effect of veld type and parity on body condition scores (square root transformed)

Parity	N	Sour rangeland	N	Sweet rangeland
0	230	1.6 ± 0.01^{b}	74	1.6 ± 0.02^{b}
1	212	1.6 ± 0.01^{b}	150	1.6 ± 0.01^{b}
2	144	1.6 ± 0.02^{b}	99	1.5 ± 0.02^{a}
3	127	1.6 ± 0.02^{b}	37	1.5 ± 0.02^{a}
4	33	1.7 ± 0.03^{c}	12	1.5 ± 0.16^{a}
5	11	1.7 ± 0.00^{c}	15	1.6 ± 0.07^{b}

[a,b,c] Values with different superscripts differ ($P < 0.05$).

The finding that first and second parity cows had higher body condition scores than those in the third parity was unexpected. It was, however, observed that farmers tended to milk cows from parity 3 and regard milk yield for first parity cows to be too low that it should be left for the maintenance and growth of the calf. The quantity of the milk produced was, however, not determined in the current study. The farmers also reported that multiparous cows produce bigger calves, which have higher milk requirements than smaller calves. We did not have the appropriate equipment and facilities to determine calf birth weight in the current study. In addition, cows calve in the distant grazing areas.

5.3.3 Ovarian activity and pregnancy status

There was a significant association between veld type, month and ovarian cyclicity (Table 5.4). Overall, the number of cows cycling in the sourveld and sweetveld were the same ($P>0.05$). A significant association between incidence of cyclicity and month was observed in the sweetveld ($P<0.05$). Over 60 % of the cows were cycling in June, October and January in the sourveld, while in the sweetveld, ovarian cyclicity was at the lowest in June and October. In the sourveld, there was no association between the incidence of cyclicity and month ($P>0.05$). No significant associations were observed between incidences of pregnancy within each veld type. Table 5.5 shows the number of cows that were exhibiting ovarian cyclicity and were pregnant in different body weight categories. Most of the cows that were cycling weighed between 250 and 400 kg. Most of the pregnant cows weighed between 300 and 400 kg. The body condition of most of the cycling and pregnant cows was 3 (Table 5.6). Conception rates were higher in the sourveld compared to the sweetveld and were highest in December (Figure 5.3). Most of the cows conceived between November and April.

Table 5.4: Proportion (%) of pregnant cows and those exhibiting ovarian cyclicity by veld type and month

	Ovarian cyclicity		Pregnancy status	
Month	Sourveld	Sweetveld	Sourveld	Sweetveld
June	66.7 (n=44)	44.2 (n=19)	30.5 (n=29)	35.8 (n=24)
August	46.7 (n=7)	62.5 (n=10)	40 (n=10)	42.7 (n=12)
October	62.1 (n=36)	34.8 (n=8)	20.5 (n=15)	28.1 (n=9)
January	63.3 (n=19)	93.7 (n=15)	21.1 (n=8)	11.1 (n=2)
Overall	59.7	58.8	28.0	29.4
P-value	(P>0.05)	(P<0.05)	(P>0.05)	(P>0.05)

Table 5.5: Number of exhibiting cyclicity and pregnancy status in cows for each bodyweight range in the sweetveld and sourveld

	Cows exhibiting ovarian cyclicity							
	Sourveld				Sweetveld			
Body weight (kg)	June	August	October	January	June	August	October	January
Less than 300	10	4	7	1	3	4	3	3
300-350	24	2	12	5	11	4	3	6
351-400	5	0	13	10	5	2	1	5
>400	5	1	4	3	0	0	1	1
	Pregnancy status							
	Sourveld				**Sweetveld**			
Less than 300	0	2	2	0	4	3	4	0
301-350	4	2	5	1	10	3	4	1
351-400	15	4	7	1	9	5	1	1
>400	10	2	1	6	1	1	0	0

Table 5.6: Body condition scores (BCS) of cycling and pregnant cows in the sweetveld and sourveld

		Veld type							
		Sourveld				Sweetveld			
Physiological status	**BCS**	Jun	Aug	Oct	Jan	June	Aug	Oct	Jan
Ovarian cyclicity	**2**	19	6	3	0	9	9	6	0
	3	24	1	30	19	10	1	2	15
	4	1	0	3	0	0	0	0	0
Pregnancy status	**2**	8	7	3	0	12	9	8	0
	3	17	3	12	2	11	3	1	2
	4	4	0	0	6	1	0	0	0

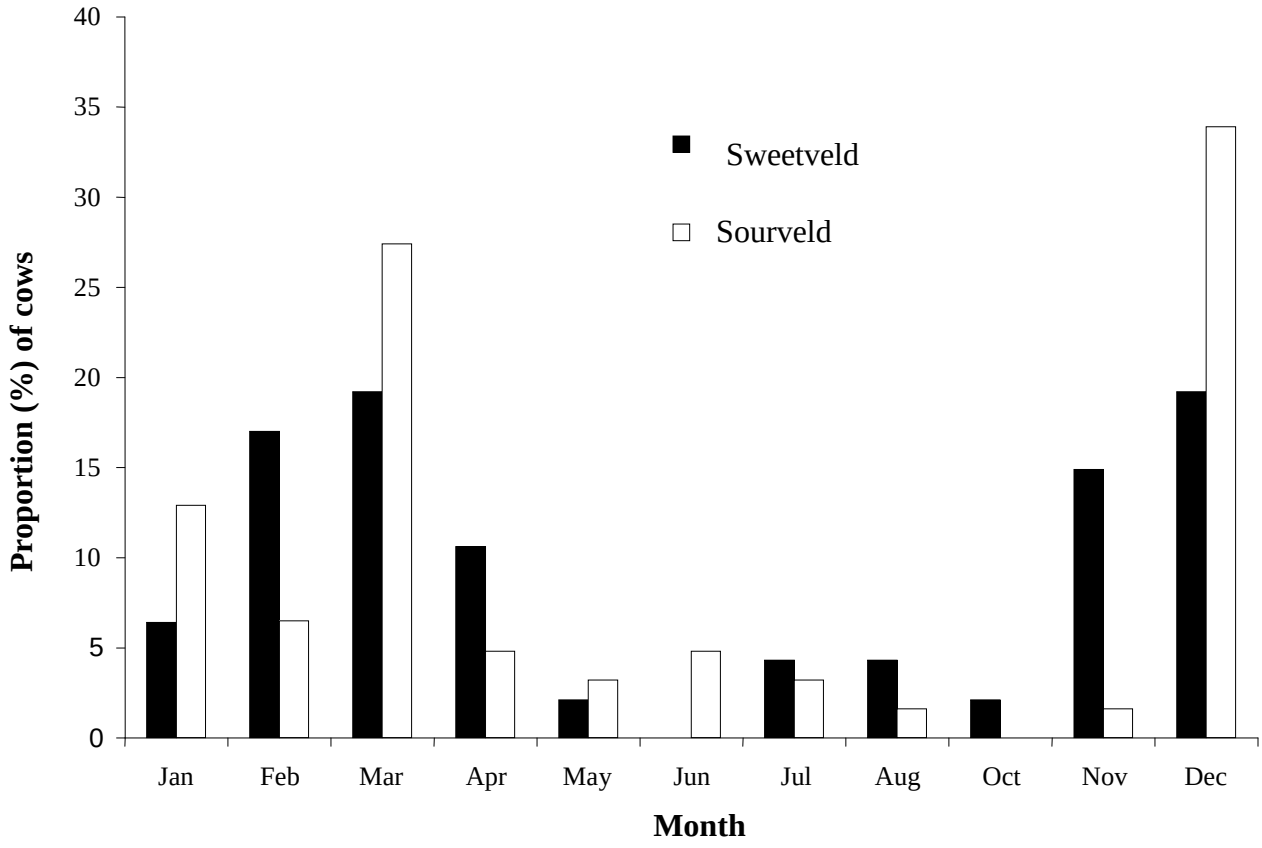

Figure 5.3: Proportion (%) of cows that conceived per month in the sweetveld and sourveld

The findings that the ovarian cyclicity in the two veld types were similar and low indicates that ovarian activity is the major determinant of low reproductive efficiency of the cows in communal areas(Chimonyo *et al*., 2000). There are various factors that determine the cyclicity of cows; chief of which are lack of adequate nutrition, heat stress and reproductive diseases (MacDonald *et al*., 2005). The observation that the sweetveld had the least number of cows that exhibited ovarian cyclicity in June and October could be explained by the limitation of feed quantities and the carrying capacity of the veld. The cows in the sweetveld exhibited a sharp drop in body condition around June, in comparison with their sourveld counterparts. There is, therefore, need to design proper veld management strategies and, if possible, supplementary feeding programmes to enhance cow performance.

The low pregnancy rates observed in both communities are a cause for concern. Overall, the incidence of pregnancy was less than 30%, which is lower than the expected pregnancy rate in commercial beef production enterprises (70%) (Gordon, 1997). Low pregnancy rates can be caused by diseases, bull fertility and low bull: cow ratios. The influence of these factors was not determined in the current study, but the farmers (Chapter 4) did not indicate fertility of bulls as a limitation to cow reproduction. It is, therefore, imperative to conduct breeding soundness evaluations and identify bull fertility diseases in these communities. Our findings suggest that the low pregnancy is likely to be caused by cow factors, such as fertility diseases and nutritional status.

Most cows were cycling and pregnant at body condition score of 2 and 3. These are ideal scores for the animals to cycle as the animal at that score is in a better condition for itself and able to

look after the calf. It is important to keep the animals in body condition score 3, as it will be able to maintain itself and recover after calving. The observation that the majority of the pregnant cows conceived between November and April was expected. The high conception rate coincided with the period when body condition scores started to improve. Conception rates were lowest when body condition scores were at their lowest. The findings in the current study, therefore, suggest that nutritional status of the cows is more important in influencing the reproductive status of cows in communal areas in agreement with the findings of Chimonyo *et al*., 2000. In other words, improving reproductive efficiency of cows in communal areas has to prioritise improved veld management. Bull: cow ratios or fertility was not an important factor in influencing conception rates since the bulls and cows were running together throughout the study period. It is, however, important to separate bulls from cows to control mating and predict when calving is likely to occur.

5.4 Conclusions

Cows in the sourveld markedly lost more weight in August than those in the sweetveld. Body condition scores were high in the sourveld and declined from March to October ($P<0.05$). Body condition scores for cows declined markedly during winter. Ovarian cyclicity was at the lowest in June and October. Conception rates were higher in the sourveld compared to the sweetveld and were highest in December. Although cows generally conceived throughout the year, most of the cows conceived between November and April.

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CHAPTER SIX

6. General Discussion, Conclusions, Recommendations and Further Research

6.1 General discussion

For communal farmers to increase off-take, reduce poverty and improve their food security status, it is essential to increase the productivity level of livestock, particularly cattle. Cattle have a multiple of functions, including the provision of draught power, provision of cash, payment of dowry and as a sign of wealth. To meet these various functions, cattle productivity has to be increased through improvement of reproductive efficiency of cows; one of the most important determinants of cattle productivity. The low reproductive efficiency of the cows in communal areas of South Africa could be due to various factors. The study was, therefore, designed to evaluate the reproductive performance of cows in the sourveld and sweetveld in communal areas of the Eastern Cape.

In the first study, participatory rural appraisals were conducted in 10 communities from the major veld types found in the Eastern Cape. The communities ranked lack of fences, tick-borne diseases, poor animal condition during winter, poor breeding practices and low market prices, respectively as major constraints limiting cattle production in the Eastern Cape. Cattle, sheep and goats, in that order, were ranked as the most important livestock species and were mainly kept for meat, cash and ceremonies, respectively. The relative ranking of poor body condition in all the communities was high. Constraints related to cow reproduction were mentioned in all the 10 communities. Most communities indicated that their cows had long calving intervals due to poor body condition, especially after parturition and in winter.

Based on the PRA findings, farmer perceptions on cow reproductive performance were obtained using structured questionnaires. A total of 551 farmers were randomly selected from the 10 communities. Most households own more cows than heifers. Low reproductive performance was reported in all the 10 communities as a major constraint in cattle productivity in communal areas of the Eastern Cape. Seasonality of calving was also common, with most cows reportedly calving during the rainy season. Lashington had the highest number of farmers who reported that cow fertility was a major constraint to cattle performance. Over half of the farmers in Mnyameni reported calf mortality problems.

Body condition score changes, ovarian cyclicity and pregnancy patterns of cows from two of the communities, Upper Mnxe and Magwiji, were monitored for one year. Cows in the sourveld markedly lost weight in August. Body condition scores were high in the sourveld and declined from March to October. Body condition scores for cows declined markedly during winter. Ovarian cyclicity was at the lowest in June and October. Conception rates were higher in the sourveld compared to the sweetveld and were highest in December. Although cows generally conceived throughout the year, most of the cows conceived between November and April.

6.2 Conclusions

Cattle functions and roles differ with communities. Farmers face several constraints that influence cattle production. Of the major constrains faced, poor animal condition is common. Poor animal condition could be due to lack of adequate grazing land, low levels of veld management and lack of supplementary feeding programmes. Reproductive performance is

generally poor with non productive animals kept in the herd, long calving intervals, low to medium levels of ovarian activity and poor pregnancy rates.

6.3 Recommendations and further research

Cattle owners in each community should be encouraged to work closely together and develop management programmes to promote productivity. This could be achieved by practising controlled and seasonal mating, proper management of the veld (including rotational resting) and providing dietary supplementation to the cows, especially in winter. Crop residues and veld hay are potential feed resources to ensure cows maintain body condition throughout the year. Feed conservation techniques should also be developed in each community, using locally available feed resources.

Capacity building of farmers should be provided. Areas that should be emphasised include body condition scoring, especially in cows for them to know when to breed and proper body condition at calving. Farmers should also be acquainted with knowledge on the appropriate body condition for cows to re-breed. Livestock owners should be encouraged to seek the services of local veterinarians to check for diseases, perform pregnancy diagnoses and other animal health conditions.

Farmers should be encouraged to keep production records for their herds. Important records that can be kept by the farmers include recording the ages of their animal at specific physiological stages, such as puberty and mating (to eliminate unproductive individuals), date of calving (to estimate the time to re-breed) and date of mating (to estimate date of calving).

The following studies are required to improve cow reproductive efficiency in communal areas:

1. The mature weight of animals and age at puberty is not known and should be determined. The age and weight at maturity of the heifers will enable farmers to cull unproductive heifers and know when to expect the first calves.
2. Bull fertility in the communal areas is also vital. Farmers should know whether the bulls are free of fertility disease, to reduce the transmission of the diseases to the cows. The bulls need to be tested before being introduced to the herd and to determine factors that influence bull fertility and breeding soundness.
3. It is also essential to evaluate calving intervals, postpartum anoestrous periods and to estimate birth and weaning weights under communal production conditions.
4. The role of nutrition on reproductive performance in the indigenous Nguni and non-descript cows in the communal areas of the Eastern Cape should be investigated. The appropriate age at marketing, appropriate feedstuffs to use and responses of weaners to supplementary feeding should also be determined.