

**THE USE OF INDIGENOUS KNOWLEDGE IN BEEF CATTLE HUSBANDRY IN
TSHEBELA VILLAGE, LIMPOPO PROVINCE**

By

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DECLARATION

I, MONERI SANAH MOGALE, declare that this mini-dissertation hereby submitted to the University of Limpopo (Turfloop Graduate School of Leadership) for the degree of Masters of Development has not previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.

Surname, Initials (Title)

Date

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- To all my participants, thank you for taking time out of your busy schedules to meet with me and provide your insights. I am grateful for all the information you shared with me and allowing me to use the information in my research.

DEDICATION

This work is dedicated to my husband, my kids Kutullo and Tshidiso and my mother for all the support they gave me throughout my studies.

LIST OF ACRONYMS

ACRONYM	NAME
BEE	Black Economic Empowerment
CASP	Comprehensive Agricultural Support Programme
CFIKS	Centre for Indigenous Knowledge System
CSIR	Council for the Science and Industrial Research
DoA	Department of Agriculture
DST	Department of Science and Technology
DTI	Department of Trade and Industry
EVM	Ethno Veterinary Medicines
FAO	Food and Agricultural Organization
FGD	Focus Group Discussions
HEIs	Higher Education Institutions
IDP	Integrated Development Plan
IK	Indigenous Knowledge
IKS	Indigenous Knowledge Systems
IPR	Intellectual Property Rights
ISDP	Integrated Sustainable Development Plan
ISRDS	Integrated Sustainable Rural and Development Strategy
MAFISA	Micro Agricultural Finance Scheme of South Africa
NRF	National Research Foundation
SARNIKS	South African Network on Indigenous Knowledge Systems
SAWS	South African Weather Service
SLF	Sustainable Livelihoods Framework
UNEP	United Nations Environmental Programme
UNESCO	United Nations
WB	World Bank
WIPO	World Intellectual Property Organization

ABSTRACT

There is a gap in the literature about the role and relevance of Indigenous Knowledge and beef cattle welfare in many parts of the Limpopo province. This gap is relevant because many marginalised cattle owners use indigenous knowledge in their day to day management of beef cattle. The aim of the study is to investigate the use of IK methods on beef cattle husbandry in Tshebela village in the Capricorn district of the Limpopo province as a contribution to filling the void identified above. The objectives of the study were as follows:

- To investigate the IK methods used in beef cattle husbandry in the area of the study;
- To assess if beef farmers use IK to identify medicinal plants to cure beef cattle;
- To investigate farmers' perceptions and attitudes on the use of IKS on beef cattle husbandry in the area of study.

A qualitative methodology that was used was primarily phenomenological in design. A purposive sampling technique was used and twenty seven (27) traditional beef farmers, two (2) local herbalists were recruited as participants. Data was collected through focus group discussions, key informant interviews, and observations. An interpretative phenomenological-based analysis was used to surface the role and relevance of indigenous knowledge in beef cattle husbandry. The findings suggest that indigenous knowledge is used by cattle owners alongside modern knowledge and that communal farming posed some challenges to the farmers.

Key Concepts: Beef Cattle Husbandry, Beef farming and Indigenous Knowledge.

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CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

In Africa, communal livestock production systems have existed for generations despite the enormous challenges and pressure that have undermined their existence, food security and livelihoods of millions of people. Such challenges include increased population densities, land degradation (Scoones, 1995; Allsopp et al., 2007), land use change and extreme climatic fluctuations (Abule et al., 2005). Extensive livestock production from natural rangelands remains an important aspect of agricultural production and rural livelihoods in many parts of the world (Turner and Hiernaux, 2002; Bennet, 2008).

The aim of this chapter is to introduce the study by providing the background information and some history about the use of indigenous knowledge in beef cattle husbandry in South Africa. The chapter also presents the statement of the research problem, research questions, research objective, significance of the study and its limitations. Definition of key concepts and the chapter outline of the mini dissertation also form part of this chapter¹.

1.2 BACKGROUND TO THE STUDY

Communal farmers use both individual as well as common knowledge to sustain their livestock production. Several authors worldwide have recognised the in-depth indigenous knowledge possessed by communal farmers and their perceptions on livestock husbandry and rangeland management and their influence on resource use and livestock production (Sheuyange et al., 2005; Solomon et al., 2007).

Based on the rich and diverse knowledge that passes through generations, communal livestock keepers in Africa have developed complex resource management systems to allow them to survive under often difficult biophysical environments, which are highly variable in space and/or time. Kinlund (1996), Dahlberg (2000), Thomas and Twyman (2004) and Twyman, Sporton and Thomas (2004) investigated the relationship between perceptions on land degradation and change in savannah ecosystems held

by scientists and land users in Southern Africa. They concluded that a combination of local and scientific knowledge can lead to a more useful assessment of environmental change and its implications for local land users.

The management of Indigenous Knowledge (IK) in South Africa seems promising, as attested to by the presence of an Indigenous Knowledge Systems (IKS) policy and various governmental structures developed to promote, preserve, protect and disseminate IK. Mosimege,2005:1 stated that South Africa's involvement in IK was formally initiated in September 1996, when the Council for the Scientific and Industrial Research (CSIR), with the support of the Portfolio Committee of Arts, Culture, Science and Technology, instructed nine historically disadvantaged universities to do an audit.

In November 2004, Cabinet adopted an Indigenous Knowledge System Policy. This policy was submitted by South Africa in April 2006 at Ninth Session of the World Intellectual Property Organization (WIPO) Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore in Geneva. The policy serves as an enabling framework to stimulate and strengthen the contribution of indigenous knowledge to social and economic development in South Africa. The policy's three main objectives or goals are summarized as follows:

- The affirmation of African cultural values in the face of globalization.
- Practical measures for the development of services provided by IK holders.
- Practitioners Underpinning the contribution of IK to the economy interfaces with other knowledge systems.

The national recognition of IK in South Africa is also reflected in the work of the National Research Foundation (NRF). The objective of the NRF is to support and promote research through funding, human resource development and the provision of necessary research facilities, in order to facilitate the creation of knowledge, innovation and development in all fields of science and technology. The NRF was established through the NRF Act (Act No. 23 of 1998). It took over the functions of the research funding agencies that were in operation previously. Being an independent agency, it provides services to the research community especially at higher education

institutions (HEIs) and science councils with a view to promote a high level of human capacity development.

The Southern African Network on Indigenous knowledge Systems (SARNIKS), formed in 1996 was part of the region's efforts to promote indigenous knowledge research. Part of SARNIKS's work, other than to promote the documentation of the indigenous knowledge, was to explore how these knowledge systems can be used in environmental education processes. Part of this research's strength is drawn from this argument (Zazu, 2007: 27).

The Department of Trade and Industry (DTI) is the leading department in the protection of Intellectual Property (IP) and IK in South Africa. Internationally, organizations such as WIPO, UNESCO, United Nations Environmental Programme (UNEP) and Food and Agricultural Organization (FAO) have been pursuing instruments that can protect the diverse constructs that fall under IP in developing countries. Included in the international spotlight are issues relating to IK.

It is with this in mind that DTI spearheaded the amendments and/or introduction of various pieces of legislature subsequently passed by parliament in order to ensure the protection and commercialization of IK. These include the Copyright and Performances Amendment Act of 2001; Patents Amendment Act, 2005; and Protection of IK Bill, 2008. It is foreseen that through these legislative interventions, the DTI, in collaboration with other departments, would contribute meaningfully to harnessing IK related initiatives of the second economy into the first economy without prejudicing the rights of the local communities (Mbengashe, 2008:19).

DST have established the National Recordal System which is the largest fingerprint initiative of the region to document and record IK as there is a serious gap in recording and documenting the knowledge of the indigenous people.

The Department of Agriculture (DOA) has developed several policies that cover indigenous crops. These include the Policy on Indigenous Food Crops, Policy on Industrial Crops, and Policy on Ornaments (Mbengashe, 2008:9). The Policy on Indigenous Food Crops was approved by the Departmental Executive Committee and

released for consultation, culminating in a national workshop and provincial workshops in eight provinces. The recommendations from the workshops led to a survey on the crops that were discussed. In promoting these crops, the Directorate of Plant Production commissioned several research and developmental projects to the Agricultural Research Council. Various other information materials were developed and distributed to the public to maintain dialogue during designated information days' (Mbengashe, 2008:9). The Directorate of Genetic Resources is involved in the ongoing documentation of the use of plant genetic resources. The collection of genetic material is undertaken nationwide before being stored at the National Gene Bank.

About 70 percent of the world's more than 1 billion rural poor people that live on less than US\$1.25 per day are at least partially dependent on livestock for their livelihoods (FAOSTAT, 2009). In smallholder and pastoral systems, livestock fulfil many functions in addition to producing meat, milk and eggs, including the provision of fertilizer, fuel, draught power and transport, a means of saving and investment, a buffer against crop failure, and diverse cultural and religious roles (FAOSTAT, 2009).

Gura, (2008) stated that small scale livestock farmers have developed strategies to help them to survive and to make the best use of their environment. Moreover they often keep mixed herds of cattle, sheep, and goats of several breeds which are high producers under good conditions; while others do not perform as well although they do produce under difficult conditions. In order to survive and make the best use of an area, it is often more important to own large numbers of animals than to own highly productive animals.

According to Munyai, (2012), it is important that we acknowledge that the main objective of small-scale, communal cattle farmers is a sustainable livelihood. Furthermore, due to the heavy reliance on beef cattle, rural farmers have long developed skills and techniques to manage their livestock that has roots within different, localised forms of IKS that reflect heterogeneous ecological constraints. Moreover it has been claimed by some that IKS can contribute to sustainable supplies of a wide range of products while requiring relatively low levels of input and costs, such as fodder, management and health care. South African rural beef cattle farmers

have long been using their IKS; however, there is a relatively limited amount of documentation on these processes.

Munyai (2012:36) said that livestock systems are the largest land-use activity on earth. In the developing countries, aside from the fact that livestock may be kept in the vicinity of the house or common land and fed with residue, there are also several other reasons why livestock is kept. These include, inter alia, the fact that livestock produces important food products and fertiliser, is source of income, provides draught power, and fulfils banking and insurance functions. In addition Dube (2008:27) indicated that rural farmers still use their IKS to manage diseases, breed cattle, rear calves, feeding and for the management of their grazing land.

The urge for survival has led humans to explore their surrounding natural environment for usable resources and cultivation. This in turn has led humans to master the various uses of available natural resources, as well as to find the best ways of extracting them. On the other hand, humans have also learned about the negative impacts their activities can have on the natural environment, including natural resource depletion, decreased production and soil erosion, and that a balanced way of utilizing and managing land and natural resources is vital to ensure that the land continuously provides necessary natural resources.(Brundtland Report ,1987).

In support of the above report, Kassahun et al.,(2008:12) indicated that Indigenous people often have detailed knowledge of local agro-ecological conditions, characteristics of plants and animals, resources and ecological processes in the ecosystems and landscapes on which they depend for sustenance and livelihoods.

Furthermore they stated that this knowledge is accumulated over hundreds and sometimes thousands of years as it is passed from generation to generation, but is also constantly adjusted to changing conditions and new experiences, moreover it is place- and culture-specific and derived from interactions between humans, animals, plants, natural forces, spirits and land forms. Lastly they emphasize that in order to appropriately integrate traditional knowledge into current management systems, its use must be coupled with an understanding of and respect for the culture of the people in which the knowledge is situated.

According to Hashe (2011:5) the use of ethno veterinary practices has spread to many countries in the world such as Egypt, China, Kenya, Ethiopia, Pakistan and South Africa. Moreover ethno veterinary medicine was considered important, sustainable, cost effective and socio-culturally acceptable to livestock problems furthermore ethno-veterinary medicines were usually used for treating diseases like heart water, red water, diarrhoea, and foot rot and black quarter. Additionally Hashe (2011:8) stated that beef cattle farmers, when preparing herbal medicines, used plants, barks, bulbs, seeds, flower roots, leaves, tubers and fruit hence herbs were usually used individually or sometimes as a mixture with other plants and was given to the animals either orally or topical depending on the ailment.

1.3 STATEMENT OF THE PROBLEM

Management of IKS among farmers is fraught with many challenges. Challenges such as, lack of knowledge on medicinal plants; inadequate knowledge on grass identification; lack of control on feeding system of beef cattle in communal land; veld condition and other related problems impact negatively on management of beef cattle in the area of the study. It is important to note that IK is orally transmitted from one generation to the next through elderly people therefore there is a need to document so that this wealth of wisdom does not get lost as they die hence the study on the use of IK methods in beef cattle husbandry in Tshebela village.

1.4 SIGNIFICANCE OF THE STUDY

The findings of this study may be incorporate into local formal livestock management systems and adaptation strategies. This could lead to the development of effective management systems that are cost-effective, participatory, and sustainable which reflect IKS as well as modern farming techniques.

The results of this study will contribute to one of the objectives of the DST (2008) which aimed at documenting IK from the knowledge holder, to create a database in order to secure and protect IKS for the current and future use. Furthermore, data may be incorporated into IKS research projects, which in turn can contribute to local empowerment and development, thereby increasing self-sufficiency and strengthening self-determination.

According to the World Bank Report (1998), learning from IKS by investigating what local communities know and have can improve understanding of local conditions and provide a productive context for activities designed to help the communities. Currently IKS is an underutilized resource in development processes. Sharing IKS within and across communities can help enhance cross-cultural understanding and promote the cultural dimension of development. The study's recommendations for the effective management of IK not only create awareness and encourage the recognition, protection and appreciation of IK, but also highlight the importance of having an Intellectual Property Rights (IPR) system that adequately recognizes and protects the rights of indigenous people and local communities to ensure that their knowledge and innovations are not ignored.

1.5 AIM OF THE STUDY

The aim of the study is to investigate the use of IK methods on beef cattle husbandry in Tshebela village in Limpopo Province.

1.6 OBJECTIVES OF THE STUDY

- To investigate the IK methods used in beef cattle husbandry in the area of the study;
- To assess if beef farmers use IK to identify medicinal plants to cure beef cattle;
- To investigate farmers' perceptions and attitudes on the use of IKS on beef cattle husbandry in the area of study.

1.7 RESEARCH QUESTIONS

- What are the IK methods used in the management of beef cattle in the area of study?
- Do beef farmers still use the same medicinal plants that were used to cure beef cattle in the past?
- Are there any observable changes which indicate an increase or decrease at a particular historical moment?

1.8 DEFINITION OF KEY TERMS

1.8.1 Beef cattle

Beef cattle are cattle raised for meat production (as distinguished from dairy cattle, used for milk production). The meat of cattle is known as beef (Hashe, 2011).

1.8.2 Indigenous knowledge

The Centre for Indigenous Knowledge System (CFIKS) and The National Research Foundation (NRF) defines IK as a complex set of knowledge, skills, and technologies existing and developed around specific conditions of populations and communities indigenous to a particular geographic area. Indigenous knowledge therefore represents the knowledge that people in a given community have developed over time and continue to develop. It forms the bases of livelihood which encompasses every aspect of life from agriculture, food preparation, health care, education and training, environmental conservation, and a host of other activities. Indigenous knowledge is entrenched in community practices, institutions, relationships, rituals and ceremonies (CFIKS, 2009).

Department of Science and Technology (DST) defines IK as an inclusive knowledge system that covers technologies and practices that have been and are still used by indigenous and local people for existence, survival and adaptation in a variety of environments. In making it more understandable, DST further explained that such knowledge is not static but evolves and changes as it develops, influences and is influenced by both internal and external circumstances and interaction with other knowledge systems. Moreover it covers content and contexts such as agriculture, architecture, engineering, mathematics, governance and other social systems and activities, medicinal and indigenous plant varieties, arts and culture.

1.8.3 Beef cattle husbandry

For the purpose of the study, it will be defined as the general management of beef cattle with special focus to feeding, pasture management, disease treatment and control.

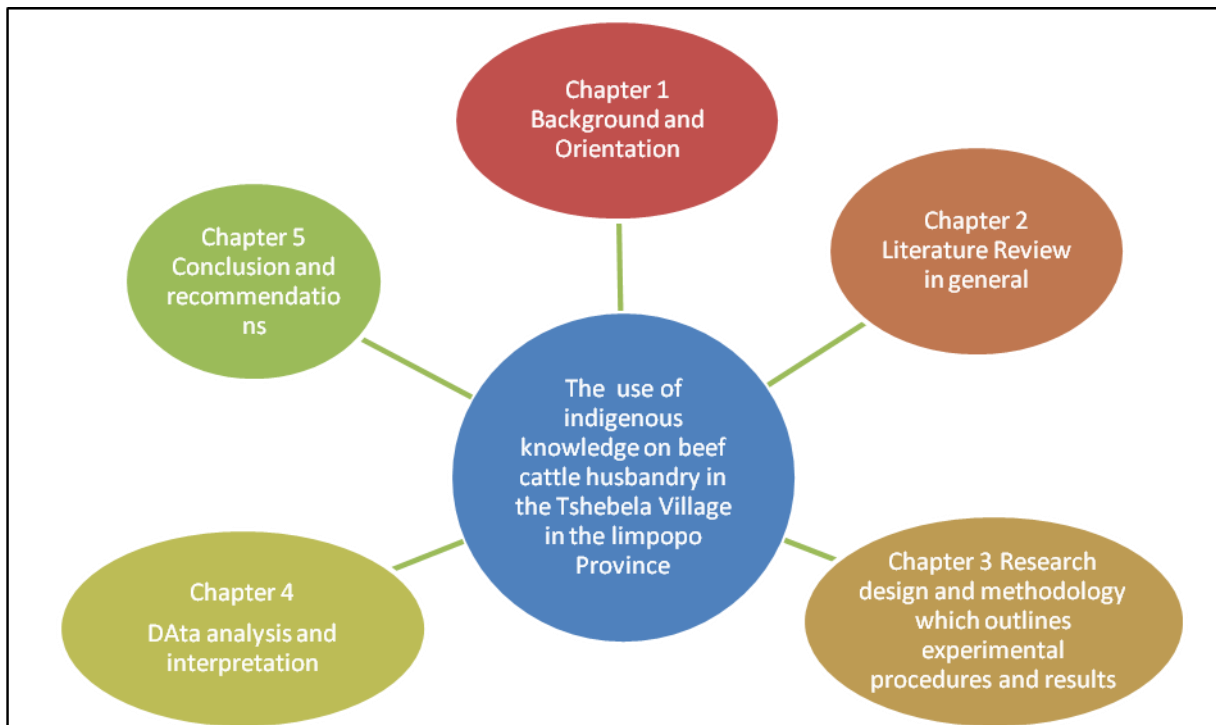


Figure 1: Outline of the report
Source: author's contribution, 2014

The dissertation is written in format with a general introduction, a general literature review and general discussion and recommendation sections. These general sections are intended to illustrate the relationships among various studies and show that, although the chapters have been written separately, they are linked. The structure of the thesis also necessitates that some themes and sections be repeated in the different sections since each of the research chapters share the same introduction and literature review.

1.9 CONCLUSION

In this chapter, the background of the use of indigenous knowledge on beef cattle husbandry was discussed. The statement of the problem, the aim, the significance, and the chapter outline of the study were also discussed.

In the next chapter, a review of selected relevant literature on indigenous knowledge system on beef cattle husbandry will be discussed. This will be done to locate the present study within the existing body of knowledge.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter a review of relevant literature on the broad definition of IK conceptual framework, the importance of IK, current debates on IKS, pasture management and ethno veterinary will be discussed and analyzed. The chapter begins with a review of the conceptual framework regarding the importance of IKS. This is followed by a critical analysis of previous and relevant research; literature which may place the current study in appropriate context in terms of its research questions as stated in the previous chapter. Lastly, the conclusion is given in a form of a summary.

Livestock production is a source of employment and livelihood in African agriculture. More percentages of the rural people in this country satisfy their subsistence needs through livestock production. This class of animals includes cattle, sheep, goats, pigs, and poultry but for the purpose of this study, we will concentrate only on the beef cattle.

2.2 RATIONALE FOR THE LITERATURE REVIEW

It gives us the tools needed to compare and constructs the findings of the study with the literature and the literature review also seeks to answer the following questions:

- What are the IK methods used in the management of beef cattle in the area of study?
- Do beef farmers still use the same medicinal plants that were used to cure beef cattle in the past?
- Are there any observable changes which indicate an increase or decrease at a particular historical moment?

2.3 CONCEPTUAL FRAMEWORK

The study followed sustainable livelihood framework as the farmers are relying on their livestock to maintain their standard of living. Munyai (2012: 27) stated the conceptual definition of IK, which is what, is applied in this study, views IK as an integrated system of cognition values and practices with a contextual information system and a consequent comprehensive dimension of application. Figure 2 below explains the relationship between all concepts involved and its impacts to the other.

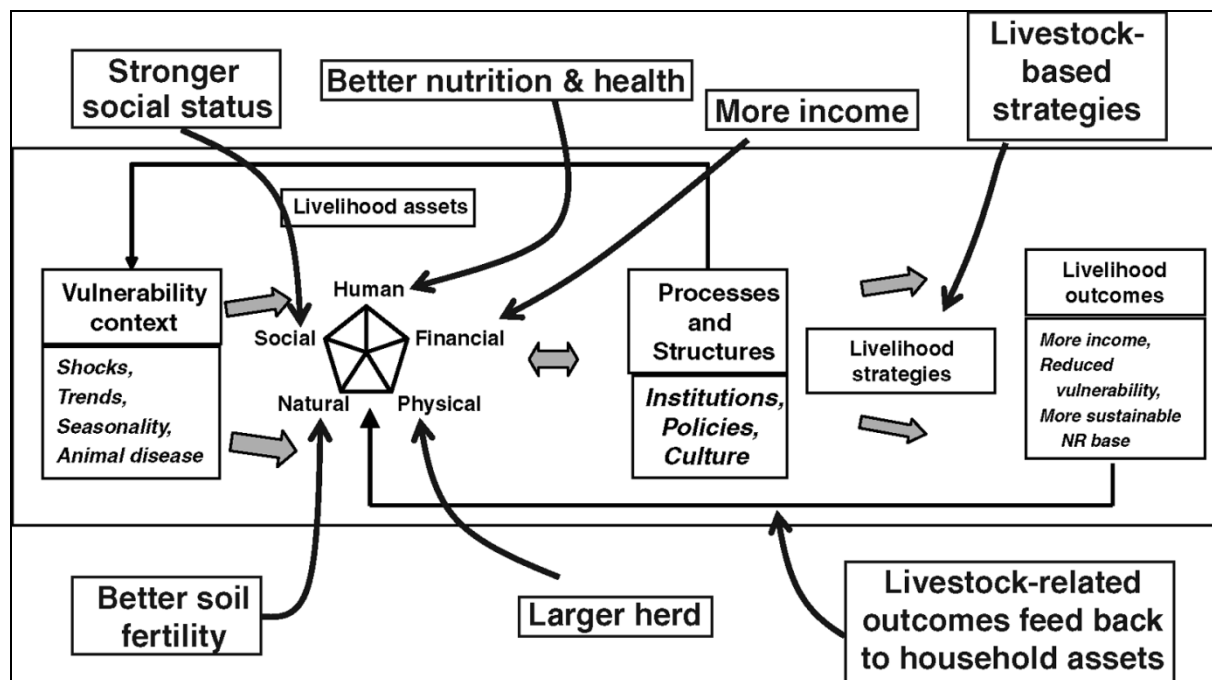


Figure 2: Sustainable Livelihoods Framework (SLF) with contributions of livestock in strengthening the asset base.
Source: Munyai, (2012).

It is clear from Figure 2 that there are multiple interdependencies that mediate the outcomes of this type of livelihood system. Figure 2 shows the centrality of livestock to the farmers and how it affects their livelihoods. There are various connections between livestock and various types of capital as illustrated in figure 2. Manure from their livestock is used to fertilise the soil and that increase their natural capital. Livestock is treated as physical assets therefore larger herd will then result in increased physical capita and better nutrition and health and finally the human capital is improved as people will be given skills and knowledge on animal husbandry and be able to treat their livestock as business (Munyai, 2012:28).

2.4 WHAT IS INDIGENOUS KNOWLEDGE?

Mapira et al., (2013:94) defines indigenous knowledge (IK) as 'The traditional and local knowledge that exists and is developed through the experiences of the local community in the process of managing the conditions or context that challenge the people's everyday life.'

Since it is based on practical experiences, it can be preserved and harnessed for the benefit of both present and future generations, which live in these communities.

Mapira et al., (2013:94) goes further to list the main characteristics of IK as:

- a) A home grown form of knowledge, which is derived from the solution of everyday life problems;
- b) It is part and parcel of a community's cultural practices and ways of life;
- c) Often it is not documented but has passed from one generation to another through oral history;
- d) It is used in solving the immediate problems that confront the community;
- e) As a dynamic form of knowledge, it changes in line with events that may be taking place in a society; and
- f) It is always under scrutiny since it is valued for its ability to solve prevailing problems.

Odora Hoppers (2002:88) also brought IK to bear on the socio-political terrain by arguing that indigenous knowledge is a combination of knowledge systems encompassing technology, social, economic, and philosophical learning, including educational, legal and governance systems. It is knowledge that therefore relates to a wide array of dimensions, that is, the technological, social, institutional, scientific and developmental, including those used in liberation struggles.

IKS constitute the knowledge that people in a given community have developed overtime, and continue to develop. It is the basis for agriculture, food preparation, health care, education and training, environmental conservation, and a host of other activities. Indigenous knowledge is embedded in community practices, institutions, relationships and rituals (Centre for Indigenous Knowledge Systems, 2005:1)

Indigenous knowledge provides the basis for problem-solving strategies for local communities, especially the poor. It represents an important component of global knowledge on development issues (World Bank report, 2005).

CFIK and NRF defines IK as a complex set of knowledge, skills, and technologies existing and developed around specific conditions of populations and communities indigenous to a particular geographic area. IK therefore represents the knowledge that people in a given community have developed over time and continue to develop. It forms the bases of livelihood which encompasses every aspect of life from agriculture, food preparation, health care, education and training, environmental conservation, and a host of other activities. IK is entrenched in community practices, institutions, relationships, rituals and ceremonies (CFIKS, 2009).

A closer analysis of the above definitions led the researcher to conclude that:

- Inherent in most of the above definitions and conceptions of “IK” is the issue of culture, tradition, history, and geographical position of a given community of peoples.
- IK therefore appears to be the “knowledge systems” (encompassing both processes and practices) of people who have lived in a particular place over time, and have shared a common history and culture. It is knowledge that communities have gained through continuous interactions with their environment and interactions between themselves.
- It is also critical to point out that IKS can neither be perceived as unique to Africa or more specifically black Africans, nor to non-western people as is often misconceived by many people (Masuku, 1999:62). It is important to note that across the world we have diverse indigenous communities.

For the purpose of this study, IK is defined as the knowledge within a given community or society. IK contrasts with the international knowledge system associated with universities, research institutions and private firms. It is the basis for local-level decision-making in agriculture, health care, food preparation, education, natural-resource management, and a host of other activities in rural communities.

Most people find it hard to differentiate or understand what constitutes IK and IKS. To better understand this study, it will be essential to understand what differentiates the two (IK and IKS). The next section therefore provides us with an understanding of these two concepts.

2.5 UNDERSTANDING INDIGENOUS KNOWLEDGE SYSTEMS (IKS)

According to Akejni (2009:42), “IKS is a systemic reference to the knowledge and practices of indigenous communities constitutive of their meaning and belief systems, as well as the substantive dimension of their practice and customs. KS is about the knowledge, practices, values, and ways of knowing and sharing in terms of which communities have survived for centuries.”

Moreover, stressed the idea that IKS is the knowledge of indigenous communities, but that goes further in saying that IKS are cumulative, representing generations of experiences, careful observations, and trial-and-error experiments. Within the African context, Akejni (2009:42) stated that IKS are about unearthing and recognising original thoughts and practices of Africans. IK and IKS are important and are shaped by and respond to local needs.

2.6 IMPORTANCE OF INDIGENOUS KNOWLEDGE (IK)

In the emerging global knowledge economy, a country’s ability to build and mobilise knowledge capital is equally essential for sustainable development than the availability of physical and financial capital (World Bank 1991). The basic component of any country’s knowledge system is its indigenous knowledge. It encompasses the skills, experiences and insights of people applied to maintain or improve their livelihood .IK is important to the livelihood of people, a fact that has been demonstrated and argued by the World Bank on a number of occasions (1998 :2).

The World Bank (1998:3) quotes the importance of IK as follows:

- IK provides the basis for problem-solving strategies for local communities, especially the poor; it represents an important component of global knowledge on development issues. IK is an underutilized resource in the development process. Learning from IK by investigating first what local communities know and have, can improve understanding of local conditions; provide a productive

context for activities designed to help the communities; understanding IK can increase responsiveness to clients; adapting international practices to the local setting can help improve the impact and sustainability of development assistance; sharing IK within and across communities can help enhance cross-cultural understanding and promote the cultural dimension of development and most importantly, investing in the exchange of IK and its integration into the assistance programs of the World Bank and its development partners can help to reduce poverty.

IK represents an important component of global knowledge on developmental issues. The World Bank (WB) agrees that IK is an underutilized resource in the development process. According to the WB report (1998/99:3), knowledge and not capital is the main impetus behind sustainable social and economic development. The first step in recognizing this would be building on local knowledge, the basic component of any country's knowledge system. This is because IK provides the basis for the acquisition of new knowledge. For example, the Maasai of Kenya and Tanzania are known to have treated foot-and-mouth disease effectively without killing the animals (Chisenga, 2000:96). Furthermore Chisenga (2000:96) indicated that in 2001, the British economy suffered a serious loss of some twelve billion euro's, as a result of a foot and mouth epidemic that required the slaughter of seven million farm animals.

The National Development Plan points out the importance of skills development in the farming sector whereby value of farmer to farmer skills transfer in order to contribute to developing a new generation of farmers as the literature revealed that IK is passed on from one generation to another by the elderly people. It is against this background that the research will investigate the IK methods used in beef cattle husbandry and document the findings so that the next generation can access the information.

The DST (website) has also reaffirmed its position on IKS in its statement which recognises the importance of IKS and the wealth of this knowledge in South Africa, Furthermore DST has been playing a leading role in the affirmation, recognition, protection and promotion thereof. Apart from the establishment of the IKS Unit in the Department in 2002, it has also been actively supporting research through the

provision of funding to Science Councils and Tertiary Institutions as well as support to non-governmental structures working in the area of IKS.

Although the above may have a positive bearing on IKS, Persens (2005:141) argues that the use of the word “poor” in NUFFIC website suggests that is only for the poor and is not the of benefit to anybody whereas Nyathi (2013:56) stated that IK can be both rural and urban so it all depends on the phenomena that the researcher is investigating at the time.

A great amount of world literature (Akenji, 2009:69) on IK provides evidence that IK is an indispensable contributor to sustainable development. IK is considered part and parcel of the main schedule of local economic development. Nel (2006) as cited by Akenji (2009:69) also stresses that IK has been involved in the improvement of community health systems, healthy community structures, sustainable livelihood and social development. Furthermore emphasises that acknowledging the importance of IK within sustainable development implies the scope of development theory is opened to alternative cultural systems and alternative knowledge is accepted for their contribution. Development does not only rely on scientific and technologically produced knowledge mediated by transfer agencies.

2.7 CURRENT DEBATES ON IKS

The debate over the use of ‘IK’ and its epistemological status in relation to the mainstream scientific and technical knowledge first appeared in the academic literature of the 1980s, both in the social and in the natural sciences. (Lanzano, 2013:101) Furthermore the issue rapidly became widespread in the political debate, especially in the fields of development aid and environmental conservation. Additionally the expression then became popular among scholars interested in environmental issues and in the link between culturally-driven behaviour and ecological balance. Finally for many authors, the concept was a tool to discuss euro centrism in the natural sciences and to acknowledge the positive role of non-Western technical knowledge. (Lanzano, 2013:101).

The debates over the use of IK and WK comes along as highlighted by the arguments made by Agrawal (1995: 413-439) when He said ' When we recognise how these two types of knowledge are similar, we can begin a 'productive dialogue that safe guards

the interests who are disadvantaged. He concludes that, '*Instead of trying to oppose IK and WK, it might be better to accept differences within these categories and find similarities across them.*'

Briggs, (2005:44) when talking about IK and WK, indicated that there is an increasing recognition of the ways in which the complexities of reality, the multiple perspectives of the people involved and the contextualisation of knowledge in time and space must play a role. Indeed, it can be argued that IK has an advantage over western science in the context of poor communities, in that information is tested in the context of survival, and hence is not just true or false in some sort of dispassionate way (as western science might conclude), but is either more or less effective in providing the means of survival, a conclusion more meaningful in the context of everyday existence.

2.7.1 International debates on IK

Akejni, (2009) argues that international interest in indigenous knowledge has emerged in tandem with the politicisation of indigenous groups and indigenous-rights movements. Indigenous people worldwide are demanding the right to be heard in development decisions. Moreover the demand for rights to land and resources to be recognised and officially acknowledged are prominent furthermore some governments such as those of Australia, Canada, Greenland and the United States have mechanisms such as Settled Land Claims and Co-Management Resource Boards that support IK systems. Lastly development practitioners have noticed that development efforts that ignored indigenous circumstances, indigenous technologies, and indigenous systems of knowledge have wasted enormous amounts of time and resources.

According to Scholtz et al.,(2013:79),the Australian beef industry presents one of the best examples of production systems where adapted zebu breeds are utilized through crossbreeding with taurine cattle, resulting in genotypes and synthetic breeds that cope better with the harsh environments, and which could be used commercially in some of the systems in developing countries. It has been reported that the Australian system is evolving as an efficient tool to improve the productive (meat quality) and reproductive (fertility rates) performance of zebu cattle adapted to the harsh tropical climatic conditions similarly, successful dairy and beef programs have been developed in Brazil.

Njirane (2012:65) stated that the main challenges to the management and preservation of IK are issues relating to methodology, access, intellectual property rights, and the media and format in which to preserve it. Underlying these challenges is the question of whether or not to use the Western paradigm for preserving IK. Judging by the discourse and debate among scholars on this issue, it is evident that there isn't one correct answer.

Kaniki and Mphahlele (2002:11) argued that existing intellectual property rights agreements like the Berne Convention on Copyright and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) do not give full and proper recognition to the rights of indigenous and local communities to their own knowledge, innovations and practices. Additionally they also stated that a community that develops and applies particular IK in their culture generally owns the IK and in dealing with the intellectual property, one of the key issues involves identifying the originator or owner of the knowledge in order for them to get what is due to them.

According to Chisenga (2000:96) the Maasai of Kenya and Tanzania managed to treat Foot and Mouth disease without killing the animals and it was in 1981 when the British and France Western Veterinarians learned that the disease spreads through wind as they previously believed that it can only spread when you are in direct contact with the animal.

2.7.2 Beef cattle farming internationally

South Africa produces 85% of its meat requirements, with 15% imported from Namibia, Botswana, Swaziland, Australia, New Zealand and the EU. Local demand generally outstrips production even though there are untapped reserves in the communal farming areas. Cattle ranches are found mainly in the Eastern Cape, parts of the Free State and KwaZulu-Natal, Limpopo and the Northern Cape. Popular beef breeds include the indigenous Afrikaner and Nguni and locally developed Bonsmara and Drakensberger. European and American breeds such as Charolais, Hereford, Angus, Simmentaler, Sussex, Brahman and Santa Gertrudis are maintained as pure breeds or used in cross-breeding (FAO, 2012).

Scholtz et al., (2013) pointed out that most beef cattle production systems in southern Africa rely only on small capital inputs in all forms (human, natural, and physical, financial, social, knowledge, cultural and physiological). This may be the reason why indigenous breed improvement is still complicated but Mapiye et al.,(2013) indicated that development efforts to reintroduce the Nguni breed have been initiated in most rural areas of South Africa, especially in the Eastern Cape. Nguni breed is being reintroduced because of its adaptability to harsh environment and its resistance to disease. The breed also has ability to maintain their condition in winter.

Munyai (2013) reported that the communal lands in South Africa are heavily stocked, often supporting livestock at levels of up to four times the recommended stocking rate. In other words, the veld has often been exposed to heavy grazing for a long period of time. In addition, the areas close to villages are usually more heavily grazed as a result of to higher densities of livestock and the greater numbers of goats, which do not usually forage far from human settlements.

In South Africa, veld fires result mainly from land use activities such as land clearing, pasture management and crop production. However, these veld fires contribute to asignificant proportion of land degradation and emission of greenhouse gases to theatmosphere. Furthermore, fire destroys the resources needed for immediate use during the dry season (Nkomo and Sussi, 2009:38).

2.7.3 Beef cattle farming in Limpopo

Beef farming contributes about 53% of the province's agriculture GDP and 51% of land is suitable for this sector (Oni et al.,2003) Limpopo province has over 5000 commercial farmers farming on 70% land and about 303 000 farmers on the remaining 30% of these, 45000 are small-holder, low-income beef cattle farmers (Oni et al., 2003). However, as Limpopo province is very prone to droughts, this has resulted in many commercial beef farmers moving to game farming which has fewer risks in the late 1990s. This trend was enhanced by a tourism boom. Limpopo province beef farming is mainly at the primary level with communal and commercial herds of 731 295 and 432 058 animals respectively (Department of Agriculture 2006).

According to South African Weather Service (SAWS) August 2014 report, Limpopo was the province received below normal rainfall. Grazing is poor in Mutale, Blouberg, Lephhalale, Maruleng, Thabazimbi, Musina, Letaba and Fetakgomo Local municipalities. Livestock conditions are fair to poor. Frost damaged tomatoes and other cash crops and there were incidents of veld fires in Polokwane and parts of Mopani. The average level of dams was at 89% in 2014 as compared to 71% of 2013 during the same period.

Statistics SA Agricultural Household Census (2011) confirmed categorised the number of cattle owned by each household as follows: 1-10 cattle owned per households were 69 089, 11-100 were 27 713 and lastly those who owned more than 100 cattle accounted for 759.

2.7.4 Use of IK on beef cattle husbandry

IK is a society-based knowledge that people use to differentiate local-level knowledge from the global knowledge that has generated over the past centuries. In agriculture, it provides the basis for decision-making by the vast majority of the world's farmers who operate outside the capital intensive, high external input approaches that characterize many large-scale farm enterprises Altieri,(2002); Thapa,et al.,(1997).

Diseases are one of the major constraints in cattle production because they lower productivity; decrease the rate of regeneration and increase the risks of transfer of these diseases to the final consumers (Adekunle, Oladele and Olukaiyeja, 2002). The indigenous methods of control of pests and diseases include constant and low costs but at most times are curative. The emphasis throughout the world is prevention as found in modern medical care such as the use of vaccines, although where these are available, they are supplied irregularly and sometimes in insufficient quantities.

Livestock farmers in the rural areas of Limpopo province depend on natural pastures and forages usually found in communal grazing area (Matlabyane,et al., 2010). Due to lack of standardize feeding management practice these results into overgrazed and therefore cannot provide adequate nutrients for good level of productivity among the livestock. Additionally, poor productivity also results during the dry season when there

is low quantity and quality of available forages that cannot meet nutrient requirements of grazing livestock in Limpopo province (Matlabyane, et al., 2010).

Jooste (2001) noted that livestock farming is a tradition within South African rural systems. It is therefore not a coincidence that the Integrated Sustainable Rural Development Strategy (ISRDS, 2004) identifies livestock farming as the agricultural enterprise with the most likely chance of improving household food security and addressing poverty alleviation in the small-scale communal farming areas of South Africa. This is particularly important considering that a third of livestock in the country is owned by small-scale farmers.

2.7.5 South African debates about IK

Zazu (2007) explained that The Southern African Network on Indigenous knowledge Systems (SARNIKS), formed in 1996 was part of the region's efforts to promote indigenous knowledge research and part of SARNIKS's work, other than to promote the documentation of the IK, was to explore how these knowledge systems can be used in environmental education processes. Part of this research's strength is drawn from this argument as its going to investigate the use of IK by farmers in pasture management.

Mosimege (2005:1) indicated that management of IK in South Africa seems promising, as attested to by the presence of an IKS policy and various governmental structures developed to promote, preserve, protect and disseminate IK. South Africa's involvement in IK was formally initiated in September 1996, when the Council for the Scientific and Industrial Research (CSIR), with the support of the Portfolio Committee of Arts, Culture, Science and Technology, commissioned nine historically disadvantaged universities to conduct audits of indigenous technologies.

The national recognition of IK in South Africa is also reflected in the work of the NRF. The objective of the NRF is to support and promote research through funding, human resource development and the provision of necessary research facilities, in order to facilitate the creation of knowledge, innovation and development in all fields of science and technology. The NRF was established through the NRF Act (Act No. 23 of 1998). It took over the functions of the research funding agencies that were in operation previously. Being an independent agency, it provides services to the research

community especially at higher education institutions (HEIs) and science councils with a view to promote a high level of human capacity development.

Seleti (2012:3) argued that SA's current legislation did not adequately protect IK. Although there was consensus that it should be done, it was unclear on how it should be done. Moreover, in the existing Intellectual Property rights system, the focus of the DTI was on statutes for copyrights, trademarks and designs, but IK was not purely commercial in nature nor was it even tangible. Furthermore new and more appropriate legislation should be passed, not necessarily to compete with existing Acts but to complement them. One can also say, developing such a system required consensus from all Intellectual Property stakeholders and should take into account both the moral and economic rights of the knowledge holders.

The challenge affecting documentation of IK, is addressing copyright and intellectual property rights issues that are included in the United Nations Declaration on Rights of Indigenous Peoples (United Nations Permanent Forum on Indigenous Issues, 2007). Moreover the challenge to the protection of traditional creative expressions is that copyright is Eurocentric, placing emphasis on individuality and material, contrary to traditional and indigenous cultural norms (Greyling & McNulty, 2011).

Lastly Emery (2007) also argues that Intellectual property rights attempt to protect the ownership of the intellectual content of the works of an individual or a legal entity. This concept is complicated when traditional knowledge is involved. By its very nature, traditional knowledge is communal, not personal. Legislation concerning intellectual property rights is able to protect traditional knowledge only when it can be identified as belonging to a person or some group of persons who specifically developed the knowledge.

Contributing to the debate on IK, Ncube, (2012) argues that this knowledge offered succeeding generations the path of knowledge that informs their heritage. Moreover in the 21st century, Africans need to adapt to their IK and skills in order to survive. The survival is not just about physical existence but also about maintaining local worldview and environment.

According to Clark et al., (2010) it is needed for the negotiation process to deal with the tensions that arise at the interfaces between actors with different views of what constitutes reliable or useful knowledge; those tensions must be managed effectively if the potential benefits of knowledge are to be realised by society. Scholars have recognized that while bridging Indigenous and science based knowledge systems is both important and necessary, the difficulties involved should not be underestimated (Folke, 2004, Berkes,2009). Case study evidence (Berkes et al.,2000,Kennett et al. ,2004) points to a range of barriers to bridging different knowledge systems. Structural barriers include power differences (Brosius, 2006), domination of decision making by governments (Davis 2006, Hill et al., 2012), as well as scientists' lack of respect for IK (Agrawal, 2002, Gratani et al., 2011).

Cognitive barriers have also been identified and include the absence of a common means of validating knowledge claims (Natcher et al., 2005) and the absence of a common language and a shared worldview (Bowman & Robinson, 2002:75). The task of knowledge integration is therefore one of situated engagement, "a means of approaching interactions in which engagement between people has to occur in situated places and concepts and practices become reliant on situated circumstances for their relevance and meaning" (Howitt &Suchet-Pearson 2006:332, Robinson, C. J., & T. J. Wallington. 2012).

Gadzirayi et al., (2006) noted that people in a community value whatever resource they get from the environment through sustainable production systems. These communities are conscious of the need to self-reliant in capital stocks and management skills. In addition, the knowledge of local people was an enabling component of development. In this regard; a large percentage of the earth's genetic diversity has been maintained and managed through farmer's IK. Moreover, IK often forms the basis for agricultural production that has been sustained for generations.

According to Owiny et al., (2014), Indigenous communities use oral communication and hands-on experience (apprenticeships, ceremonies, practice, etc.) to preserve and transmit their knowledge. However, young people are losing these skills, because they spend more time at educational institutions (Western) than with the teachers (elders) in the community. Preservation of IK is critical, because it ensures the

continuation of the community and its knowledge. If IK is not recorded and preserved, the knowledge will be lost through the death of elders and traditional leaders in African communities and will remain inaccessible to other communities, scholars, and development workers.

The study sponsored by United Nations Environment Programme (UNEP) in 2008 comprised Kenya, South Africa, Swaziland and Tanzania have concluded that the communities have well developed IKS covering practically every aspect of life from food production and health care to nature conservation and natural disaster management. Furthermore, IKS are culture specific and have evolved over time to cope with particular environments. While the systems may differ in detail, depending on local culture and environment, they share similarities and common challenges. But the major challenges facing IK is the increasing pressure on land. In many cases people have now started to violate some of the traditional rules that enabled the communities to conserve nature and its biodiversity and live harmoniously with it.

An important step towards the growth of IK is through the integration of IK in institutions of higher learning. Kaya (2004:1) outlines an IKS academic programme offered at the North West University. The programme was among various other new learning, research and community outreach programmes launched in 2001.

Emery (2000) argues that IK is more than a simple compilation of facts drawn from local, and often remote, environments. It is a complex and sophisticated system of knowledge drawing on centuries of wisdom and experience. It also constantly grows and changes with new information. To use this sophistication one must include the indigenous peoples themselves as practitioners.

2.7.6 Disease treatment and control using IK

Ethno-medicine is a set of empirical local practices on the basis of IK of a social group often transmitted orally from generation to generation. Ethno-medicinal knowledge on plant resources has been constantly diminishing because of changing perception of the local people, increasing influence of global commercialization and socioeconomic transformation (Gadgil et al., 1993; Kunwar & Adhikari, 2005).

It is suggested that disease control should be based on the geographical area since vegetation zone also influences the kind of disease prevalent in an area. For instance, another study undertaken in South Africa (Mabombo et al., 2003) showed that EVM practices were not sufficiently or completely documented in existing studies since many more other plants were found in the same area already documented by Masika et al., (2000).

According to Pfeifer and Butz (2005), ethno botanical knowledge and practices within any culture vary by geographical origin, residence, ethnicity, religion, age, and gender. Thus, EVM practices are locality and culture specific making generalisation of results from one area to another is not an option. This has also an implication on plant conservation strategy since policies or determination on threat or overuse might not have considered this undocumented use in EVM.

Scholtz et al., (2013), argues that the altered patterns of diseases in animals are a significant and permanent threat as a result of climate change. The scholars indicated that there is emergence of new diseases and also a change in the prevalence of existing diseases, particularly those spread by biting insects. Therefore animals will be exposed to different parasites and/or diseases, as indicated by the predicted change in the distribution of, for example, the Tsetse fly in Africa; putting an even greater pressure on production and the survival of livestock breeds

2.8 THE SOUTH AFRICAN FARMING SECTOR

In South Africa, stock farming is the only viable agricultural activity in a large part of the country. Approximately 69% of South African agricultural land is used for extensive grazing. Cattle production have increased by nearly 1 million heads from 12.6 million in 1994 to 13.5 million in 2004 and areas for grazing declined owing to expanding human settlements and other activities such as mining, crops, forestry and conservation. Beef cattle producers vary from highly sophisticated commercial (who rely on high technology) to communal subsistence producers (who rely on indigenous knowledge and appropriate technology (National Department of Agriculture report, 2011).

Land is regarded as a very important commodity and is used for farming, which provides food, a living space, and can also be seen as a sign of wealth and success.

Even though it is said that “in the South, land was not regarded as a commodity, but formed a fundamental part of the community’s universe and sense of identity in material and spiritual terms” (Akerjini, 2009), it is divided into a number of farming regions according to climate, natural vegetation, soil type and farming practices.

According to Statistics South Africa Agricultural survey (2011), less than a quarter of South African households (33%) are involved in agricultural production, with those involved in agriculture engaged mostly in the production of food and grains (43.4%), fruit and vegetables (30.1%), poultry (43.9%) and livestock (49.4%). Most crop production takes place in backyard gardens (87.6%).

Livestock is the largest agricultural sector in South Africa, with a population of some 13.8 million cattle and 28.8 million sheep. Stock breeders concentrate on the development of breeds that are well adapted to diverse climatic and environmental conditions (Akerjini, 2009).

Numerous researchers, including Munyai, (2012), Hashe, (2011) and Nengovhela (2010) support the concept that livestock production fulfils a multipurpose role in developing environments. From an economic perspective, livestock contributes to food supply, cash income, traction and fertilizer. Furthermore, livestock constitutes a valuable asset portfolio and investment opportunity while, from a social perspective, livestock builds relationships, addresses gender imbalances and allows the distribution of benefits. Furthermore, the natural environment becomes increasingly relevant, as livestock owners are expected to fulfil an important stewardship role in sensible resource utilisation.

2.9 VELD MANAGEMENT

Communal grazing prevails in most of Central and Southern Africa, India and South East Asia. Communal lands grazed by animals are usually associated with adjacent croplands with animals grazing the communal pastures in the growing season and the cropping lands in the dry season. The availability of crop residues and crop by products in the dry season enables high numbers of animals to be kept, with corresponding high pressure on the communal lands. (Munyai, 2012)

The current grazing policies in southern Africa (for example, TGLP of Botswana) were based on the assumptions that ranches would promote sustainable land use and conserve rangeland resources. However, current evidence suggests that rangeland degradation is occurring in both communal and ranching lands (Vanderpost et al., 2011). This had led to others arguing that the current grazing policies had failed to address the land degradation problem and had instead exacerbated it (Rohde, et al., 2006).

In addition, the communal grazing land which supports the large population of livestock continues to shrink in size as more land is demarcated into ranches (Boone, 2005). Subsequently, grazing pressures have intensified in communal grazing land (Bennett et al., 2010) especially since owners of private ranches continue to use communal grazing land in addition to their ranches furthermore taking into consideration that the limited land currently available for grazing by pastoral communities, the existing policies need thorough revision and dual grazing rights to the farmers allocated ranches should be eliminated. This would address the current inequity of land distribution, which could ultimately threaten the sustainability of the entire savanna ecosystem (Eriksen and Watson, 2009a). Kgosikoma, (2013) suggests that they should consider the interaction between actors; peasants and herders; “the cow feeds the grass, the grass feeds the cow”.

According to Van de Ven et al., (2003), South Africa most beef herds are kept on pastures. Thus grazing management forms an important and integral part of the production system .Moreover the production outputs from these systems are highly dependent on climatic conditions, veld type and stocking rate. Furthermore veld type is a relative constant factor at farm level while climatic conditions are dependent on prevailing weather systems and thus both out of the control of the farmer.

Ndou et al., (2011) raises concerns that most of communal grazing is uncontrolled and continuous grazing are common and most communities are overstocked since the ownership of grazing is communal so lack of ownership to the field does not exist. The cattle, therefore, lose body condition, particularly in winter and spring. Cross et al., (2004) cited by Ndou et al.,(2011) recommended that to maximize production, anticipation of the area to be allocated for grazing, the area to be set aside to cope

with weather fluctuations and the quantity of supplementary feeding needed, is required. Aliber et al., (2009) argued that the natural resource base is being depleted as a result of the mismanagement of the commons. There is extensive and unmanaged harvesting of firewood and overgrazing of livestock as grazing areas were seldom rotated.

Choocharoen et al., (2014) argued that cattle rearing can actually decrease the competition between agricultural and forest land use because it lowers the risk of income losses in times of crop failure as it is used as insurance. Furthermore they serve as traditional fertilizers as the dry dung is hauled by farmers to their crop fields, the overnight kraaling of livestock in mobile kraals helps to not only break the soil crust and integrate organic matter into the soil surface but also adds nitrogen rich fresh dung and urine, hair and saliva. Lastly the kraal is moved after five to seven days to prevent over-fertilization and compaction (FAO 2013).

Nengovhela (2010:48) concluded that insufficient feed supply in terms of both quantity and quality is the major cause of poor livestock production in the communal area. Winter or dry season is the time when the feed is in shortest supply. After harvesting, animals are allowed to forage randomly on crop residues in the arable areas. Cattle are often sold in an unfinished state straight from the veld and this, in turn, results in a reduced income, often below cost.

According to Du Toit (2003:101) stated that grazing capacity is used in instances in which the goal is the sustainable management and use of natural veld utilised by grazing domestic livestock. However, grazing capacity varies from farm to farm and even from place to place on one farm. It also varies according to the weather conditions during the different seasons. Grazing capacity is expressed as hectares per animal unit (ha/LSU). Knowledge of the grazing capacity may assist farmers to formulate a sound veld management plan that will provide for the needs of livestock and also ensure the sustained productivity of the veld plants.

2.10 CRITIQUES OF IK AND DEVELOPMENT

Although the World Bank, UNESCO and other multilateral organizations have created databases, websites, and documents to raise awareness and mainstream or integrate IK, their initiatives are still critiqued by many scholars. These scholars mainly argue that international development organizations are not appropriately institutionalizing IK and acknowledging its dynamic characteristics

Agrawal, (1995) specifically questions whether IK is appropriately captured and represented in these institutions. He mainly attacks databases, where most forms of IK are stored at an international level, and argues that knowledge is organized into databases and institutionalized solely based on the biases of the development practitioner or database manager. He believes that these development practitioners or database managers simply use their positions of power to authorize and validate what IK should be institutionalized. Therefore, only some forms of IK are highlighted in international development and they are organized based on the interests of the development practitioner or database manager. In addition, he notes that data basing IK simply highlights their differences to conventional knowledge. Rather, he suggests that similarities should also be showcased.

Akejni ,(2009) argues that IK functions best at a local or community level and believed it should not be scaled up to global levels. Furthermore they suggest that IK is not effective at an international level and believe that development results (using indigenous knowledge) are seen mainly in small-scale NGOs or work conducted at a grassroots level.

They write that successful small-scale efforts should not be used to inform or develop international development practices or policies because IK becomes de-contextualized and ineffective when separated from its environment. In addition, they note that it can take several years to understand how IK can inform development projects in one local area. Unfortunately, at the international level a comprehensive understanding of IK is lacking as international guidelines follow different time lines for their work and expect faster development results.

2.11 GOVERNMENT STRATEGIES TO ASSIST BEEF FARMERS

- a) Comprehensive Agricultural Support Programmes (CASP) - which provides among others marketing infrastructures at village level, fencing material to camp communal grazing areas, fix water reticulation on land reform farms.

- b) Black Economic Empowerment (BEE) program - which encourages business partnerships with established farmers, agribusiness and all service sectors like auctioneers (Department of Agriculture 2005b). The other important available avenue under this program is mentorship which expects neighboring commercial farmers to mentor these farmers through farmer-to-farmer training methodologies (Department of Agriculture 2005b).

- c) The land reform program is also providing more grazing to the 5.7 million herds through the SLAG, LRAD and land restitution programs despite their problems.

- d) Micro financing scheme through a program called MAFISA (Micro Agricultural Finance Schemes of South Africa) which provides credit for a low-income farmer (Department of Agriculture 2005).

2.12 CONCLUSION

This chapter presented the review of literature on IK, IKS and its use on beef cattle husbandry. It started by giving its definition, the understanding of the IK as a concept and its importance to beef cattle farmers. The conceptual framework was also presented to define the key concepts that guided the study. It also focused on the review and the success and failures of the use of IK in beef cattle husbandry internationally, beef farming in Limpopo was also presented followed by the use of IK in beef production, South Africa was also presented. The last part of the literature presented the critiques and strategies used by the government to assist farmers. In the next chapter, the different types of research approaches, methods and techniques of relevance to this study will be discussed.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 THE AIM OF THIS CHAPTER

The aim of this chapter is to provide an outline of the research methodology applied in collecting and analysing both the primary and secondary data in this study. It focuses on the description of the study area; theoretical background on the research design and its rationale; a description of the population and sampling procedure; and an indication of the research process followed in collecting and analysing data in this study. The last section of this chapter contains the data analysis techniques applied and the ethical consideration adhered to in conducting this study.

3.2 THE RESEARCH DESIGN PROCESS

Research designs are plans and the procedures for research that span the decision from broad assumptions to detailed methods of data collection and analysis (Cresswell, 2009). Furthermore it can be viewed as a plan or strategy which moves from the underlying philosophical assumptions to specifying the selection of respondents, the data gathering techniques to be used and the data analysis to be done (Maree, 2010) Welman and Kruger (2005) describe research design as “a plan for collecting and analyzing data in order to get answers to the research questions”. A research design is “the plan and structure of investigation so conceived as to obtain answers to the research question”. It includes “an outline of what the investigator will do from writing hypotheses and their operational implications to the final analysis of data” (Cooper and Schindler, 2011).

The study also presents the challenges encountered during the data collection process. Creswell (1994:2) views the qualitative research method as “an enquiry process of understanding a social human problem, based on building a complex, holistic picture, formed with words, reporting views of information, and conducted in a natural setting”. Qualitative research as a research methodology is concerned with understanding the processes and the social and cultural contexts which underlie various behavioural patterns and is mostly concerned with exploring the “why” questions of research. It further studies people or systems by interacting with and

observing the participants in their natural environment and focussing on their meanings and interpretations (Maree, 2010:51). Qualitative research is defined simply as an empirical research where the data are not in the form of numbers (Punch, 2014:4). Due to the fact that qualitative method works with subjective information and observation to investigate the context, it comes to the end with wider understanding of the entire situation.

Hofstee (2006) stated that if one undertakes qualitative research, one needs to try to present the data with „open minds“ and realize that all data are “value laden”. The qualitative researchers acknowledge that the researcher and the study are intimately connected and that the researcher cannot be completely objective. The research therefore will be descriptive and explanatory in nature. The information and knowledge acquired will emphasize the participants' perspective and beliefs.

The study have used phenomenological approach as a research design within a qualitative paradigm which its purpose is to establish the essential attributes of a given phenomenon, ideas or objects without which, in the eyes of the beholder, such phenomena, ideas or objects cease to be known as such (Mawila, 2007:7). The view in phenomenology is from what the researcher observed, which not reality is as such, but an interpreted reality (Milondzo, 2003:42). What is vital is that, what appears in the consciousness to the researcher could be different to that which appears to the people constituting the research sample. It implies that the researcher must engage in an investigation which seeks to determine how a given phenomenon appears and is construed to be by the research sample. Poor reliability of the findings in those two researchers may arrive at different conclusions based on their observation of the same phenomena.

3.3 GEOGRAPHICAL AREA OF THE STUDY

The study was conducted in Tshebela area and the area consists of six villages, namely: Ga-Mogano, Tshebela, Mamatsha, Ramperi, Boshega and Marepathekong and all these villages falls under Polokwane Local Municipality. Given the nature of the study, Tshebela and Ga-Mogano village was chosen as the area of study because those are the village where indigenous knowledge is still used in the management of beef cattle. The municipality is located in the Capricorn District Municipality of the

Limpopo Province; South Africa. It covers a surface area of 3775 km² and accounts for 3% of the Province's total surface area of ±124 000 km². In terms of its physical composition Polokwane Municipality is 23% urbanised and 71% still rural. The remaining area (6%) comprises small holdings and institutional, industrial and recreational land (Polokwane Municipality IDP, 2011/2012).

3.4 POPULATION

Welman and Kruger (2005:52) describe the population as “the study object which consists of individuals, groups, organisations, human products and events or the conditions to which they are exposed”. It encompasses the total collection of all units of analysis about which the researcher wishes to make specific conclusions. Babbie and Mouton (2003) defines target population as that group of people, items, objects, or elements who meet the designated set of criteria for the study and about whom one wants to draw a conclusion or conclusions. It is also known as “a well-defined collection of individuals or objects known to have similar characteristics” (Creswell *et al.*, 2007).

According to the LDA report (2014), the total number beef farmers in the in the two villages of the study area was 207 and on average each farmer is owned a minimum 5 beef cattle and above. Given the focus of the study, only 52 farmers acknowledged that they use IK in management of their livestock. Therefore population of this study comprises 52 traditional beef farmers at Tshebela and Ga-Mogano village and lastly two herbalists who were also key informants. Both the beef farmers and the herbalists were targeted because they are believed to be custodians of IK and could provide information required to accomplish the research objectives of the study.

3.5 SAMPLE SELECTION PROCESS

A sample in research refers to “a group of people, objects, or items that are taken from a larger population for measurement” (Welman and Kruger, 2005:275). Two types of sampling procedures can be identified, namely (i) probability and (ii) non-probability sampling. Probability sampling determines “the probability that any element or member of the population will be included in the sample, while non-probability sampling by contrast, cannot specify the probability that any element or member of the population will be included in the sample” (Welman and Kruger, 2005:56). Simple

random sampling, stratified random sampling, systematic sampling and cluster sampling are some examples of probability sampling (Welman and Kruger, 2005). Examples of non-probability sampling are “accidental sampling, quota sampling, purposive sampling, snowball sampling, self-selection sampling and convenience sampling” (Welman and Kruger, 2005:68-69).

3.5.1 Sampling criteria

Purposive sampling, also known as judgmental sampling, is an on-probability sampling technique in which the researcher uses a wide range of methods to locate all possible cases of highly specific and difficult-to-reach populations (Neuman, 2006:222).

Purposive sampling is based entirely on the judgment of the researcher, meaning that the sample is composed of elements that contain the most characteristic, representative or typical attributes of the population (Singleton et al., 1988:153). This sampling technique is used when the researcher relies on his/her experiences or previous research findings to deliberately obtain units of analysis in such a manner that the sample they obtain may be regarded as being representative of the relevant population (Qhosola, 2011:49).

The purposeful sampling method is a non-random method of sampling in which the researcher selects ‘information-rich samples’ for study in depth (Patton 1990:169). Information-rich cases, according to Patton (2002:243), strategically and purposefully determine the number of cases, depending on study purpose and resources. Bernard et al., (2000:176) state: ‘In purposeful sampling, you decide the purpose you want the informants to serve and you go out to find some relevant samples to meet that need.’

The total population of traditional beef farmers using IK was fifty two (52) in both villages. Ga-Mogano village had twenty (20) beef farmers while Tshebela had thirty two (32) traditional beef farmers. The sample drawn from the target population was twenty seven (27) and fifteen (15) participants was from Tshebela village followed by twelve (12) which was from Ga-Mogano village. This was done because of the way these farmers used medicinal plants to cure their beef cattle, hence the researcher used purposive random sampling. Moreover, the identification process of the

participants was also based on the discussions held within the two (2) villages, ten (10) and ten(10) participant were purposefully selected per village respectively.

Furthermore, identification of the participants was based upon prior discussions with community leaders and local extension officers of each village in the area of study. Lastly purposive sampling enabled the researcher to select those participants who had much information and could articulate and explain issues with regard to the patterns used on indigenous knowledge of beef cattle husbandry in Tshebela village in Limpopo Province.

3.6 DATA COLLECTION METHODS

3.6.1 Primary data

Primary data is the original data collected and analysed for a specific research aim (Streubert and Carpenter, 1995; Hox and Boije, 2005). For the best research results of the qualitative study, a plurality of data collection methods that includes focus group discussions, key informant interviews, and observations was used (Bless & Higson-Smith, 2000:105-109; Davids et al, 2005:174-175).

3.7 DATA COLLECTION INSTRUMENT

3.7.1 Focus group discussions (FGD)

According to Krueger and Casey (2000) a focus group discussion is a qualitative data collection tool containing a series of discussions themes and questions that are designed to obtain perceptions of participants in a non-threatening situation. The specialty of focus group discussions is that the researcher listens not only for the content of focus group discussions, but also emotions, ironies, contradictions, and tensions. This enables the researcher to learn or confirm not just the facts, but the meaning behind the facts. It also requires that the researcher redirect the conversation if it moves too far from the research topics (Dunn 2005).

The focus groups consisted of between five (5) and fifteen (15) respondents who were interviewed together in each group (Rusten, 2010). In total two (2) focus group discussions were held in Tshebela village. The participants were traditional farmers from Tshebela village which included farmers and herbalists. The data collectors

facilitated the focus group discussions using an interviewing schedule. Focus groups were particularly important as they captured discussions on agreements and disagreements by the group which helped explore the topic further thereby producing a much deeper understanding of the problem (Bless & Higson-Smith, 2000:110). In addition focus groups provided an opportunity for the participants to learn from each other. The following protocol was recommended to participants:

- Sepedi was the only language used as the medium of communication;
- All participants were be given an opportunity to voice out their views;
- Participants were allowed to agree or disagree;
- Minimised distractions such as side talks and answering cell phones;
- Each focus group discussion lasted not longer than 2 hours.

The farmers had to sign a consent form before the facilitator could proceed with the interview. The consent form served as proof that the farmer agreed to be interviewed and as reassurance that none of their personal information would be used for any other purposes outside of this study.

By design only one focus group was interviewed per day and three groups were interviewed on weekly basis which took a month to complete the discussions. After each interview, the principal researcher met with each data collector to discuss the questions and responses. This not only allowed for the immediate translation of the responses but it also permitted the extraction of additional information about data collection method, correction of mistakes and interpretation of local language usage.

3.7.2 Semi structured interviews

Because phenomenological research aims to examine the perception of the participants and find out how they make meaning of the world around them, therefore it requires flexible methods of data collection (Smith and Osborn, 2008). In this study the researcher opted to use semi structured interviews with key informants. Matthew and Ross (2010) describes that semi structured as interviews that involves a series of open ended questions asked to participants with the aim of facilitating the participant to give their own version of the use of IK in beef cattle husbandry in the area. Smith,

Flowers and Larkin (2009) add this method of data collection enables the researcher to create rapport with participants.

In this study, the facilitators used semi structured interviews with the aim to: but the interview will be guided by the schedule rather than be dictated by it.

- Create rapport with the participants;
- To free in probing for interesting areas that arise during the interviews;
- The interview can follow the respondent's interests or concerns.

The researcher planned to use semi-structured interviews with the herbalist within the sampled population as key informants who were elderly and possess more were knowledge on indigenous farming practices. The key informants were asked to provide their history in relation to the use of IK in beef cattle husbandry and in general, their way of life and how each one of them practices agriculture. Their homesteads were also observed and described in detail. Information collected provided a detailed and wider perspective of indigenous farming practices used by the key informants.

3.7.3 Observation

Observation as a data collection technique was used to observe the grazing land allocated for the livestock farmers in order to see the veld condition, tress that the farmers use for ethno veterinary purpose and the type of pastures that are available in the area for livestock feeding. The areas were recommended by Key informants and FGDs participants as they were of interest to them. As Tjora, (2006:432) suggests, comprehensive field notes such as "(i) the physical setting, (ii) the participants and their roles and tasks, (iii) formal interactions, (iv) informal interactions, (v) the social actors' own interpretations by informal conversation and formal interviews and (vi) photographs" were taken during observation. Observations were recorded immediately to avoid the possibility of distortion and unintentional misrepresentation. Notational conventions such as quotation marks around recorded material were used to indicate exact recall as noted by Nachmias and Nachmias (1996:292).

3.8 PROCESS OF DATA COLLECTION

3.8.1 Request for permission to conduct research

The researcher notified the responsible tribal authority in Tshebela area about the reasons and aims of the study in accordance with the national law of information and communication retrieval (See appendix A).

3.8.2 Recruitment of respondents and field-workers

Traditional beef farmers and herbalists were selected from Tshebela village. These included all 27 beef cattle farmers who were elderly and also 2 herbalists who were more knowledgeable about beef cattle husbandry. Prior to selection, a meeting was held with residents of the villages to introduce the purpose of the study and identify willing farmers but in a purposeful manner. Thereafter key informants were identified by the farmers at their monthly meeting and the researcher was informed by the Headman of Tshebela village.

3.8.3 Training of the field-workers

The researcher used two facilitators to help with the data collection. The facilitators were chosen from the Tshebela area with the assistants of the Tribal Council. The training of the field workers commenced two weeks before the actual date of data collection. The training entailed:

- Familiarisation with the research study's aim and objectives;
- Interview techniques and data collection using FGD, semi-structured interviews and observation.

3.8.4 Appointment with the respondents

Appointment was made prior the commencement of the discussions with the respondents and it was done through the tribal office.

3.8.5 Conducting interviews

Each facilitator obtained permission from the FGD participants to take an audio recording of the discussions before the discussion started. There was no objection from participants to record the discussions since the topic was not a sensitive one.

The facilitator then established a focus group discussion protocol together with the participants (Davids et al, 2005:13).

In order to maximise return rates, interviewing schedule were designed to be as simple and clear as possible, with targeted sections and questions. Most importantly, interviewing schedule was made to be brief with eighteen number of question.

3.8.6 The use of tape recorders

Smith et al., (2009) point out that it is necessary to decide to tape-record the interview and it is not possible capture the verbatim the views of the participants without tape recording them. Corden and Sainsbury (2006) add attempts to write down everything the participant is saying during the interview without using a voice receding device will lead to the loss of the cream of the information and consequently misinterpretation of the message intended.

3.9 DATA ANALYSIS

Data analysis entails the process of bringing order, structure and meaning to the mass of collected data (De Vos, 2005). In-depth data analysis involved using appropriate techniques such a mind mapping to reduce the data, and organizing it into themes, patterns, trends, and relationships that are easier to understand. Interpretation of data involved extracting meaning and integrating views of other authors into something new such that the final product was not mere rewriting of existing knowledge but new knowledge drawn from findings and conclusion (Nachmias and Nachmias, 1996; Brynard & Hanekom, 1997; Mouton, 2001).

An interpretative phenomenological-based approach analysis method was used to highlight the experiences of the group as presented in the group discussions. According to Smith et al., (2008:58) the main aim of an interpretative phenomenological analysis is to attempt to "...understand the content and complexity of those meanings rather than measure their frequency and explore in detail how participants are making sense of their personal and social world". The researcher adopted the six steps of interpretative phenomenological data analysis as stipulated by Biggerstaff & Thompson, (2008:11), namely:

Table 3.9.1: Steps on interpretative phenomenological data analysis.

Steps	Activity	Description
1.	Familiarisation with data	The researcher repeatedly read the participants' descriptions until the researcher is familiar with what has been said.
2.	Highlighting meaningful phrases	The researcher re-reads the data, identifying and highlighting meaningful phrases, statements or words that seem to be important for the phenomena being studied.
3.	Statements noting	The researcher then notes each significant statement relating to the research question.
4.	Statements organization	The researcher organises different statements into themes. Similar themes are identified and grouped together.
5.	Theme linking	The researcher linked the themes and then describe and summarise them
6.	Comparisons	The researcher group similar ideas into themes and compare them.

Source: author's contribution.

3.9.1 Data management

After each interview, the principal researcher met with each data collector to discuss the questions and responses. This not only allowed for the immediate translation of the responses but it also permitted the extraction of additional information about data collection method, correction of mistakes and interpretation of local language usage.

3.10 MEASURES OF TRUSTWORTHINESS

3.10.1 Credibility

According to Houghton, Casey, Shaw and Murphy (2013:13) credibility in qualitative research involves establishing whether or not the results of qualitative research are believable from the perspective of the participant in the research. The following strategies were used to ensure accuracy and credibility of the study.

3.10.2 Member Checking

According to Bradbury-Jones, Irvine and Sambrook, (2010: 26) "...member checking is a key feature of phenomenology study". Rubin and Babbie (2008) defines member checking as a process of providing feedback to the participants either during or after the process of the data collection. Harper and Cole, (2012: 510-17) identifies the importance doing member checking as:

- To offers participants the opportunity to assess what intend by providing certain more information;
- To give the participants the opportunity to correct and challenge what may be perceived as misinterpretations;
- To allow the participants to give further information;

In this research study, to ensure member checking was done during the FGDs. This was done by repeating and summarising the narratives of the participants to determine accuracy.

3.10.2 Confirm-Ability

According Houghton, Casey, Shaw and Murphy, (2013: 13) conform-ability "...refers to the neutrality and accuracy of the data". In this study conform-ability was done following the activities as outlined in the table below.

Table 3.10.1:1 Activities for conform-ability

Activity	Description
Raw data assessment	Written field notes, documents, survey results.
Data reduction	Writing-ups of field notes, summaries and condensed notes, theoretical notes such as working hypotheses, concepts, and hunches.
Data reconstruction	Developing themes, findings and conclusions, final report.
Intentions and characters	Inquiry proposal, personal notes, expectations.
Instrument development	Documenting the process followed in developing the instrument for data collection.

Source: author's contribution

3.11 ETHICAL CONSIDERATIONS

The goal of ethics in research is to ensure that no one suffers adverse consequences from the research activities (Cooper and Schindler, 2006:117). Therefore the following steps were undertaken to satisfy these ethical requirements.

3.11.1 Permission

The researcher notified the responsible tribal authority in Tshebela area about the reasons and aims of the study in accordance with the national law of information and communication retrieval. The researcher also notified the subjects about the aims and objectives of the study and made sure that the environment for the study was secure, conducive and appropriate.

3.11.2 Confidentiality and anonymity

According to Gibson, Benson and Brand (2013) is a promise to the participants that their information will not be made public without their concerns and anonymity not revealing the identity of the individuals who participated in the study. To ensure anonymity participate were requested to use pseudonyms during the Focus Groups Discussion and interviews. The researcher ensured confidentiality of the information

collected and that the anonymity of the respondents would be maintained and respected.

3.11.3 Privacy

The findings of the study will be shared with the community after completion. This will be through community meetings in the community which will either be conducted by the researcher or officials from the Department of Agriculture working in the area. Sensitive information will not be released without prior knowledge of the community concerned.

3.11.4 Informed Consent

Section 12, subsection 2 (c) of the Constitution of the Republic of South Africa states that everyone has the right "...not to be subjected to medical or scientific experiments without their informed consent". A letter indicating the purpose of the research and specifying the kind of cooperation requested from participants was written in English to serve as an introductory tool to the tribal headman before data collection resumed.

3.12 CONCLUSION

In this chapter, various research approaches, methods and techniques were described and analysed to show the relevance to the study. The choice of research designs and their applicability to the area of the study were discussed in full. Trustworthiness and credibility were also discussed. The ethical considerations of the study and the limitations of the study were also outlined. The approaches and the methodology that have been discussed in chapter three were employed to collect, analyse and interpret the findings of the study. In this regard the data collected about the patterns of IK in beef cattle husbandry is presented and discussed in chapter four.

CHAPTER FOUR

PRESENTATION AND INTERPRETATION OF RESEARCH

FINDINGS

4.1 AIM OF THE CHAPTER

In this chapter, the data that were collected are presented. The first section describes the biographical information of the participants and is followed by a section discussing the findings from the interviews, focus group discussion and observations made by the participants and the researcher. In total, 27 beef farmers participated between 05th May and 18th July 2014. The focus groups were conducted in Sepedi. The purpose of the study was to investigate the IK methods used in beef cattle husbandry in Tshebela village within Polokwane Municipality.

This study was trying to answer the following research questions:

- What are the IK methods used in the management of beef cattle in the area of study?
- Do beef farmers still use the same medicinal plants that were used to cure beef cattle in the past?
- Are there any observable changes which indicate an increase or decrease at a particular historical moment?

4.2 FINDINGS ON THE BIOGRAPHICAL INFORMATION

A total of twenty seven (27) respondents participated in the study and all the respondents were males so there were no females involved. The study was not based on gender as they were not excluded during the recruitment process therefore their exclusion present a problem faced by women in rural communities thou these problem will not be interrogated in the study.

The age of the respondents ranged from 32 to 82 and 75% of them were older than 65 years, 20% was between 36 to 64 years of age and only 5% were youth and this findings present a serious challenge faced by the farming community because IK is orally transmitted by the elderly people to youth hence their participation in farming is less. Thus, this necessitates IK preservation either through finding better IK

management systems or better ways to transfer it to as many youths as possible. (Lwoga et al., 2010). Moreover these findings alluded to the conclusion made by Luseba and Van der Merwe (2006) that traditional practitioner do not reveal freely their knowledge as it is the source of their livelihood. Therefore, IK is basically transmitted by word of mouth from generation to generation thus, facing extinction if it is not recorded.

Findings on education showed that 60% of the respondents were illiterates, 15% of them were able to read and write, while the remaining 20% and 5% were in between grade 4 to 8 and 9 to 12 respectively. It is evident that most respondents were elderly people and in the olden days, education was not prioritised as boys were taught about the cattle farming at a very early age and that was their way of life.

4.3 THE USE OF IK IN BEEF CATTLE HUSBANDRY

The information gathered from the focus group discussion and interviews on the use of IK in beef cattle husbandry are presented in table 4.3.1 below.

Table 4.3.1: The coded findings of the key issues on the use of beef cattle husbandry

Code	Theme	Category	Percentage of participants (%)	Narratives examples
K	Type of knowledge (-Indigenous Knowledge(IK) -Western Knowledge(WK))	Both IK and WK	52%	<ul style="list-style-type: none"> I prefer to treat my cattle using traditional medicines but I sometimes use product like valbazen to dose my animals for internal parasites. I have been using IK for the past years but now I use both medicines because I think it boost the immune system of my cattle.
		Only IK	38%	<ul style="list-style-type: none"> I use traditional medicinal plants like aloe because it is cheaper than conventional method, these plants are readily available and we get them for free. I prefer using indigenous knowledge when treating my cattle diseases and I have been using it since because I don't trust western medicines.
		Only WK	10%	<ul style="list-style-type: none"> I use western medicines fulltime as the instructions are clear to follow and I don't know much about indigenous medicines. I use WK on my cattle as I am not a fulltime farmer and am employed so I just buy the medicines on monthly basis like Penicillin.
B	Types of breeds	Nguni	60%	<ul style="list-style-type: none"> I have Nguni cattle and I love it because it copes here. I use Nguni cattle because they are hardy breeds and they can travel long distance in search of grass and water. I use Nguni cattle as it withstands extreme heat, disease and parasites like ticks.
		Bonsmara	20%	<ul style="list-style-type: none"> I prefer Bonsmara cattle because of their big frame and they fetch better prices at the auction. I am very happy with my Bonsmara cattle as they tolerate all types of diseases and during drought they cope.
		Mixed breed	20%	<ul style="list-style-type: none"> I have mixed breeds because I don't have money to buy good bulls but I prefer Brahman as it grows well.

				<ul style="list-style-type: none"> • My grandparents left me this mixed breeds and they are good breeds which don't give me problem when it comes to diseases
F	Feeding system	Natural grazing	70%	<ul style="list-style-type: none"> • I fully rely on natural grazing for feeding my cattle and it is sometimes a problem if it doesn't rain as the cattle suffer. • I depend on natural grazing for my cattle; they graze on communal land with other farmers cattle.
		Both natural grazing and supplementary feeding	30%	<ul style="list-style-type: none"> • My cattle graze on the veld all year and during winter when the grass is dry I still take them to the veld but I only give fodder when supplied by government.
G	Types of grasses	Highly palatable	70%	<ul style="list-style-type: none"> • The cattle run towards the palatable grass like blue buffalo and they become overgrazed first. • Grasses in the river banks are most preferred by cattle but there are different types of grasses here like finger and buffalo grass.
		Averagely palatable	25%	<ul style="list-style-type: none"> • Cattle are just like us people so they eat grass that is more tasty grass and when it is overgrazed, they move to the next which is just medium in palatability.
		Less palatable	5%	<ul style="list-style-type: none"> • In winter grass is dry so my cattle eat any grass that is available and as the palatable once are overgrazed first, they eat grasses like gum grass even thou is low in palatability.

Source: author's contribution

The table above (4.3.1) contains an excerpt of the interviews with the participants. It clearly indicates how the codes were attached to the descriptive information of the field notes. The codes are placed at the left of the text followed by the themes that emerged which were then categorized according to the participant's response and the narrative examples were stated clearly in the last column of the table. Below is the presentation and discussion of the key findings on use of IK in beef cattle husbandry in the area of study as outlined in table 4.3.1.

4.3.1 Findings on the types of knowledge practiced

The findings indicated that majority of the respondents used both IK and WK in the treatment of diseases and any other ailment in their beef cattle though there were also those respondents who prefer only IK. One of the farmers said:

"I use medicinal plants to cure my beef cattle because it is accessible and free whereas western medicines are very expensive and government provide assistance once in a while or not provided at all".

From the above analysis, it is clear that there are various factors that contribute to any type of knowledge used and money is the root of the problem. It is important to note that the findings bring us to the fact that both knowledge complements each other and in some instances socio economic issues dictate the situation and farmers find themselves stuck with IK simply because they cannot afford the WK medicines.

Another respondent commented:

"I prefer using indigenous knowledge when treating my cattle diseases and I have been using it since because I don't trust".

From the above response, it is clear that there are still farmers who truly believe in IK and will never compromise it for anything as they believe that western treatment will kill their livestock. It came to the researcher's attention that much of what type of knowledge is used by all respondents is influenced by various factors like money, education level and culture and other IKS, which they have received from their elders and ancestors.

To support the above findings and narratives, Briggs (2005:67) when talking about IK and WK, indicated that there is an increasing recognition of the ways in which the complexities of reality, the multiple perspectives of the people involved and the contextualisation of knowledge in time and space must play a role. Indeed, it can be argued that IK has an advantage over western science in the context of poor communities, in that information is tested in the context of survival, and hence is not just true or false in some sort of dispassionate way (as western science might conclude), but is either more or less effective in providing the means of survival, a conclusion more meaningful in the context of everyday existence.

4.3.2 Findings on the types of breeds

Respondent's findings on types of breeds indicated that majority of the respondents owned Nguni followed by Bonsmara and mixed breeds. Most of this beef cattle farmer have acquired these breeds not because they prefer the breed but inherited them. Lack of funds has resulted into farmers doing farming without productive intension therefore rural farmers are not competitive so they keep their beef cattle for status. To support this statement, one of the farmers has this to say:

"I don't like mixed breeds because some of them cannot resist during drought times; I got these mixture of breed from my father who passed away in the past five years."

From the above response, it is clear that most rural farmers have inherited different herds cattle from their forefathers hence they have no specific type of beef cattle. Bonsmara and Mixed breeds have equal percentage in ownership and the respondents have this to say:

"I prefer Bonsmara cattle because of their big frame and they fetch better prices at the auction."

Based on the above respond, derived from the findings, beef farmers use their cattle to sustain their lives as they sell their beef cattle to the auction for survival. Additionally findings suggest that farmers have mixed breeds but they don't like it as one of the respondents said:

“I have mixed breeds because I don't have money to buy good bulls but I prefer Brahman as it grows well.”

The above mentioned response indicated that money posed a serious challenge to these beef farmers as they settled for mixed breeds because they cannot afford their preferred breed. Their livelihood is therefore affected negatively due the fact that they have breeds that are difficult to sell thou they are resistance to parasites and ticks.

4.3.3 Findings on the Feeding system used

Majority of the respondents relied on natural grazing in providing feed for their livestock whilst used natural grazing and also give supplementary feeding in dry season (winter). One farmer said:

“I fully rely on natural grazing for feeding my cattle and it is sometimes a problem if it doesn't rain as the cattle suffer”

From the above response, it is clear that climate change is now affecting our farmers in a very bad way therefore given such challenge, it will be important to come up with intervention which improves the situation of the farmers in the area of study.

The findings was supported by literature whereby Matlabyane et al., (2010) indicated that livestock farmers in the rural areas of Limpopo province depend on natural pastures and forages usually found in communal grazing area and due to lack of standardize feeding management practice these results into overgrazed and therefore cannot provide adequate nutrients for good level of productivity among the livestock.

Respondents' indicated that use communal land allocated for grazing throughout the year. One farmer said:

“My cattle graze on the veld all year and during winter when the grass is dry I still take them to the veld but I only give fodder when supplied by government.”

The response above revealed that communal grazing is now a problem as it no longer like in the olden days when government erected fence and grazing camps for rural farmers and that affect the supply of feed which result in overgrazing. In support to these findings, Ndou et al., (2011) also raises concerns that most of communal

grazing is uncontrolled and continuous grazing are common and most communities are overstocked since the ownership of grazing is communal so lack of ownership to the field does not exist. The cattle, therefore, lose body condition particularly in winter and spring.

4.3.4 Findings on the grass identification

Table 4.3.4.1.1 indicates the grasses which are dominant in the area of study. The respondents were using Sepedi in identification of these types of grasses therefore the researcher consulted pasture specialist from LDA who then assisted with a chart of grasses in Limpopo Province which had types of grasses in all Limpopo official languages and the chart was used to compile the table 4.3.4.1 below.

Table 4.3.4.1: Dominants grasses in the area of study

Family name and Botanical name	Common name	Sepedi name	Palatability
<i>Panicum maximum</i>	Buffalo Grass	Mphafa	High
<i>Digitariaeriantha</i>	Finger Grass	Nabile	High
<i>Cenchrusciliaris</i>	Blue Buffalo Grass	Mphafa	High
<i>Cynodondactylon</i>	Couch grass	Mohlwa	High
<i>Heteropogoncontortus</i>	Spear Grass	Seloka	Medium
<i>Hypetheliadissoluta</i>	Yellow Thatching grass	Morulela	Medium
<i>Eragrostislehmanniana</i>	Lehman's love grass	Matolwana	Medium
<i>Melinisrepens</i>	Red top	Moririmoshweu	Medium
<i>Aristidacongesta</i>	Tassel three awn	Lefielo	Low
<i>Stipagrostisuniplumis</i>	Bushman grass	Bjangbabarwana	Low
<i>Eragrostisgummiflua</i>	Gum grass	Thita-poo	Low
<i>Tragus berteronianus</i>	Carrot seed grass	Segowa	Low

Source: author's contribution

From the finding, it is clear that the majority of the respondents know different types of grasses that can be consumed by beef cattle. Lack of camps and fences disadvantage beef farmers and cause unnecessary overgrazing in the area of study. One of the farmers commented:

“Our cattle were having free movement in the past and why should we erect fences now”.

From the above response, it is clear that beef farmers still believe that natural grazing did not disadvantage their beef cattle. Lack of knowledge made the respondent not to be aware of the negative impact that can be caused by overgrazing in the area of study. It should be noted that the respondent knows how to manage re-growth for the grasses as they reported that at the end of the dry season, grass pastures were usually set on fire to stimulate new growth of grass. The new growth grass was reported to be palatable to beef cattle. These findings suggest that beef farmers have their indigenous way of stimulating pasture growth without disturbing nature as they also indicated the time of burning the grasses.

Findings also suggest that the respondents have concerns on the erosion of some of the good grasses that they use to have in the area of study and one of the farmers said:

“We use to have white buffalo grass which was very palatable but now it is no longer there”

Based on the above response, it is very clear that types of grasses have deteriorated as a result of overgrazing and re-growth did not happen hence the study on grass identification is necessary to close the knowledge gap.

4.3.5 Findings on veld condition

From the above findings, it is clear that majority of the farmers believed that the veld condition is always good. One of the respondent commented:

“I have been feeding my cattle there for decades and I have not experienced any death due to shortage of feed “

From the above response, it is evident that farmers are still dwelling in the history and are reluctant to accept that things have changed dramatically due to climate change but it was good to know that some though few respondents indicated that veld is poor because the grazing veld is now converted to human settlement due to an increase in population.

4.3.6 Findings on ethno veterinary as practiced by beef farmers

Respondents were observed by the researcher when they collected some of the medicinal plants in the veld and also witnessed some of the preparatory methods for those medicines and also the how it was administered to the animals therefore table 4.3.6.1 below will present the findings. The researcher consulted the Botany section of University of Limpopo so that the Sepedi name of the trees is converted to the botanical names for validity purpose

Table 4.3.6.1: Plants and plant parts administered for the treatment of internal parasites, constipation, wounds, diarrhoea and other diseases in cattle in the area of study.

Family and botanical names	Sepedi names	Disease	Habitat	Part used	Preparation and administration (as reported by the participants)
<i>Cassia Abbreviate</i>	Monepenepe	Internal Parasite	Shrub	Bark	The bark is crushed and mixed with water
<i>Dicerocaryum Seneciode</i>	Mompati	Retained Placenta	Shrub	Leaves	Leaves are mixed with water and salt and given orally to the cow
<i>Solanum Parduriforme</i>	Motholla	Constipation	Tree	Whole plant and Roots	Cut the whole plant including roots, immerse for 24 h, 1 litre once a day for 3 days
<i>Clerodendrum Glabrum</i>	Mhlokholoko	Tick Control	Tree	Leaves	Grind and apply the mixture directly where ticks are.
<i>Gymnosporia Senegalensis</i>	Mophato	Diarrhoea	Tree	Roots	Take water of the boiled roots, make it cool and give one litre to the big cattle and give half a litre to the young once.
<i>Aloe Zebrine</i>	Kgopha	Wounds	Tree	Leaves	Crush leaves, apply directly on the wounds

Source: author's contribution 2014

Seven plant species belonging to 7 families were identified (Table 4.3 6.1) by the respondents and four were tree and two were shrubs. Respondents interviewed reported that medicinal plants were collected from the wild source by the respondents. Herbalist raised their concerns on the how other people come to their area to harvest the plant without proper knowledge and they indicated this as exploitation of their income source and also the cause of diminishing of other species which might miss being documented. One respondent has this to say:

“We are still using medicinal plants to cure the sickness of the beef cattle, although there are few of them because of climate change”

Findings derived from the above response revealed that the climatic conditions have tempered with the environment and it is good that beef farmers are aware of the situation as they have their survival strategies regardless of the conditions they find themselves in.

The findings revealed that water is a common solvent used in the preparation of concoctions to be given to the animals for the treatment of internal parasites, conditions and other diseases and other. The plants' parts were used immediately after harvesting except for *Clerodendrum glabrum* and *Dicerocarym senecioides* that need to be dried and milled before use (Table 4.3.6.1).

Respondents revealed that remedy preparation were largely made from the leaves that accounted for 69% followed by roots (14%), bark and the whole plant were equally used (8, 5%) each. In preparing the medicines for cattle, the respondents used various methods for different ailments, some boiled the plant parts (25), some grinded the part (35), some crushed (35) whilst few (5%) cut the part. The fact that majority of the plant species need to used immediately after harvest, the researcher see the future of the next generation being compromised and also plant conservation of the harvested species need to be considered.

These findings are supported by conclusions made by Van der Merwe et al., (2001); Luseba and Van der Merwe, (2006) as they indicated that farmers harvested wild plants, used different parts of the plant for various ailments but their argument was the fact that in most cases, farmers use fresh plants and this will have negative impact

on biodiversity. The researcher concur with Luseba and Van der Merwe, (2006) as it was indicated earlier that plant species are facing extinction therefore our ecosystem will ultimately be affected and all the living and non-living organisms will be affected.

The findings suggest that documentation of IK is crucial as the respondents interviewed complained that contemporary youth were no longer interested in IK as they consider it out dated, backwards and of questionable value. Moreover they elderly and the herbalist fear extinction of IK due to lack of successors. The youth who were part of the study showed no interest during preparation of the plants for remedies. In investigating the relationship between the themes which emerged in the findings, the next point present the linkage of this themes and how these themes influence the lives of beef farmers in the area of study.

4.4. Linkage of the emerged themes from the findings

Table 4.4.1 below show the link indigenous knowledge had on different variables and how they influence the daily lives of beef farmers in the area of study.

Table 2.4.1: Presents the linkage of themes

Themes	Linkage of themes category to the variables		Narrative examples
Knowledge Type	IK	Money	I use traditional medicinal plants like aloe because it is cheaper than conventional method, these plants are readily available and we get them for free
	IK	Accessibility	I use traditional medicinal plants like aloe because it is cheaper than conventional method, these plants are readily available and we get them for free
	IK	Locality	I use various parts of trees from our village to treat my cattle when they have diseases and these trees are only found in this village as we see people from other village come and collect what they want here.
	WK	Educational level	I use western medicines fulltime as the instructions are clear to follow and I don't know much about indigenous medicines.
Veld Condition	Poor	Population growth	Looking back, veld condition was good but now it's poor because number of cattle has increased while the grazing area is decreasing due to conversion of grazing land to human settlement.

Source: author's contribution 2014

According to the most responses, derived from the findings, money is the main variable which the farmers are focusing at to improve their livelihood. Cattle are reared only to give them better status in the community. Furthermore most of the farmers lacked formal training hence they believed in IK information that they received from their elders.

As far as veld condition is concern, it was discovered that most of the beef cattle farmers still believed that the conditions of the veld is still good even if the population have decreased enormously in the past five year. From the above findings, the researcher believes that the more population growth, the less grazing land can be found.

The finding from the respondents indicated that IK is connected to accessibility and locality furthermore the respondents revealed that they use IK because it is easily accessible as they just go to the veld, collect plants and use them for the treatment of their cattle . The respondents also raised concerns on the fact that people came from other villages to collect those plant as they are locality specific .Therefore this area is going to experience extinction of some plants which will then result in death of their cattle because they depend on those cattle for survival, their livelihood will change for the worse.

Furthermore findings made by Mapira et al.,(2013) states in the research done in Zimbabwe that there were specific areas for grazing and over-stocking was rare due to the abundance of land compared to livestock numbers and livestock would be moved from one area to another in search of greener pastures. Moreover they concluded by arguing that although it is impossible for them to go back to the past, Zimbabweans can benefit from the fusion of IKS and modern approaches in the country's quest for environmental sustainability .

4.5 PRODUCTION MANAGEMENT

4.5.1 Governmental support

4.5 .1.1 Accessibility of extension officers

Table 4.5.1.1.1: Visiting patterns of the extension officers

Number of times	Number of participants	Percentage
Once per year	2	4%
Twice per year	2	6%
Five times per year	11	44%
Six times per year	10	42%
I never see an extension officer	2	4%
Total	27	100%

Source: authors' contribution 2014

According to the findings above, forty four percent (44%) of the respondents were supported by the extension officer five times per year. Forty two (42%) of the respondents indicated that they were visited six times per year, four percent indicated that they only had one visit per annum from the extension officer and lastly the other four percent(4%) reported that they never saw the extension officer in their area. The findings suggest that government support to beef farmers is satisfactory and this is even evident from the researcher's side as they assisted in informing the farmers about all the meetings held prior the research commenced and also during the focus groups discussions.

4.5.1.2 Accessibility of animal health technicians

Table 4.5.1.2.1: Visiting patterns of the Animal Health technician

Number of visiting times	Number of respondents	Percentage
Once per year	2	7%
Twice per year	2	7%
Five times per year	4	15%
Six times per year	9	33%
I never see animal health technician	10	38%
Total	27	100%

Source: authors' contribution 2014

The study found that majority of the part (38%) never saw the animal health technician, thirty three (33%) of the respondents have seen animal health technician five times per year(15%) followed by those who saw the technician twice per year and the least of the participants (10%) said five times and once per year respectively. Derived from these findings, it is evident that beef farmers don't have access to services provided by the animal health technician hence they use medicinal plants for the treatment of their beef cattle.

4.6 CONCLUSION

This chapter presented the findings of the study. It started off by providing an analysis of the biographical information which reflects that elderly people are the custodians of IK in beef cattle husbandry and youth participation proved to be at a very low rate. It went further to provide an analysis of the level of education of the participants which showed that majority of them were illiterate.

Presentation of the findings on themes and the narrative examples were clearly indicated in table 4.3.1 followed by the linkages of above mentioned themes to various variable which are interconnected to each to reflect the real situation of the participant.(Table 4.4.1).

Presentation of the finding on the types of grass and trees in the area of study was done and discussed in detail. Ethno veterinary practised by the traditional beef farmers in Tshebela and Ga-Mogano was also presented and discussed.

The researcher concluded by analysing the support provided by government to the participants. In the next chapter, the findings, recommendations and conclusion are presented. This brings us to the conclusion of this chapter and a transition to summary of the findings and recommendations in the next chapter.

CHAPTER FIVE

SUMMARY OF RESULTS, RECOMMENDATIONS AND CONCLUSION

5.1 INTRODUCTION

The aim of this study was to investigate the patterns of IK used in beef cattle husbandry in Polokwane Municipality. In this chapter conclusions are drawn and recommendations are made based on the analysis of responses in relation to the research questions as stated in chapter 1. Conclusions drawn are informed by both the literature review (chapter 2) and the data analysis done in chapter 4. This chapter further provides possible future research topic, as it did not explore in detail other sub-domains of animal husbandry, and the last part of this chapter concludes the study.

5.1.1 Contextual summary

The study had the following objectives:

- To investigate the IK methods used in beef cattle husbandry in the area of study. The participants were asked about the grazing and the feeding patterns applied in beef cattle husbandry. Types of grasses were identified and listed according to its palatability. Types of breeds were identified together with the preferred traits;
- To assess if beef farmers use IK to identify medicinal plants which to cure beef cattle. Participants were also asked about the state of the veld compared from when they started beef farming and now. Lastly they were asked to identify plants which were used to treat their livestock diseases and if there are no changes on the use of IK versus WK;
- To investigate farmers' perceptions and attitudes on the use of IKS on beef cattle husbandry in the area of study. The participants were asked to explain the use of IK in disease control compared with conventional methods and the reasons behind using each or both methods.

5.2 SUMMARY OF THE KEY RESULTS

5.2.1. Type of knowledge used by beef cattle farmers (IK and WK)

The use of IK versus WK gave an indication that people now prefer using both as long as they have funds available for the medication. Youth preferred the use of WK because they said they are not knowledgeable about IK and its time consuming as they don't have time collect medicinal plant as they do farming part time

5.2.2 Grass identification

Elderly people were more knowledgeable on the different times of grasses that were available in the area of study and thou the indicated that some does not grow anymore.

5.2.3 Types of breeds owned by the beef farmers

It has to be noted that ownership was based on inheritance and the traits were just a bonus as the farmers use their beef cattle for survival not to make production.

5.2.4 Feeding system

It was also revealed that the grazing land have decreased due to high population and gardens that are created in the area which was previously allocated for grazing. This resulted in overgrazing of the veld and affected the body condition of the animals and then the price drops as they charge the price by the way it looks not based on the weight as done by commercial farmers

Nevertheless respondents demonstrated to be knowledgeable on the medicinal plants in the area of the study and the also managed to identify various grasses according to the preference of their cattle therefore; they were able to manage their pasture.

5.2.5 Veld condition

The finding suggested that the veld is still in good condition regardless of shrinkage of the grazing land due to increased population but some mentioned overgrazing as the challenge. Lack of fence was also mentioned as a challenge because livestock from other villages graze in their grazing land.

5.2.6 Ethno veterinary used on beef cattle

Respondents evidently demonstrated their understanding of ethno veterinary practices used to cure their beef cattle therefore it was clear that they have knowledge on medicinal plants used and also all the parts of the plants used. The biggest fear that the respondents have is that fact that the plants are facing extinction as other farmers from other villages harvest the plants in the area of study as they are area specific.

5.3 RECOMMENDATIONS

On the basis of the findings from the primary data, the following motivated recommendations were made:

5.3.1 Types of knowledge used

The Department of Agriculture should be encouraged to assist farmers by providing training in order for farmer to have a better understanding when it comes to WK so as to supplement the IK that they have. The department should also be encouraged to do research in IKS to support beef farmers in their beliefs.

5.3.2 Grass identification

Experienced elderly farmers should be encouraged to pass on the IK skill of identifying different types of grasses to the next generation and emerging beef cattle farmers in the area of study.

5.3.3 Types of breeds owned by the beef farmers

Department of agriculture should collaborate with other institutions to identify the best breeds that can be adapt in environmental condition in the area of study. For example Nguni cattle have been cited by the farmers that it withstands harsh conditions and it can also resist other diseases.

5.3.4 Feeding system

Department of agriculture should be encouraged to erect fences so as to preserve grazing veld in the area of study.

5.3.5 Veld condition

In order to improve the veld condition and to be in a position to control movement of livestock from one area to another, the Department of Agriculture should design camps for the farmers so that they can be able to practice rotational grazing. These will ensure that camps have resting period and allow the grass to re-grow for the next grazing season.

5.3.6 Ethno veterinary used on beef cattle

Documentation of all the medicinal plants in the area of study should be done by DOA in partnership with other stakeholders hence the need for more research on these medicinal plants.

5.3.7 Further research

All the studies are intended to suggest further research as no research is complete in itself. The following topics are suggested for further research:

5.3.7.1 Exploring the factors that impact negatively on the grazing veld.

5.3.7.2 The role of keeping special breed of cattle on economic growth.

5.3.7.3 The perceptions of emerging farmers on the impact of IKS in their livelihood.

5.4 CONCLUSION

Based on the main three research questions, the study revealed that the use of IK in beef cattle is still being practised and it also revealed that the IK methods used has since changed as land is now a scarce asset. This is evident in the fact that not all respondents indicated that they try by all means to keep less cattle so that the available land for grazing remains sustainable to their herd. The researcher concludes by saying that the states has a duty to see to it that the required plants for indigenous medicines continue to be available and are not depleted, and that small scale farmers will be able to have access to the areas where important plants grow.

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APPENDICES

Appendix A: Letter requesting consent of participation

Dear Participants

My name is Moneri Mogale and I am currently a student at University of Limpopo, Turfloop campus. To complete my studies I have to conduct a research study and write a dissertation on my finding. I am interested in the (Indigenous Knowledge Systems (IKS) used by farmers to manage their beef cattle and this will also be focus for my dissertation. You are voluntary invited to take part in this study. The study aims at investigating IKS used by farmers to manage their beef cattle. The main objectives for this study are:

- To investigate the IK methods used in beef cattle husbandry in the area of the study;
- To assess if beef farmers use IK to identify medicinal plants to cure beef cattle;
- To investigate farmers' perceptions and attitudes on the use of IKS on beef cattle husbandry in the area of study.

Please note that your participation in this study is entirely voluntary and you can refuse to participate or stop at any time without prejudice. You can also withdraw your consent at any time, before, during or at the end of the interview. Most important, please note that the findings of this study may be reported or published in scientific journals but will not include any information that identify you as a participants, you are thus guaranteed to remain anonymous.

Informed Consent

I hereby confirm that Moneri Sanah Mogale has informed me, about the nature, conduct, benefits, and risk of the study. I have also received, read, and understood the participant's information paper regarding the study. I am aware that the information will be recorded and that the results may be anonymously processed in to a study report. I was also informed that I may at any stage withdraw my consent and participation in the study. I have had sufficient opportunity to ask questions and declare myself prepared to participate in the study.

Name of Participant

Signature

Date

Name of Researcher

Signature

Date

Appendix B: Letter requesting permission to conduct a study in your area



BABIRWA BA MOGANO

ROYAL COUNCIL

'Striving for Complete Tribal Identity and Pride'

Stand No. 306/7
Mogano Village
MPHOGODIBA
0732

P.O. Box 1555
Mogano Village
0766
Tel: 0782167321

Date: 28/03/2014
Enquiries: MOGANO OFFICE/0782167321
DEPARTMENT OF AGRICULTURE
TSHEBELA OFFICE
MANKWENG

Mokomiso, ye: tshedimoso ka tswaalo le wlokomelo ka Leruo.
MONERI SANAH MOGALE O kopane le bakunisi ba ga MOGANO le metsi mabapi ka ga huetse tshedimoso le tsebo ka wlokomelo ya Leruo, ka mokgwa wa sekgale goba wa bo rakgolokhukhu.

Kopano yea e bile MATSHELA SEPARAKONG, Matseng wa ga MOGANO wa BABIRWA BA MOGANO. Dinyakisi so tso di bile ka kgwedi ya MARCH 2014

Tsebo le phegelo le bakgoni ad: fihlelele sethaba, Tlala ethe ka magang/ntalapeng

Mengwaledi wa BABIRWA BA MOGANO.

E. M. MPE

28/03/2014

DIHLATSE: MOGANO J. M.

20 T. M. Mogomo

Appendix C: Interviewing schedule

Section A: Biographical Data			
NO.	Question	Prompt/Instructions	Code
1	Age		
2	Gender		
3	Educational level		
4	Are you a full time or part time farmer	Elaborate	Other jobs/occupation
5	Years in farming	Elaborate	Experience/Knowledge
6	Number of cattle owned	Are the numbers increasing or decreasing? Explain	Ownership /consistency
7	Cattle breed preferred	Explain	Type of breed/preferred traits
Section B: Economic Status			
8	Is cattle farming your only source of income	Elaborate	Other jobs/occupation
9	What other sources of income do you have?	Elaborate	Other jobs/occupation
10	Is your income sufficient to meet your basic needs and those of your family?	Explain	Other jobs/occupation/livelihood means
11	Do you rear your cattle for consumption or for production	Explain	Subsistence/income
Section C: Sustainability: Resource-conserving			
12	Where do you graze your cattle throughout the year		Feeding pattern/season
13	What plants have the indigenous farmers used in making medicines to treat livestock	What local plants and materials do you use in the preparation of the indigenous medication	Plant species/ethno veterinary
14	When, and why, do they use western or indigenous medicines to treat livestock diseases		Western or Indigenous practices
15	What is the current status of your veld compared to when you started using it	Elaborate	Veld condition/historical
16	Is your local pasturage	Elaborate	Pasture/suitability

	suitable for livestock farming		
17	Which grass species are most dominant?	List them in order of importance and also indicate species which were most dominant 5–10 years ago	Grass species/Palatability
18	How did you traditionally acquire knowledge over beef husbandry	Briefly explain	Knowledge transmission/ beef cattle husbandry
19	What constraints do you experience in rearing cattle	Explain how are you to managing them	Challenge/coping strategies
Section D: Enabling external institutions			
20	What do you think of agriculture officials?	Explain and also indicate how often do you see them	Farmer's perceptions/Government support
21	How are local groups involved in coordinated beef cattle husbandry committees? (e.g. community organizations, farmer research groups, farmer to farmer extension, etc.)	Elaborate/give examples	Established groups/Knowledge sharing
Section E Production			
22	How do you keep your cattle records	Elaborate/give examples	Record keeping/Reasons
23	Where and when do you sell your cattle	Elaborate/give examples	Marketing/ time /situation
24	How do you feel about the terms of trade in the market?	Elaborate	Favourable policy for sustainable agriculture/trade terms