Potential of Jozini smallholder cattle farmers to progress from subsistence to commercial cattle farming for enhanced rural livelihoods

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DECLARATION

I, Sinelizwi Fakade declare that:

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PREFACE

The work described in this thesis was carried out in the School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal from _____ to _____, under the supervision of Professor J M Green_____.

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As the candidate's supervisors, we agree to the submission of this thesis.

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Prof J M Green (Supervisor)

Signed: _____ Date: _____

Prof M Chimonyo (Supervisor)

ABSTRACT

Globally, livestock contributes significantly towards domestic production and household food security. Smallholder farmers are cited to won large livestock numbers compared to commercial farmers, especially in South Africa. The potential to commercialise exists however, various factors influence the transition from smallholder to commercial farming. This study assessed nutrition and health status of Jozini cattle, and determined the potential of Jozini smallholder farmers progressing into commercial cattle farming. By identifying the nutrition and health status of cattle, the study seeks to gain insight on what the current position is with regards to animal quality. By determining the potential to progress, the aim is to assess whether smallholder farmers are in a position to progress, and if not what is compromising this transition.

Data was collected using purposive sampling and 120 smallholder farmers were purposively selected in Jozini Northern KwaZulu-Natal Province of South Africa. Descriptive statistics were used to present analyse and the results of gender, age, education level, and income level, herd size, farming experience, land size and willingness to progress. Descriptive statistics were also used to analyse the association and significance with regard to socio-demographics as well as factors that determine farmer potential to progress. Majority of the sampled farmers were middle to old age. A total of 70 farmers had an average income of between R100-1500, which came from pension or government grants. Of the sampled farmers, 34 percent had no formal education. Farmers had the necessary farming experience with 50 percent having more than 10 years

There were high odd ratio estimates from farming experience and income level. Farmers, who had more years of experience and higher income level, were more likely to progress into commercial cattle farming. Descriptive statistics indicated that farmers were willing to progress into commercialisation; however, factors such as market availability and market access, poor infrastructure, inability to access information, age and poor education contributed to farmer progressing potential being compromised.

Body condition score was used to assess the nutrition status of cattle. Other contributing factors that were observed were the role of lactation in relation to body condition and supplementary feeding as a practice which contributes to nutrition status of animals. Similarly a clinical health

checklist criterion was used to record information regarding the health status of cattle. The results showed that the majority of cattle had a poor body condition score of 2. There was a significant association between Body Condition Scoring and lactation. Furthermore, descriptive statistics revealed that tick counts were predominantly low in cattle due to a strict dipping programme implemented by farmers. Additionally, there was a significant relationship between tick count and body condition Score. The most common diseases mentioned by the farmers were black quarter and Foot and Mouth Disease (FMD). Vaccinations were administered to control diseases in the area.

The study identified poor nutrition status in cattle in relation to body condition scores, effective tick control me in smallholder cattle farming in Jozini. Farmers relied extensively on agricultural extension services and the study recommends that such support services are improved. Greater attention should be directed towards empowering smallholder cattle farmers in the area through skills and knowledge development. More so, infrastructure, access to functional markets access relevant information and production resources would significantly contribute to smallholder farmers potential to progress into commercialisation

Keywords: *smallholder livestock, body condition scoring, extension services, commercialisation*

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SPSS: Strategic Policy Smallholder Support Services

BCS: Body condition Scoring

NERPO: National Emerging Red Meat Producers Organisation

FAO: Food Agriculture Organization

ISRDS: Integrated Sustainable Rural Development Strategy

Introduction

1.1. Introduction

Globally, there is a significant dependence on agriculture due to its ability to provide food and sustaining livelihoods of rural households mainly (Coetzee *et al.* 2005). This sector employs about 1.3 billion people and supplies for 600 million livelihoods in developing countries (Thornton 2010). Livestock plays an important role in household food security, because its products can be used as a source of food and also sold for revenue (Dovie *et al.* 2006). The increasing food demand which is influenced by rapid population growth, cannot be a challenge associated with crop production only.

The livestock sector offers opportunities for economic growth, poverty reduction, and sustaining livelihoods (FAO, 2013). According to FAO (2012), there are 752 million poor people in the world who rely on livestock as a source of food, income generator and as an asset accumulator. in particular, the world's rural poor come from East Africa, Central Africa, Sub-Saharan Africa, North and West Africa; these communities are characterised by areas of low economic growth, poor infrastructure and household food security (Moyo & Swanepoel 2010). Thornton (2002) reported that, in developing countries, especially in Africa, one billion people rely on livestock for food security. This indicates the vital role that livestock play for the rural poor households in developing countries.

In the National Development Plan of South Africa (NDP), one of the main goals is to have an integrated and inclusive rural economy. Within that, agriculture has been highlighted as the primary economic activity towards achieving that goal. More-so, one of the objectives aligned to achieving that goal, is through the support of smallholder farmers. Ways which have been mentioned to support smallholder farmers are through expanded irrigation schemes focusing on crop production through the conversion of under-utilized land in communal areas into commercial crop projects (NDP 2011). Additionally in South Africa, the strategic policy for smallholder support (SPSS) concurs with the National Development Plan goal by highlighting the potential importance of supporting smallholder farmers.

This policy mentions the need to improve extension services, enhance farmer access to markets and market information, infrastructure development and access to financial institutions as key strategic principles in ensuring that smallholder farmer development and support is achieved. This is in line with research conducted by (Jayne *et al.* 2010), which reveals that in order to ensure smallholder farmer capacity development in South Africa, investment needs to focus on economic drivers such as market access, improved availability of financial institutions and infrastructural development. The relevance of this to this study is that these policies identify key areas where smallholder farmers are lacking continued institutional and or organisational support.

The Strategic Policy for Smallholder Support mentions factors which directly influence the ability of smallholder farmers' potential to progress from subsistence farming to commercialisation. However, more importantly the Strategic Policy for smallholder support (SPSS) admits that challenges such as poor agricultural extension support, poor financial accessibility and market access have hindered smallholder farmer progress and this requires more effort from public institutions. This relates to research by Shange (2014) which demonstrates that, for as long as limited efforts are made towards ensuring continuous smallholder farmer development through extension services, production information, skills and training, the smallholder farmer sub-sector will continue finding it a constraint to actively participate in the agricultural economy of South Africa.

The major sources of nutrition for cattle in arid and semi-arid areas are natural pastures. According to Gwelo (2012), natural pastures' grasses are the major source of nutritious grazing for cattle; however, this feed source rarely meets animal requirements throughout the year. Berhane & Eik (2006) relate to this by stating that forage quality and quantity in arid or semi-arid areas is affected by seasonal fluctuations, therefore limiting forage availability throughout the year.

In the attempt to meet livestock nutritional requirements, farmers have adopted various strategies in order to mitigate the poor natural pasture performance. A study by Pen *et al.* (2010), revealed that farmers utilised rice straw as a source of feed for cattle, especially during scarcity of natural pastures. More so, farmers indicated that even though it is low in nutrients, it sustained the animal. Other feed sources included maize stalks and sweet potato stems. Similar supplementary

feeding practices were employed in Uganda according, to Kiggundu *et al.* (2014). Meeting daily nutritional requirements of cattle is a constraint many rural based farmers face, and so farmers should employ strategies such as supplementary feeding and/or seek cost saving methods that will improve their cattle nutrition. Nutrition plays an important role in animal performance, body condition and health.

Poor animal welfare and diseases continue to constrain livestock productivity, agricultural development, human wellbeing and poverty in many regions of the developing world (Perry & Grace 2009). Rushton (2009), highlights that livestock diseases and parasites account for direct losses (deaths, slow growth, and reduced fertility) and indirect losses (additional drug costs, vaccination costs) towards farm revenue. With livestock in developing countries being a source of food, provision of income, transport, store of wealth and draught power, disease and parasite control is of paramount importance, especially for smallholder farmers.

Ticks are considered to be the main health issue smallholder farmers face and Rajput *et al.* (2006) agree with Rushton (2009) by stating that ticks and diseases cause substantial loss in production, reduce animal productivity and often death. Ticks cause hide damage; introduce toxins and suck blood from animals (Atif *et al.* 2012). Significantly though, ticks can transmit diseases from infected cattle to healthy ones, and they are considered to be amongst the most important vectors of diseases affecting livestock (Jongejan & Uilenberg 2004). It is imperative that smallholder cattle farmers are aware and understand the contribution animal health has towards effective production management practices.

By positioning smallholder livestock to commercialise, it is assumed that households have access to higher household income, the ability to purchase production inputs such as feed or animal medication. More so, through the higher income-commercialisation linkage, smallholder farmer households can purchase a diversified mix of good and services, including food, health care, and better housing amongst others. The link between cattle nutrition and health is paramount when it comes to livestock production systems. There is a need for ensuring smallholder farmers are consistently improving in this regard.

Importance of study

Reist, Hintermann *et al.* (2007) state that the Integrated Sustainable Rural Development Strategy (ISRDS) has identified livestock farming as the agricultural enterprise with great potential in improving household food security, sustaining livelihoods and alleviating poverty. Throughout the world, many rural poor people depend largely on domestic animals for meat, milk, hides, draft and fertilizer (Coetzee *et al.* 2005).

Cattle importance to the rural-poor cannot be over emphasized. Cattle play an important role in rural farming systems; they act as a source of income which is primarily intended for household needs and emergencies (Montshwe 2006). The National Development Plan of South Africa NDP (2011), states that the livestock industry has significant growth potential and market opportunity when it comes to empowering smallholder farmers. However despite the enormous investments made by government institutions, smallholder livestock farmers progression and performance has been disappointing, resulting in poor smallholder farmer participation within the commercial sector (Shange 2014).

In opposition of the afore-mentioned, Kirsten *et al.* (2012) indicate that the smallholder cattle sub-sector contribution potential has been underestimated or largely neglected. With previous studies focusing on market access and participation, there is inadequate literature on production management practices and farmer potential to progress into commercial farming. Additionally with 35 percent of the national herd owned by smallholder farmers, it justifies the need to assess production management practices and potential of Jozini smallholder farmers to progress into commercial farming, for enhanced rural livelihoods.

The findings of this study will provide insight on the production management practices and potential of Jozini smallholder cattle farmers progressing into commercial farming, for enhanced rural livelihoods. This study will benefit smallholder cattle farmers through informing them about the health condition of cattle, the need to adopt production management strategies related to cattle health and nutrition, and the benefits of exploring commercial farming as a production system. With regard to agricultural extension officers, importance of continuous support services to farmers and factors involved with ensuring active commercial participation for smallholder cattle farmers.

1.2. Problem Statement

Beef production performance in South Africa is below its true potential (Coetzee *et al.* 2005). This is mainly due to lack of strategies and support given to smallholder cattle farmers. With low production levels, smallholder farmers have little influence on the industry (de Haan 2001). Cattle are kept for various reasons irrespective of their production potential. Smallholder farmers consider quantity to be better than quality. Quality looks at animal health condition and the reproduction characteristics that cattle pose. Quantity is the number of cattle being reared, regardless of their quality (Meltzer 1995).

Within the opportunities and development strategies of Jozini, agriculture is an important component in addressing unemployment, poverty alleviation and eradicating household food insecurity. Available literature is silent on issues related to cattle production management, yet this subsector could act as a strategy in dealing with challenges faced in Jozini local municipality. Therefore, there is a need to investigate the production management practices of Jozini smallholder cattle farmers in order to determine their potential for progressing from subsistence cattle farming to commercialisation in order to enhance livelihoods.

1.3. Aim of the study

The study aimed at investigating the production management practises and potential of Jozini smallholder cattle farmers to progress from subsistence to commercial farming, for enhanced rural livelihoods.

1.4. Research objectives

The specific objectives of the research were to;

- Assess the nutrition and health status of cattle in Jozini
- Determine the potential of Jozini smallholder cattle farmers to progress into commercial farming for enhanced rural livelihoods.

1.5. Hypothesis

The hypothesis tested was that:

Jozini smallholder cattle farmers have the potential to progress from subsistence to commercial farming thus enhanced livelihoods; however, they face certain constraints which may compromise the transition.

1.6. Study Limits

The study covered four dip tank areas of Jozini local municipality in Northern KwaZulu-Natal, therefore the results may not be generalised for all rural areas in Jozini as a local municipality or KwaZulu-Natal as a province. Veld condition assessments (which involve estimating the percentage of each species that is present and comparing it to the benchmark in order to determine comparative scores of the veld in question) were meant to be conducted, but due to severe drought and poor species availability, this assessment could not be carried out.

1.7. Definition of terms

Nutrition: The process of providing or obtaining the food necessary for good health and growth of living organism

Health: The state of cattle being free from illness or injury

Subsistence: Self-sufficient farming, whereby food is grown sufficiently to feed themselves and their family (Boyazoglu 1998).

Smallholder farmer: Farmers owning small plots of land on which they grow subsistence crops relying solely on family labour (Udo *et al.* 2011)

Body Condition Scoring: A numerical tool used to assess the condition of cattle

Livestock: The researcher is specifically relating to cattle in this study

1.8. Organisation of the Dissertation

The dissertation is organized as follows. Chapter one introduces the study, outlines the importance of the study, problem statement, aims of the study, research objectives, hypothesis, study limits and definition of terms. Chapter two, literature is reviewed with regard to production management and issues or factors that hinder smallholder farmers from progressing from subsistence to commercial cattle farming for enhanced rural livelihoods. Chapter three contains the study area, climate, agricultural status, research design, sampling technique, data collection and data analysis. A specific research methodology followed for each manuscript has been included in chapter four and chapter five. Chapter six forms the conclusion and discussion.

Chapter 2 : Literature Review

2.1. Introduction

Livestock have an important role to play in the livelihoods of smallholder farmers in Southern Africa. Livestock contribute to human nutrition, transport, income, and financial security. In addition, livestock fulfills an important role at social and cultural levels, given that the world's poorest people (approximately 1 billion) depend on livestock for their livelihoods. Munyai (2012). Sansoucy *et al.* (1995) mention that a high percentage of the rural poor and the landless receive a higher proportion of their income from livestock, therefore making this sub-sector an indispensable part of household economic improvement.

2.2. Livestock Sector in Sub-Saharan Africa

Livestock sub-sector in Sub-Saharan Africa accounts for more than 90 percent of the livestock population existing within the region, and this figure continues to rise (Ali & Khan 2013). Livestock products such as hides, meat and milk have increased by 3 percent during the years 2000-2010. This production increase is influenced by livestock number growth as well as productivity levels by smallholder farmers. Oluwafemi (2009) argues that, even though there has been an increase in animal numbers and productivity levels, the livestock sub-sector continues to struggle with meeting population demands. Therefore, this opens up new markets for smallholder livestock farmers within the region.

Udo *et al.* (2011) highlight that population growth rate on average, urban population increase and rising income levels are some but not all determinants which influence market opportunities within Sub-Saharan Africa. Sidhu and Kaur (2006) agree by stating that livestock products, such as meat and milk, continue to be in high demand for populations within sub-Saharan states which means more market opportunities for smallholder farmers. The review of animal product demand levels in Sub-Saharan Africa by Msangi *et al.* (2014) also bears out this view. More so, the role of smallholder farmers contributing to meeting those product demand levels is crucial. Smallholder livestock farmers have the herd numbers and available natural resources to actively participate within the formal economy of commercial agriculture. However, they face various challenges such as inefficient support services, inability to access existing markets, limited

exposure to new technologies and relevant information relating to livestock production. Participation within the commercial market is compromised, thus livelihood improvement levels are static.

2.3. The paradox of smallholder farmers progressing into commercialisation in SA

With regard to commercialisation, there is no definite definition but it can be described based on the farmer's goals or aspirations. According to Kibirige (2013b), commercialisation can be assumed when a farmer is producing a significant amount of cash commodities or selling considerable proportions of their agricultural output. Osmani *et al.* (2014) define commercial farming as the transition from subsistence orientated farming practices to increasingly market associated patterns of production and input use.

According to Statistics South Africa, less than a quarter of households (22 percent) are actively involved in agricultural production (Stats-SA 2010). Livestock production contributes 49 percent of agricultural output, while 80 percent of agricultural land in South Africa is only suitable for extensive livestock farming (Munyai 2012). Within the South African livestock economy, there are two main streams of trading which are smallholder/emerging farmers and commercial farmers (Munyai 2012).

The commercial sector is served by sophisticated agricultural marketing systems, well developed infrastructure such as roads and cattle handling facilities, structured cattle production systems such as organisations and breeding societies as well as marketing (Van Schalkwyk *et al.* 2003). Commercial cattle production operates on large farms which are well organized and located on prime lands. Access to information, technology and active marketing systems are not viewed as challenges that influence their production management systems.

On the contrary, the smallholder/emerging cattle farmers are characterised by farmers who mainly function using their indigenous knowledge, exposed to low technologies that influence effective production, poor infrastructure and marketing abilities (Munyai 2012). Lyne (1996) further states, that smallholder cattle farmers continue to find it a challenge accessing markets due to poor roads, communication networks, innovative skills and knowledge focusing on cattle production in South Africa. Makhura and Mokoena (2003) further indicate that other constraints

which smallholder cattle farmers face is the discrimination at institutions relevant to their livelihood, which is cattle farming.

Institutions related to livestock farming are failing to effectively assist smallholder production systems, and so these farmers are deprived from opportunities that would enhance their production levels and economic status. Public and private institutions are not taking enough responsibility between themselves, thus negatively affecting smallholder farmer's progress and development. They focus on discrimination in a sense whereby it is viewed that smallholder farmers have the inability to become active participants of the livestock economy due to their unwillingness of viewing their assets (cattle) as economic wealth rather than social pedigree amongst other issues. Previously, the main aim of this group of farmers was reported to be producing for household consumption, with whatever surplus being marketed (Lyne 1996). However, recent studies have reported that smallholder farmers' role has changed. The potential of such farmers contributing to meat and milk demand and national economic growth cannot be ignored. This can be best explained by the high government expenditure to establish livestock projects and programs to areas which poses potential to progress into the formal economy.

Institutions and relevant organisations need to intervene because smallholder livestock farming could become one of the key strategies used to generate livelihoods and aid in dealing with food insecurity at all levels. The South African National Development Plan highlights the importance of investing substantially in providing innovative market linkages for smallholder farmers in communal areas. This will involve linking farmers to markets in South Africa, and further afield in the sub-continental areas (NDP 2011). It addresses the need to improve infrastructure such as roads, rails and communication networks in order to ensure that farm produce is efficiently transported to relevant markets. The Plan also emphasizes the importance of equipping smallholder farmers with extended and improved marketing skills such as entrepreneurship training. This is aimed at enabling the smallholder farmers to actively participate in the value chain of various markets in agriculture.

Despite the positive intentions of the government to position smallholder farmers towards commercialisation, the practicality, however, of smallholder farmers' production systems and coping strategies could be further hindering them from progressing. The policies such as Strategic Policy for Smallholder Support (SPSS) prioritise the smallholder farmers; however, the

reality is that the reported challenges overburdening the smallholder farmers and subsequently preventing their market participation still remain. Recent literature continues to reveal that smallholder livestock farmers contribute less to the national agricultural market; however, their ability to mitigate hunger and food insecurity cannot be overlooked (Aliber & Maluleke 2010). Therefore, it is important that development policies and programs are implemented if this group of farmers is to play a significant role within the livestock commercial sector.

2.4. Livestock as a source of Livelihood for smallholder farmers

According to Ashley *et al.* (1999), two thirds of resource-poor households keep some type of livestock. Randolph *et al.* (2007) state that there are poorly resourced farmers keep livestock .Food production, whereby the purpose of livestock being kept is for rural households to access regularly nutrient rich animal food sources. These food sources provide critical supplements and diversity of meals. Animals can be slaughtered or sold so that households gain adequate access to nutritious foods.

Meat and milk contain concentrated levels of protein and vitamins which are essential for child growth, mental development and general health; income generation, where livestock can be sold during tough times within rural households for immediate cash needs (Moll 2005). According to Freeman (2008), rural households tend to sell their livestock if there are immediate cash needs for food purchase, health costs or educational needs; provision of manure, looks at the use of manure in many African countries being a common element of rural households.

Freeman (2008) stated that dung can be used to maintain soil fertility, thus contributing to improved crop yields. Dung can be used as fuel for fire or even building material in rural households; financial instrument, Moyo and Swanepoel (2010) mention that livestock act as a form of saving account system for rural households. Livestock can be sold and transferred into cash upon requirement by family members; draught power, specific livestock can be utilised for the purpose of ploughing, ridging, transporting, and planting or pulling sledges.

Stroebel *et al*. (2008) indicate that, where mechanical motorized machinery is not available, livestock draught power is commonly the alternative for resource-poor households. Similarly, Shackleton *et al.* (2001) reveal that animal traction provides a viable option for smallholder farmers since it is affordable, sustainable and environmentally friendly. Social status looks at the

status in which livestock owning families have within communities. According to Sansoucy *et al.* (1995), higher social status can translate into access to or authority, over broader base resources within the community. Farmers with large livestock numbers enjoy social recognition and tend to be culturally powerful.

A study conducted in Kenya by Heffernan and Mistuerelli (2000), gave evidence of the major role played by livestock in household economic security. With the use of a ranking scale, it was discovered that rural households identify livestock keeping as their most important income source. Similarly Dercon (1998) found that households with cattle had higher levels of income than those who did not own cattle. More so, a study in Tanzania revealed that rural households involved with cattle keeping had better food security levels. Therefore, this suggested keeping cattle had a positive impact towards food security levels within the households according to Dercon (1998). From these studies, it is evident that cattle play a major role towards household food security and economic levels of the poor in developing countries.

It is important to note that the main objective of smallholder farming is to sustain livelihoods (Campbell 2002). Most households have rich and different livelihood structures and show great resourcefulness in making ends meet (Campbell 2002). To better understand the contribution made by livestock towards rural households, the sustainable livelihood framework can be used. Ellis (2000) states that a livelihood needs five assets namely human, capital, financial, physical, social, and natural capital.

Natural capital includes land, water and biological resources utilised by people to survive. Physical capital is infrastructure such as roads, electricity and water supply systems or machinery; human capital consists of labour availability at household level, their education, skills and health; financial capital speaks to monetary reserves which the household can access. These could be loans, credit or savings; social capital consists of the wider social contribution towards individual or household survival. A livelihood is sustainable when it can respond and recover from abrupt changes or shocks, by maintaining or improving its capabilities and capacities with minimal disturbance to natural resources (Moyo & Swanepoel 2010).

The role played by livestock within smallholder farmer households is integrated between production and consumption decisions, thus making this activity complex (Vandamme *et al.* 2010). Randolph *et al*. (2007) use the sustainable livelihoods framework to explain the complexity and to provide insight into the role being played by livestock towards supporting rural households (Figure 2.1).

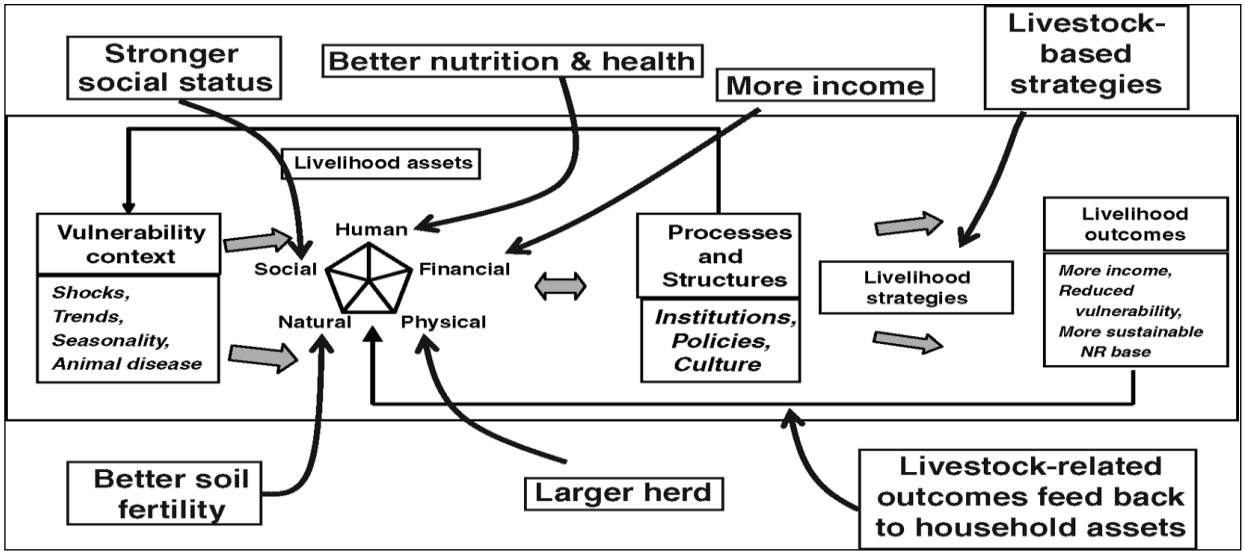

Figure 2-1 indicates that households face constant threats from biophysical and social-economic shocks (Randolph *et al*. 2007)

From this, it can be derived as a household experiencing vulnerability. Households manage their livelihoods with asset bases which are financial, physical, natural, social and human assets (Carney 1999). Households develop their livelihoods strategies based on their available assets, which are influenced by institutional environments (public and private sector, policy cultures and society rules or behaviour). Illustrated in figure 2.1 are various connections between livestock and livelihoods.

Larger herds promote physical capital, livestock ownership addresses enhanced social capital and nutrition speaks to human capital. Financial capital is interrelated in figure 1 because by having larger herds, they put themselves in a position to potentially gain higher income. In terms of livestock, it is a physical asset which can influence the other key household assets, thus reducing vulnerability to sudden changes or shocks, extending livelihood alternatives and improving livelihood performance.

2.5. Market access and constraints

Agricultural commercialisation has taken many forms when it comes to being explained and assessed (Chirwa & Matita 2012). If the concept of commercialisation is unclear, it may give rise to misconception and influence policy implementation negatively (Leavy & Poulton 2007). Commercialisation can happen on the output side of production, whereby there an increased marketable surplus or by the input side with an increased use of purchased inputs. Commonly, farmers are separated into different categories of farming namely, being commercial and smallholder/ emerging (Chirwa & Matita 2012). This is based on the size of farming operation and purpose for which the individual is practicing farming.

Commercialisation can also be determined by the number of animals that an individual may have (Groenewald & Jooste 2012). Someone with less than ten cattle can find it a challenge in exploiting the commercial element as a meat or milk producer. Fraser (1992) conducted a study in Ciskei of which 80 percent of smallholder cattle farmers who did not sell their animals, mentioned insufficient numbers as the main reason of not commercially trading cattle.

In the case of commercial and smallholder livestock farming, Hugh (1972) attempts to distinguish between economic value and purely commercial value of cattle. The main purpose of smallholder cattle farming is to sell animals for immediate cash needs. Schalkwyk *et al.* (2012) states further that smallholder livestock farmers stop thereafter because keeping livestock is their only available way of accumulating capital. On the other hand, commercial cattle farming are associated with farmers being exposed to financial institutions and functional marketing systems. Selling of livestock is determined by market price, supply and demand. The cash obtained from sales takes care of immediate financial needs and the rest is deposited into banks for investment and or further growth (Schalkwyk *et al.* 2012).

Fraser (1992) reports that there are reasons to believe cattle keeping purposes are changing amongst smallholder farmers. In Ciskei Eastern Cape, commercial motives have become an important element within the smallholder livestock production community. Information platforms such as magazines often reported smallholder farmers entering into the commercial economy by means of actively participating in sales in and around the province.

However, Jooste and van Rooyen (1996) indicate that market access continues to be a constraint against smallholder farmer's transition towards commercial production systems. Related to that issue are poor infrastructure and market price variability. With regards to smallholder cattle farmer's potential to graduate into commercialisation, various studies have been conducted in and around South Africa.

A case study conducted in Lebowa, Limpopo Province, pointed out various marketing channels used by smallholder farmers (Nkosi & Kirsten 1993). Farmers used auctions, butcheries, direct marketing and private sales as platforms to market cattle. Nearly half of the respondents (48 percent) kept livestock for commercial reasons. Auctions were viewed as dissatisfying marketing strategies due to low prices. Not having enough buyers could have been the influence which speaks to the lack of competition. Contrary to that is research by Düvel and Stephanus (2002) in the northern communal areas of Namibia, where farmer perceptions in relation to keeping cattle were assessed. The purpose of cattle keeping according to ranking order of importance revealed that 16.2 percent of respondents mentioned commercial farming as the main purpose of cattle keeping. Cash for regular household requirements was ranked as the most important, while common reasons 66 percent such as cultural practices, ceremonies, and social status ranked higher than commercialisation.

These studies reflect how commercialisation has been adopted by smallholder cattle farmers in certain areas of South Africa. Farmers are willing to make the transition into commercial farming. Becoming an active participant within the formal livestock economy is a priority. On other hand, smallholder farmers continue to view the importance of commercialisation as a minor contributor towards enhancing their livelihoods.

Coetzee *et al.* (2005) highlight some major marketing constraints faced by smallholder cattle farmers. Poor condition of livestock plays an important role towards animals fetching high prices at markets. Animals in poor condition indicate poor nutrition and/or health status. Similarly, old animals cannot be expected to fetch good prices because their condition tends to be poorer due to age. Market related constraints facing smallholder cattle farmers are lack of marketing facilities. This imposes a serious threat for smallholder cattle farmers and their ability to market their animals. Majority of smallholder cattle farmers are situated in remote areas which are far from markets.

These areas lack both physical and institutional infrastructure. This then explains the poor participation of smallholder cattle farmers within the formal economy. According to Frisch (1999), marketing facilities are either in poor condition or non-functional due to limited financial resources. In South Africa, lack of infrastructure such as sale yards, loading ramps and cattle handling facilities tend to influence smallholder farmer participation within the formal market (NERPO 2004).

Fidzani (1993) argues that poor infrastructure does not necessarily impact on market participation, since most buyers provide their own transport and loading. NERPO (2004) indicates that although there is also an issue of distance from communal areas to markets, road conditions play a major role when it comes to market access. Poor road conditions have made it difficult for customers seeking to purchase cattle in communal areas. With poor road conditions and infrastructure, customers are not buying cattle from smallholder farmers. Therefore, it means economic losses and low financial reserves. Smallholder farmers lack updated market information with regard to how the market functions, pricing, supply and demand trends (Coetzee *et al.* 2005). Farmers end up accepting whatever price offered, thus fetching lower prices for their animals. However, practical strategies have been recommended to ensure market participation from smallholder farmers.

Kumar *et al.* (2000) recommend that concerted efforts towards improving natural pasture management is crucial. Smallholder farmers can look into farming in co-operatives and operate feedlots in communal areas. This will require extensive training and mentorship from public and private sector. Exposure to market functionality and information is vital in ensuring that smallholder farmers understand and effectively participate within the formal economy of livestock production. This could be through information days held at dip-tank sites, formal trainings, visits to commercially operated cattle farms and market arenas. Government should priorities market infrastructure in communal areas. Sale yards, roads, communication lines all influence market functioning and need to be maintained. Other strategies such as one stop services, whereby farmers can sell their cattle, access financial services and assistance, obtain medicine for diseases as well as feed or supplements. This will inevitably contribute towards smallholder cattle farmer's potential to progress into commercial farming, thus enhanced livelihoods.

2.6. Production management practices

2.6.1. Nutrition

Nutrition represents one of the most serious limitations to livestock production in developing countries (Kaasschieter *et al.* 1992). Feed resources are inadequate in both quality and quantity, especially during dry seasons. Winter is the period where feed shortages are the highest, and these impact sources of feed for cattle in communal areas of South Africa. Donaldson (1998) mentions, that the declining veld production and loss of sustainable grazing systems threaten both productivity of livestock and sustainability of natural pastures. In South Africa, natural pasture types are diverse in terms of dry matter production potential and nutritive value, which speaks to the ability of sustaining animal production or performance (Okello *et al.* 2005).

Nutritionally, an animal requires a certain quantity of nutrients in order to meet daily needs. Munyai (2012) states that for ruminants, 7-8 percent crude protein is required. According to Bondi (1987), in order to facilitate favourable ruminal physiological functions in ruminants, they require crude protein of 13 percent. Amounts of crude protein required by an animal depend on the animal's species, age, the physiological functions being undertaken, for example, growth or lactation. Mineral requirements tend to decline with age, although it is not possible to predict the rate and extent of the decline as a result of variations in seasonal conditions, soil types and nutrient levels (Munyai 2012). In South Africa, natural pastures are generally deficient in minerals, especially phosphorus and protein in winter periods. It is advisable that, to avoid imbalanced quantities of these minerals and nutrients, as they may impact animal performance and develop physiological disorders (Tainton 1999). Supplement feeding is a strategy where smallholder farmers can substitute nutrients and minerals that may be lacking in the veld.

This practice is not commonly carried out in smallholder production systems due to limited resources. Natural pastures in South Africa are in bad condition and have been dominated by unpalatable species (Tainton 1999). The influencing factors for this are environmental conditions, overgrazing due to high stocking rates or simply the lack of farmer knowledge and information, which is affected by poor advice or training. Tainton (1999) states that in South Africa, 60 percent of natural pastures are in poor condition while 30 percent is intermediate and 10 percent in good condition. This necessitates the need for veld management strategies that will

ensure this source of feed is sustained, especially for smallholder livestock farmers who depend on it.

A study conducted by Mapiye *et al.* (2009) in Eastern Cape, revealed that natural pastures are the main source of feed for smallholder cattle farmers. With regards to animal nutrition and feed availability, smallholder cattle farmers indicated that body condition deteriorates during winter which is when natural pasture growth is low. Supplementary feeding is practised by farmers, but this occurs once per day in winter. Those who did not implement supplementary feeding cited cash and lack of knowledge as constraints contributing to their inability of improving animal nutrition.

On the contrary, a case study by Mpofu (2002) in Zimbabwe revealed how smallholder farmers had innovative ways of meeting feed demands of cattle. Browsing trees and shrubs are planted on contour banks to provide additional fodder for cattle during dry periods of the year. Rapid expansion of soya bean production has led to farmers seeking information about the nutritive value of soya bean stover. Efforts are being made for smallholder farmers to use soya bean hay more effectively as a source of roughage. Both of these studies address the importance of nutrition on animal welfare. If smallholder cattle farmers are to meet nutrition requirements for their cattle, it is important that supplementary feeding practices are adopted.

2.6.2. Animal Health

Animal health is directly related to levels of production in livestock farming (Kaasschieter *et al.* 1992). Animal health plays a vital role in ensuring productivity and welfare of livestock. This shows the relationship between animal health and sustaining livelihoods. The importance of livestock in poor areas is to sustain livelihoods and animal health is very influential in this regard according to Bayer *et al.* (2003a). Animal diseases affect poor people who are also exposed to challenges in dealing with animal health, and this is due to lack of information access, the expense of animal health production inputs and effective coping strategies when dealing with disease outbreaks (Ogunkoya 2014).

There are three groups of diseases that are commonly dealt with in smallholder animal health. These are endemic diseases, epidemic diseases and tick-borne diseases. Endemic diseases such as mastitis, pneumonia and parasite transmitted diseases have major impacts on smallholder animal health. This is due to productivity losses, costs of control or eradication programs (Perry & Grace 2009). Endemic diseases tend to be those that exert their greatest effect at farm level. Epidemic diseases are those that threaten farm production and national livestock industries.

Rich and Perry (2011) state that such diseases included high levels of mortality, high control or eradication costs and restricts trade. Epidemic diseases can cause severe shocks to smallholder animal health by wiping out the whole herd. Diseases such as foot and mouth are considered to be epidemic as well. Zoonotic diseases such as Rift Valley Fever, Brucellosis and rabies have impacts mainly on human health, animal health or even both (Bruckner *et al.* 2002). They tend to affect smallholder farmers who are in close proximity with their cattle. With regard to the study area, Black Quarter, Foot and Mouth Disease (FMD) and Heartwater are common diseases that farmers experience in South Africa.

2.6.2.1. Black Quarter (BQ)

Black Quarter is said to be an acute infectious disease of cattle, which causes severe inflammation of skeletal, and cardiac muscle (Sultana *et al.* 2008). The impact of black quarter on smallholder farmers is significant. Furthermore, most cases of black quarter outbreak occur in the warmer months of the year. With the bacterial spores able to withstand various environmental stresses, they can persist for a number of years within an area (Sultana *et al.* 2008). Clinical symptoms include presence of muscle swelling on the affected area; however post mortem findings include dark and discoloured muscles. The key to prevention is a strict vaccination programme, given that the disease can cause high mortalities and financial loss.

Research by Useh *et al.* (2006) in Nigeria highlights that black quarter caused severe farmer's losses through deaths, thus impacting on farmers' financial status. It is important that farmers are aware of practices to prevent this disease as well as receive continuous support from agricultural extension services with regard to implementing vaccination programs where necessary.

2.6.2.2. Foot and Mouth Disease (FMD)

Foot and Mouth Disease (FMD) is highly contagious with low mortality rates, however it accounts for extreme losses in terms of livestock productivity and trading ability (Longjam *et al.* 2011). In addition, Knight-Jones and Rushton (2013) highlight that direct loss due to FMD is low meat and milk production, loss of weight, loss of draught power and marginally cases of death. Indirect losses speak to additional control costs, prevention costs and marketing ability of livestock. For example, in the United Kingdom FMD outbreak cost the state 4-5 billion dollars to control and eventually eradicate the disease. Barasa *et al.* (2008) state that the dreaded constraints of this disease are that it is highly contagious, has a wide geographical distribution and severe economic loss. Grubman and Baxt (2004) stated that livestock movement and trade play an important role in the spread of FMD.

Studies by Otte *et al.* (2004) in Uruguay revealed that through mass vaccination programmes, the country was saving between 8 and 9 million dollars annually against FMD disease outbreaks. Additionally, in Turkey, vaccination programmes act as a prominent method in preventing the disease. Other means include strict product inspections at import points within the country.

2.6.2.3. Tick and Tick-borne diseases

Another important aspect of animal health is controlling tick and tick-borne diseases, which impact production management potential on cattle. Ticks transmit a variety of micro-organisms, protozoa and viruses. They are among the most important vectors of diseases affecting livestock (de Castro 1997). Ticks can cause severe conditions in animals such as paralysis, irritation and allergies. Diseases which are transmitted by ticks to livestock can have additional constraints on animal production. According to de Castro (1997), ticks are responsible for animal blood loss, damage to hides and skins as well as introduction of toxins.

Example of tick-born disease- Heartwater disease

An example of tick-borne disease is heartwater, which is a serious tick-borne disease affecting livestock in Sub-Saharan Africa. This disease is transmitted by the African bont tick (*Amblyomma hebraeum)* and is endemic in most areas of the Sub-Saharan region (Rushton *et al.* 2002). Moreover, the disease is one of the major causes of livestock losses for smallholder

farmers. Typically the infection causes a high fever, nervous signs, accumulation of fluid around the cardial and lung cavity, thus leading to death (Allsopp 2009).

The impact of heartwater on smallholder production systems has been well documented in literature. Research by Mukhebi *et al.* (1999) highlight that economic loss in relation to acaricides result in low milk production levels; traction and manure are factors which smallholder farmers indicate as being influenced by heartwater prevalence within their cattle herds. Furthermore, a study by Makala *et al.* (2003) revealed that heartwater is regarded as a serious disease from which smallholder farmers sustain great losses in terms of cattle numbers, therefore impacting negatively towards their livelihood sustainability. The relevance of highlighting the aforementioned diseases is due to their influence on smallholder cattle production systems within the Sub-Saharan region. Additionally, methods of controlling and preventing these diseases become very important in relation to smallholder farmer' commercialisation potential and the sustainability thereof.

With regard to ticks and tick-borne diseases, it is crucial that intervention controls are implemented, especially for smallholder cattle farmers who find this issue a challenge to manage. These interventions need to address the problem; they must be economically viable and socially acceptable to farmers. Tick control interventions could be through: chemicals acaricides or vaccinations, genetic resistance which speaks to breeding animals for resistance and veld management by means of veld burning, stocking rates and veld resting systems (Jongejan & Uilenberg 2004).

A study by Ocaido *et al.* (2009) in Uganda, assessed the impact of diseases and vectors towards smallholder cattle production. The study revealed that diseases such as Foot and Mouth (FMD), anaplasmosis, Lumpy Skin Disease (LSD) and Heartwater were commonly diagnosed in sick animals. Economic loss to farmers in the form of mortality, milk production loss and draught power ability influenced livelihood sustainability negatively amongst farmers. Conventional methods such as dipping, vaccinations and or spraying were employed by farmers to address tick loads and aforementioned diseases. The significance of this study is, are smallholder farmers in developing countries willing to adopt conventional methods with regards to animal health. By highlighting the relationship between health and economic loss, it indicates that with poor animal

health, smallholder cattle farmers will continue finding it a challenge to become commercial farmers and enhance their livelihoods.

2.7. Constraints of Smallholder Livestock farmers

2.7.1. Livestock Nutrition

Feed quality and quantity is regarded as the most important constraint that livestock farmers face in developing countries (International Livestock Research Institute 2003). Poor levels of animal nutrition tend to affect meat and milk yields, affect breeding and makes animals susceptible to diseases. Munyai (2012) reports that major nutritional issues revolve around the seasonal shortages of grass from natural pastures in rural areas. Heavy degradation of natural pastures is posing a threat to sustainable livestock farming in communal areas. Farmers are resorting to other sources of food such as crop residues and other forms of forage to meet animal daily requirements. A study by Maass *et al.* (2012) in Democratic Republic of Congo, indicated that 78 percent of the respondents mentioned the lack of feed options contributed to the poor nutrition of their livestock. The inability to afford supplementary feed due to household demands meant that livestock have to survive on whatever forage available. For those who could afford giving livestock supplementary feed, maize, rice and cassava were the main source of feed used for their animals.

Similarly, a study conducted by Mutibvu *et al.* (2012) in Zimbabwe, revealed that natural pasture growth is influenced substantially by rainfall and seasonal patterns. Grass quality and quantity is affected negatively from lack of rain. With natural pastures being the main source of feed for smallholder livestock farmers, it does not bode well for their livelihood sustainability if strategies are not implemented to address livestock nutrition.

With regard to recommendations for nutrition, Mapiye *et al.* (2009) conducted research in the Eastern Cape and farmers mentioned that the use of local feed supplements such as acacia could solve nutritional problems with their livestock. Educating farmers about cost-effective ways of improving nutrition was important. These methods could be harvesting, conserving forages and or crop residues. Similarly Taivirimirwa, Mwembe *et al.* (2013) recommend from their study that smallholder farmers could use cheap technologies such as urea treatment for crop residues, thus increase crude protein levels, therefore improving supplementary feed quality. Strategies such as

supplementary feeding, improved natural pasture management form part of the broader agenda which is increasing nutrition levels for livestock. This also requires farmer exposure to information sharing and trainings headed by livestock related organisations as well as institutions.

2.7.2. Animal Health

Diseases pose a great threat to smallholder livestock farmers. They have the potential to reduce productivity, and can restrict farmer's ability to trade, which impacts negatively with farmer livelihood sustainability and household food security. Munyai (2012) mentions that part of the problem is existing disease management practices which are not appropriately designed for communal areas or not made available due to developmental issues or adoption by farmers.

The ILRI (2003) relates to this by mentioning how little effort is being made by private and public sectors in ensuring practical and appropriate strategies are put in place to deal with livestock health. Furthermore, with increased globalization trade happening, smallholder farmers may be restricted to participate in this market due to poor health standards of their animals. With livestock diseases being a constraint, smallholder farmers may find it difficult to generate income, thus affecting their ability of purchasing required medicine for specific diseases. Households with low income levels are more vulnerable to household food insecurity (Hoffmann 2011).

Research conducted by Oladele *et al.* (2013) highlight various interventions which could be implemented to improve animal health for smallholder livestock farmers. Farmers must be encouraged to form co-operatives so that financial resources can be pooled together in order to access costly veterinary medicines. Livestock farmers who have good animal health records could be rewarded by means of incentives, so that health standards can be maintained. The training of smallholders is vital towards achieving improved animal health measures, and this could be through agricultural extension services, whereby farmers are informed of how to handle vaccines, how to vaccinate, steps taken if there is a disease outbreak and the essence of using animal health services.

2.8. Summary and Conclusion

The literature looked into how the South African livestock sector impacts on smallholder farmers in terms of progress and growth. The differences between commercial systems and smallholder systems have been clearly identified. Review of literature has been used to explain how various institutions such as government intend improving smallholder market participation when it comes to livestock.

The aspect of indigenous knowledge and how conventional methods could rather be incorporated and not directly transferred is also highlighted within the literature review. Two production management related factors, namely nutrition and health have been reviewed. Animal quality with regard to sound conformation toward health goes a long way in ensuring high prices at markets for livestock farmers. There are many challenges hindering smallholder farmers from making a successful transition to commercialisation of their livelihood. These constraints have been reviewed.

Chapter 3 : Research Methodology

3.1 Chapter Overview

The research approaches used in the study are described. The chapter also covers the study area; climatic conditions and contribution made by agriculture towards municipal development are explained. Research design, sampling procedure and data collection are outlined in this chapter. Lastly, the chapter presents data analysis and summary.

3.2 Study Area

The study was conducted in Jozini, located in northern KwaZulu-Natal and borders on Swaziland as well as Mozambique. Jozini local municipality is one of 50 local municipalities that form the KwaZulu-Natal Province (IDP 2014). Jozini local municipality covers 3057 square kilometres of the total area of 13859 square kilometres of uMkhanyakude District municipality. A large area of Jozini municipality is covered by 20 municipal wards which are mostly rural, under developed, poverty stricken, and with poor service provision. It is estimated that about 36 percent of the population earns no income, thereby contributing to the poverty cycle in Jozini (IDP 2014). Jozini municipality is characterised by six towns namely; Ingwavuma, Jozini, uBombo, Bhambanana, uMkuze and Ndumo. The reason for selecting Jozini was because it had the highest number of active smallholder cattle farmers and was the largest town as compared to the others within the Municipal area.

The total population of Jozini municipality is 186 502 people and 38 849 households (IDP 2014). This represents 29 percent of the total district's population. The municipality has a high proportion of youth which comprises of 72 percent of the total municipal population. With such a statistic, Jozini municipality seeks to improve job creation within the agricultural and eco-tourism sector.

3.2.1 Climate in Jozini Municipal area

Jozini is characterized by seasonal dry winters and wet summers, with periodic flooding. Summer temperatures range from 23^0-40^0 C, while winter temperatures vary between 16^0 C and

25^0 C respectively. The mean annual rainfall is 600mm, and 800mm along the Lebombo Mountains which falls within the moist belt.

3.2.2 Agriculture in Jozini municipal area

Within the Integrated Development Plan of Jozini, agriculture has been identified as one of the main economic drivers. Currently, agricultural activity in the form of smallholder and commercial sugarcane farming, livestock farming and other summer crops, predominately maize. According to the Makhatini Integrated Master Development Plan (MIMDP) of Jozini, livestock and crop sub-sectors are underdeveloped when it comes to agricultural potential. The plan identifies ideal climate conditions for crop growth and irrigable land amounting to 13000 hectares, listed for crop production. However, the plan fails to identify livestock production as a key contributor of agricultural development in Jozini. Livestock also play an important role when it comes to addressing poverty, unemployment but this opportunity needs to be recognised as such. According to a cattle census conducted in March 2014 by Department of Agriculture, Environmental Affairs and Rural Development, there were 160 862 cattle in Jozini supporting 8581 households, so on average each household owned 1.88 cattle.

3.2.3 Location map of study area

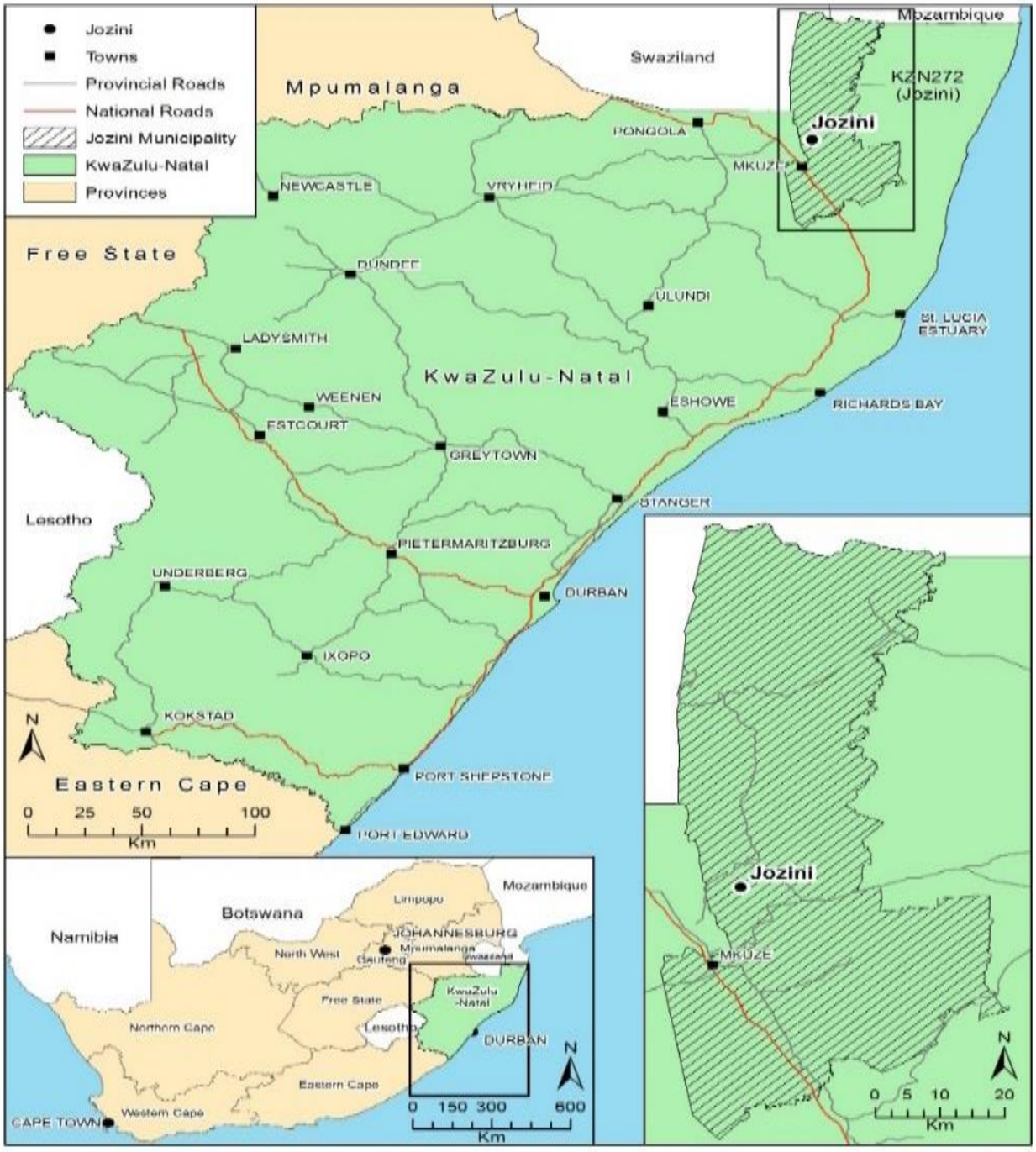

Figure 3.1: Location map of study area

3.3 Research Design

This study used the mixed method of qualitative and quantitative approaches. The reason for this was to gain a better understanding of the research problems identified within the study. The data used in this study were primary data, which was collected using well-structured questionnaires, focus group discussions, and criteria to assess animal health and body condition score sheet to evaluate animal condition.

3.4 Sampling Technique and data collection

The top 4 diptank areas (Zineshe, GG area, Gedleza and Umthala) with the highest cattle herd numbers were selected. A purposive sample of 120 (30 farmers from each dip-tank area) smallholder cattle farmers were systematically selected from four dip-tank areas in Jozini local municipality, Northern KwaZulu-Natal. Purposive sampling is a technique used in qualitative research for identification and selection of information-rich cases, for the most effective use of limited resources (Palinkas *et al.* 2013). It involves identifying and selecting individuals or group of individuals that are knowledgeable or experienced with a phenomenon (Palinkas *et al.* 2013). The participants were selected based on a criterion of owning more than 10 cattle per household. According to Groenewald and Jooste (2012), farmers who own less than ten cattle, tend to find it a challenge exploiting the commercial element as meat or milk producers.

3.4.1 Cattle sampling

A total of 50 cattle were selected to undergo a Body Condition Scoring Assessment from four dip-tanks. For this study, cows and bulls were condition-scored, respectively. Eversole *et al.* (2009) indicated that body condition scoring is a useful management tool for distinguishing differences in nutritional needs of beef cows, heifers and bulls. It uses numeric scores to estimate body energy reserves in cattle. Also, research conducted by Grobler *et al.* (2013) reveals the significant relationship between body condition and reproductive ability (breeding), nutritional status of the animal, and health. The health status of cattle was assessed using a clinical health checklist criterion, this consisted of factors such as number of ticks, alertness of the animal, posture and normal function which related to milk production, lactation of cows and mating ability of bulls. Observations were conducted by the researcher and recorded.

3.4.2 Data Collection

The Focus Group Discussion (FGD) sample comprised of participants who were part of the dip tank committee in each area. FGD's were conducted by the researcher and there were eight participants, who were selected in accordance to them being part of the diptank committee or not, from the total sample size participating in the study within each FGD. The FGD interview comprised of questions regarding cattle nutrition and health management, rural livelihoods and cattle farming, value of owning cattle and perceived contribution to rural livelihoods (See Appendix 2). Information was recorded on writing pads by the researcher. Permission to collect data was obtained from the heads of rural households and suitable times as well as venues were arranged with farmers prior to the commencement of data collection. Farmers were interviewed at their homesteads using a pre-tested structured questionnaire. The interviews were conducted in the Zulu vernacular by trained enumerators. Data collected included household demographics, cattle nutrition and health management practices (Appendix 1).

Cattle health status was assessed at the dip tank by the researcher and two trained enumerators, prior to them being dipped. Visual assessment of the body condition was made using the Body Condition Scoring system, in which a score of one was emaciated and a score of four was very fat (Eversole *et al.* 2009) (See Appendix 3). The health status of cattle was assessed using a clinical health checklist criterion. The checklist consisted of sub-headings being number of ticks, alertness of the animal, posture, lactating, being milked and if the bull was mating. Ticks were counted and recorded on each animal by examining both sides for all visible engorged adult ticks, and this was done by the researcher as well as two trained enumerators. Tick counts were categorised into low tick count (0-30), medium tick count (31-60) and high tick count (>61) (Londt *et al.* 1979). Ticks were counted on predilection sites. These sites were: 1). Pinna: the surface of each ear on the animal. 2). Neck: include the dewlap and lateral surfaces of the neck. 3). Legs: from the elbow down towards the foot/ hoof. 4). Tail: included the tail brush and underneath the tail towards the anus. 5). Lower perineum: which is ventral to the vulva in females or anus in males, towards the base of the udder or scrotum (Baker & Ducasse 1967).

With regards to the other factors on the health checklist criterion, alertness was noted by judging if the animal was reactive once approached. In terms of posture, the animal was allowed to walk at which point if there were abnormalities in its stride or stance, this was recorded according to the checklist. Other factors on the health criterion included lactating, producing milk, being milked where the herdsman was queried by the researcher.

3.5 Data Analysis

Data was analysed using Statistical Analysis Software (SAS 2002). Coded demographic data provided a general overview of gender, age, marital status, education, land size, income and herd size. Frequencies reflected body condition scores; tick counts, sources of food used, supplementary feeding and chi-square tests presented the significance in association. Focus group discussions were analysed using content analysis. An ordinal logistic regression was used to estimate the likelihood of smallholder farmers progressing into commercial cattle farming (SAS 2008).

Chapter 4 : Assessment of cattle quality in terms of nutritional and health status of Jozini cattle

Abstract

Smallholder farmer commercialisation in South Africa has the potential to contribute to the economic growth and development of the country through improved productivity, farmer skills and active market participation. This chapter will investigate the production management practices used by Jozini smallholder cattle farmers and the impact of these practices on animal health and nutrition. A structured questionnaire and FGDs were used to collect data on cattle production management practices looking specifically at nutrition, health and livelihoods. The Body Condition Scores (BCS) and health status (amount of ticks, alertness, posture and normal function) of 200 cattle were also assessed from four diptank areas in Jozini. The preliminary results of the research showed that the majority of the cattle in Jozini were in poor condition, with 56 percent of the cattle scoring a BCS of 2. The health and nutrition status of cattle in the area is highly affected by poor grazing availability, thus affecting the condition of the animals and a high prevalence of ticks and diseases. In this chapter, it was discovered that BCS correlates highly with lactation and tick count.

Key words*: cattle health, nutrition, body-condition scoring, commercialisation*

4.1 Introduction

The potential of smallholder farmers progressing to commercialisation is an indispensable pathway towards economic growth and development for most developing countries relying on agriculture (Jaleta *et al.* 2009). Smallholder commercialisation could potentially lead to active market participation, facilitate the use and adoption of developed production systems, enhance farmer skills, improve information access and influence farmer productivity (Pingali & Rosegrant 1995). Although there is a rich body of literature analysing the extent of commercialisation for crop production, commercialisation potential in the livestock sub-sector has received little attention. Furthermore, literature reflects little study on the importance of production management factors contributing to the commercialisation potential of smallholder livestock farmers. With livestock in developing countries being a source of food, provision of income, transport, store of wealth and draught power, disease and parasite control, all of which are of paramount importance especially for smallholder farmers.

Even though 84 percent of communal land in Southern Africa has the potential for grazing, livestock production from these areas contributes little towards the cash economy in terms of sales for slaughter to formal markets (Bembridge & Tapson 1993). This is due to a lack of effective cattle production management practices (Bembridge & Tapson 1993). Meat and milk production from communal cattle is estimated to be a quarter of that in commercial farming (Hoffmann 2011). This has been attributed to low levels of nutrition and poor health management practices implemented in communal areas (Bembridge 1987). Low offtake of cattle in communal areas is also due to a low resource base and rapid land degradation (Boonzaier *et al.* 1990).

Communal farmers experience high levels of cattle mortalities (Scholtz and Bester (2010). These losses have been attributed to diseases and parasites, poor access to quality veterinary and agricultural extension services. The major source of nutrition for cattle in arid and semi-arid areas is natural pastures. Natural pastures, however, rarely satisfy animal requirements throughout the year. Forage quality and quantity in arid or semi-arid areas is affected by seasonal fluctuations and, thus, limiting forage availability throughout the year. According to Scholtz *et al.* (2008), production management practices play an important role towards sustaining a

livestock production system, therefore influencing the commercialisation ability of smallholder farmers.

If smallholder farmers are to progress into commercial cattle farming, factors such as health and nutritional status of animals become critical. More so, day to day production management practices impact on the sustainability of the livelihood once the transition has been made by the smallholder cattle farmers of Jozini. Therefore, the objective of this study was to assess the health and nutritional status of cattle owned by Jozini smallholder farmers.

4.2 Research Methodology

A total of 200 cattle randomly selected from four diptank areas in Jozini were assessed in terms of their nutritional and health status. Body condition score assessment was conducted whereby the animal was observed by the researcher and recorded according to the body condition score scale which is from 1 to 4. Furthermore, a clinical health checklist criterion was used to assess cattle health status. Factors within the health criterion included amount of ticks, alertness of the animal, posture and normal function which speaks to lactation and mating ability of bulls (Refer to chapter 3).

4.3. Results

Table 4.1 represents the household characteristics of respondents who participated in the study. Farmer age shows that the majority of respondents (50 out of 120) were middle aged farmers. A proportion of was old age farmers (36.7 percent) stated that due to their current age, keeping cattle for commercial purposes was not their main aim as farmers. The most important reason for keeping cattle was for socio-cultural practices (Lobola, ceremonial gatherings etc.) and to sell for immediate cash needs. Youth respondents accounted for the lowest percentage (21.7 percent) from the sampled farmers.

The majority of the sampled farmers had little (primary) (30.8 percent), or no formal education (34.2 percent), while (28.3 percent) had secondary education. Farmers who had a tertiary education (6.7 percent) and those who had secondary education would find it easier adapting to new technologies and taking production orientated decisions. The results show that more males (65 percent) are involved in cattle farming than their female counterparts (35 percent). Female participation is influenced by men migrating to urban areas in search of employment, voluntarily

deciding to participate in cattle farming or through family inheritance. Commonly, family inheritance occurred through spousal death. There was an association between gender and herd size ($P< 0.05$).

Table 4-1 Demographic characteristics of the respondents and mean herd sizes of cattle (n=200)

Class	Frequency	Percentage
Farmer age		
18-35 (youth)	26	21.7
36-59 (middle age)	50	41.7
> 60 (old age)	44	36.7
Education level		
No Education	41	34.2
Primary	37	30.8
Secondary	34	28.3
Tertiary	8	6.7
Gender		
Males	78	65
Females	42	35
Farmer age		
18-35 (youth)	26	21.7
36-59 (middle age)	50	41.7
> 60 (old age)	44	36.7
Education level		
No Education	41	34.2
Primary	37	30.8
Secondary	34	28.3
Tertiary	8	6.7
Gender		
Males	78	65
Females	42	35

Cattle assessments in relation to nutritional and health status

Cattle assessed in the study area had a poor body condition score (BCS). A significant proportion of the cattle were recorded to be very thin (56 percent), which was a score of 1. This reflected poor nutrition plan which the animals could have been exposed to over a reasonable length of time. Cattle that scored a moderate body condition (19 percent) of which was a score of 3 or over fat (14 percent) being a score of 4 were considered to be exposed to some form of supplementary feeding, had a better health status, were lactating and or pregnant. Severely

emaciated cattle (10 percent) showed a poor health status by means of a high tick count, and low alertness levels.

Table 4-2 : Frequency distribution of cattle body condition scores

Body condition Scores	Frequency	Percent (%)
1-Severly emaciated	20	10
2-Very thin	112	56
3-Moderate	39	19
4-Over fat	29	14
Total	200	100.0

Presented in table 4.3 is the physiological status (lactating versus non-lactating) cows which was recorded as part of the clinical health checklist. The majority (58 percent) of the lactating cows had a body condition score of 2, while 38.7 percent of the non-lactating cows scored a body condition of 4. Furthermore, the results indicate that the physiological status of cows influences body condition scores. There was a significant association between physiological status and body condition scores in cows ($P< 0.01$).

Table 4-3 : The physiological status (lactating versus non-lactating) of cows and association between body condition scores.

Lactating animal n= 156	BCS[1]	Percentage
Lactating n= 75	1= 2	1= 2%
	2=60	2= 80%
	3= 8	3= 11%
	4= 5	4= 7%
Non-lactating n= 81	1=10	1= 12%
	2=20	2= 25%
	3=31	3= 38%
	4=20	4= 25%

1=body condition score

Outcome of focus group discussions interview outcome with smallholder farmers in relation to cattle nutrition

Focus group discussions conducted with the farmers revealed that poor availability of grazing influenced the poor condition of their animals. Farmers mentioned that, since grazing land was available far from normal grazing sites, it meant that cattle had to walk great distances in order to access better grazing land. This then had a negative impact on cattle condition. Farmers indicated that sometimes, they had to erect temporary shelters far from their homesteads just so their cattle could get enough food on a daily basis.

Other smallholder farmers preferred to occupy private land such as surrounding game reserves so that cattle could graze. The reason behind such measures was drought. Respondents indicated that Jozini was experiencing its worst drought in over 10 years and this was taking a toll on animal condition. With limited income to cope with animal feed shortages, farmers were looking to the provincial agricultural department for animal feed assistance which they indicated was not willing to help them.

Supplementary feed practices and sources

Table 4-4: Respondents with regard to supplementary feeding

Supplementary Feeding	Frequency	Percent (%)
yes	50	41.7
no	70	58.3
Total	120	100.0

A total of 41.7 percent of respondents indicated that they practice some form of supplementary feeding presently. These were respondents who had higher income margins within the whole survey population. Supporting information from the focus group discussions, the farmers were asked what their understanding of practicing supplementary feeding was, farmers mentioned that it helps maintain cattle condition through dry seasons and times where grazing availability is low and is cheaper depending on what type of supplementary feed is being used.

A total of 58.3 percent respondents mentioned that they did not practice supplementary feeding currently. The main reason mentioned was the inability to afford feed which also entailed other

costs such as transport. They stated that as much as the loss of an animal was detrimental to them, their income was directed more towards ensuring household food security than that of animals.

The chi-square tests revealed that there was no significant relationship between supplementary feeding and education, however there was a significant association with regards to supplementary feeding and household average income (P< 0.05). Furthermore, there was no significant association between supplementary feeding and education level of farmers, but there was a significant association between average income per household and education level. Similarly, there was no significant relationship between supplementary feeding and average income level. Results are presented in Table 4.5.

Table 4-5: Indicating associations between education level, average income and supplementary feeding (n=120)

Education level	
Average Income	P value (0.000)**
Supplementary feeding	P value (0.215) NS
Supplementary feeding	
Education Level	P value (0.215) NS
Average income	P value (0.008) NS
Average Income	
Education level	P value (0.000)**
Supplementary feeding	P value (0.008) NS

NS= not significant ** significant P< (0.005)

Feed sources utilised by smallholder cattle farmers of Jozini are presented in Table 4.6. Crop residues (47.5 percent) were the main supplementary feed source, and this consisted of maize stalks. The maize stalk was bought at R100 per bakkie load from surrounding commercial green

maize farmers. Hay-bales (5.8 percent) and concentrates (2.5 percent) acted as a supplementary feed source for smallholder cattle farmers; however this was a costly practice. With Jozini experiencing severe drought conditions and farmers depending on natural grazing as a feed source for their animals, 44.2 percent of the farmers opted not to use any form of a feed source for supplementary feeding. (See Table 4.6)

Table 4-6: Feed source types used for supplementary feeding by smallholder cattle farmers

Supplementary feed sources	Frequency	Percent (%)
Crop residues	57	47.5
Concentrates	3	2.5
Hay bales	7	5.8
No feed sources used	53	44.2
Total	120	100.0

Health status and management of the cattle

Outcome of focus group discussions with smallholder farmers in relation to cattle health

Smallholder cattle farmers who participated in the focus group discussion (FGDs) revealed that they relied extensively on agricultural extension officers when it came to tick and disease control methods. However, information gathered from FGDs indicated that this process was not entirely effective. Farmers stated that the acaricides were not being delivered on time by agricultural extension officers, thus affecting the dipping schedule. More so, vaccines would sometimes arrive on odd days and not according to schedules agreed upon with farmers and agricultural extension officers. This meant that cattle were vaccinated later than usual, and by the time this happened a significant number of cattle would have died from diseases such as black quarter.

Farmers mentioned swollen muscles and lameness on the affected area as signs of black quarter. Ethno- veterinarian practices included the stabbing of the infected area by using "*Umkhonto"*- the Zulu spear in order to release "*igazi elimnyama*" (bad blood). The opened wound would then be cleaned using warm water and methylated spirits. Other ethno-veterinarian methods were the cutting of "*amaqhuqhuva*" (lumps) when an animal had lumpy skin disease. The wound would then be washed rinsed with water mixed with methylated spirits, savlon or Dettol. Such methods were regarded as 'Generation-wisdom 'passed on from generation to generation and it worked, and so they have adopted it.

Tick count category and total number of cattle assessed are presented in Table 4.7. Of the sampled cattle, 61 percent had a low tick count, while 27.5 percent were in category two which was medium tick count. A total of 11.5 percent had a high tick count. Tick counts were categorised with one being low tick count (0-30); two was medium tick count (31-60) and three being high tick count (>61) (Marufu *et al.* 2011)

Table 4-7: Tick loads that were examined on cattle and their categories (n=200)

Tick count category [1]	Frequency	Percentage (%)
1-low	122	61
2-medium	55	27.5
3-high	23	11.5
Total	200	100

Almost all farmers (97 percent) were using conventional methods to control ticks in the study area which were acaricides provided by the provincial Department of Agriculture. A total of 3 percent still practiced some form of ethno-veterinary method in controlling ticks such as aloe. This involved crushing and soaking the plant in water then spraying the animal. Respondents (87 percent) mentioned that dipping occurred every two weeks, with the plunge dipping method being adopted and 13 percent used the spraying method for tick control. More so, it resulted in cattle accumulating tick loads which farmers stipulated influenced cattle condition and health by means of blood and weight loss. There was no significant association between tick control methods or dipping methods according to the chi-square test (P=0.201).

Table 4-8: Tick control methods implemented by the farmers (n=120)

Tick Control methods	Frequency	Percentage
Conventional method	80	97%
Ethno-veterinary method	3	3%
Dipping Method		
Plunge dipping method	104	87%
Spray dipping method	16	13%

Specific diseases considered to be contributing to cattle health in the study area are shown in Figure 4.1. Black quarter (88 percent) was the common diseases affecting cattle. Foot and Mouth disease (FMD), 44 percent was prevalent as well, and this was impacting on the ability to sell cattle. The results further indicated that there was no association between disease prevalence and willingness to sell cattle (P= 0.513).

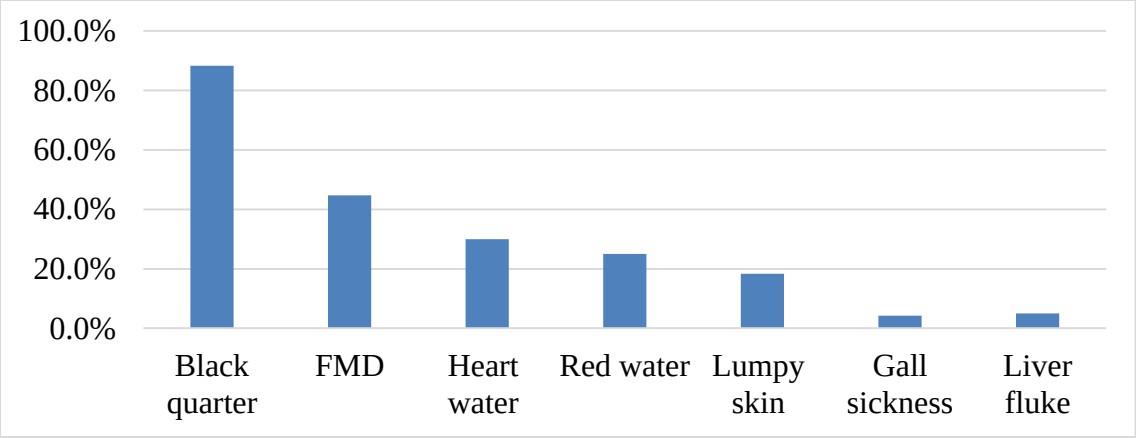

Figure 4-1: Disease prevalence in cattle of Jozini

Almost all sampled farmers (97 percent) mentioned that they used conventional methods to control diseases, while (3 percent) still used ethno-veterinarian methods to control diseases. Vaccinations programmes provided by the provincial Department of Agriculture and supervised by Agricultural Extension officers were the main conventional method used to control diseases.

Table 4-9: The tick count in relation to body condition scoring (n=200)

Tick Count by Body Condition Scores	**Body condition Scores (Frequencies)**				
	BCS 1	**BCS 2**	**BCS 3**	**BCS 4**	
Percentage (%) **Tick count category**					
1- Low	7	72	25	18	61
2- Medium	4	41	6	4	27.5
3- High	16	5	2	0	11.5
Chi-square (P<0.005)					100

Of the sampled cattle, 61 percent had a low tick count in relation to all body condition scores presented in Table 4.9. A total of 72 animals were the highest number of cattle recorded as having a body condition score of 2 and a low tick count. Similarity, 41 animals had a body condition score of 2, however were categorized as having a medium tick count. The results from the chi-square test indicated that the relationship between body condition and tick count was highly significant ($P<0.005$).

4.4. Discussion

Cattle keeping are predominantly male dominated in Jozini, according to the results presented in Table 3.1. The glaring gender disparities in livestock keeping can be attributed to a multifaceted, though often subtle societal challenges which could be social or cultural. Similar findings by Assan (2014) on gender disparities in livestock production and their implication for livestock productivity in Africa concurs with the findings of this study. The majority of the sampled farmers were middle aged to old.

With older farmers dominating livestock keeping in the area, the risk of such a livelihood not being sustained is fairly high due to poor youth involvement who are considered to be the next generation This relates to research by White (2012) which confirms the alleged view that rural youth are increasingly disinterested in smallholder farming which they perceive as dirty work. Lastly, education levels revealed in the study indicate that literacy levels of farmers sampled is poor. Adapting to new production orientated technologies, being exposed to livestock trainings and skill development programmes, accessing relevant information are some but not all areas which require some form of basic education level. Farmers may find it a challenge understanding and implementing the necessary knowledge and production skills required when producing on commercial scale sustainability.

The physiological status of an animal is paramount in cattle production systems. In the study, physiological status looked specifically at the comparison between lactating and non-lactating cows. The relevance of these results to this study is that lactation of the cow directly influences body condition score. Research by Nyoni *et al.* (2000) found that lactating cows tend to experience low body condition scores which in turn could be affected by poor animal nutrition.

The results indicated that the BCS of Jozini cattle was poor. Results also reveal that BCS was influenced by factors such as lactating, poor availability of grazing land and supplementary feeding. This supports findings by Bayer *et al* (2003b) that poor grazing availability meant that cattle had to walk great distances in search of food and water, thus impacting on cattle body condition. Farmers indicated that with the severe drought being experienced, cattle walked great distances in search of better grazing. Risky measures such as occupation of private land and erecting of temporary shelters in locations far from home had to be implemented to guard animals from stock thieves.

Supplementary feeding is the most cost effective way of providing feed for livestock during dry periods. However in this study, supplementary feeding was being practiced by a minority of sampled farmers. Such farmers had higher income averages, and could afford to buy supplementary feed sources such as hay, crop residues and concentrates. Challenges that were highlighted by smallholder cattle farmers who could not afford purchasing supplementary feeds were the lack of transport and prioritising their income to household needs.

The findings revealed that specific diseases impacted negatively on cattle health in Jozini. Respondents highlighted black quarter and FMD as the two primary diseases which impact their cattle health. This is in line with research conducted by Sultana *et al.* (2008) that black quarter is an acute disease which causes high mortality rates, especially in the smallholder livestock sector. With regard to FMD, not only does it affect cattle health but what was revealed from survey interviews and supported by FGD's, was that FMD limited the farmer's ability to trade their animals. This is verified by research done by Scoones & Wolmer (2008) where he states that FMD prevents poor livestock farmers from actively participating in a market system where they could enhance their livelihood potential.

Agricultural extension services are of paramount importance to rural livestock farmers. Farmers depend on extension services for new production knowledge, information, trainings and skills improvement. This level of dependency is presented in the results, where health related practices such as dipping and cattle vaccination relied on government interventions lead by extension services. Farmers mentioned however, that they were experiencing inefficiency with such interventions and that impacted negatively on the health of their cattle.

The importance of extension services to Jozini smallholder cattle farmers is in line with research by Akpalu (2013) who stated that agricultural extension services form an integral part of smallholder farmer capacity development, productivity potential and sustained rural livelihoods. Government should intervene given that grazing shortage was affecting the whole of Jozini not just cattle farmers, and poor crop growth has resulted in low availability of crop residues that could be utilised by their livestock.

4.5 Conclusion

The health and nutrition status of cattle owned by Jozini smallholder farmers is of inferior quality. A number of factors can be attributed to this inferiority, factors such as poor animal body condition scores (BCS) due to poor grazing availability in the area, with the majority (56 percent) of the cattle in the area being recorded as very thin. Animals have to walk long distances to access grazing which results in the deterioration of the body condition. A large portion (58.3 percent) of the farmers in Jozini cannot afford the additional cost of supplementary feeding. Livestock diseases and tick count were indicated as other prevalent factors influencing cattle health and nutrition in the area, with Black quarter (88 percent) and Foot and Mouth disease (44 percent) being the most common disease affecting cattle in the area.

All the above mentioned factors are considered crucial to animal health and nutrition, which determines whether farmers are able to sell their cattle at a commercial scale.

Chapter 5 : Commercialisation potential of smallholder cattle farmers in Jozini

Abstract

The South African government is pursuing a national goal towards an integrated and inclusive rural economy to be achieved by 2030; as is stated on the National Development Plan (NDP). For smallholder farmers to make such desired transition, it is important to consider determinants which influence their potential to progress into commercial agriculture for enhanced rural livelihoods. This study seeks to investigate factors which influence commercialisation potential, the relationship between these determinants and how this links to enhancing rural livelihoods of smallholder cattle farmers in Jozini, KZN. A structured questionnaire and focus group discussions (FGDs) were used to collect data on farmer perception towards progressing into commercial farming based on indicators which determine smallholder commercialisation.

The availability of land through communal ownership, farming experience and willingness of the farmers to progress were identified as important factors contributing towards their potential to progress to commercialisation. However, results show that markets and market access and the education status of the farmers was a concern, as increased literacy levels are reported to enhance more adoption of technology and new learning. Cattle were infected with diseases due to limited and/or, unreliable access to veterinary and extension services. Lack of infrastructure, and information access played a significant role in compromising their potential towards commercialisation. In relation to farmer livelihoods, farmers prioritised cattle more towards socio-cultural values and used their cattle as financial buffers rather than a commercial entity. The potential of Jozini smallholder farmers progressing into commercialisation can become a reality, however it requires the necessary institutional support from Department of Agriculture as well as the buy-in from the farmers themselves. Policy and decision makers should note that cattle farming among smallholder farmers should be viewed more than just an economic activity, as it is about the identity and self-worth of these farmers. For progression towards commercial agriculture to occur perhaps, there is a need for mind-shift interventions for the farmers to recognise cattle as a commercial asset without compromising their perceived meaning of owning cattle.

Key words: *livelihoods, smallholder farmers, commercialisation, progression, economic*

5.1 Introduction

Commercialisation plays a significant role in increasing income levels and stimulating rural growth through improving employment opportunities, increasing rural agricultural productivity, expanding food supply and potentially improving the nutritional status of rural households (Baisa 2009). Furthermore, Osmani *et al.* (2014) indicate that the shift from subsistence to market orientated (commercial) farming significantly increases the income of smallholder farmers, which allows for production system expansion through upscaling, affordability of production inputs and the ability of directing cash towards household needs.

This is in line with a study by Zhou *et al.* (2013) whereby, in Tanzania, smallholder farmers mentioned that by adopting commercial orientated production systems, income levels were higher which allowed for cash to be used for several other purposes within their households and not just for purchasing production inputs. More so, Pingali (1997) state that smallholder commercialisation can contribute to poverty alleviation and economic growth within developing states.

The relevance of identifying the benefits of commercial agriculture to this study is that research has focused mainly on commercialisation potential of smallholder crop producers; however limited studies have addressed the commercial potential of livestock within smallholder farming systems. Therefore this study seeks to determine smallholder cattle farmers' potential to progress into commercial farming for enhanced rural livelihoods.

There are various determinants which influence smallholder farmer potential to progress into commercial farming. Osmani *et al.* (2015) highlight land size, education, farmer location as determining smallholder potential to progress to commercialisation. Egbetokun and Omonona (2012) argue that in order for smallholder livestock farmers to actively participate in commercial farming, factors such as age, source of labour, farming experience and farm size affect potential for smallholder farmers to progress into commercial farming. Gebremedhin and Jaleta (2010) state, the need for improved infrastructure, land size, access to support services such as agricultural extension, information related to production and markets as well as farming experience are key elements towards enabling increased smallholder productivity and commercialisation potential. Based on studies by Abang *et al.* (2000) and Goshu *et al.* (2012),

the following factors which contribute to livestock farmer commercialisation potential were selected for further study.

Infrastructure

Smallholder farmers are usually served with poor infrastructure within their rural communities (Makhura 2001). Improved infrastructure development in developing countries has led to higher and better market participation especially for rural-based farmers (MacLeod *et al.* 2008). The general consensus when it comes to infrastructure and smallholder livestock farming is that farmers tend to be limited by lack of market orientated infrastructure such as poor market sales yards, cattle handling pens and sale yards (Coetzee *et al.* 2005). Furthermore, Coetzee *et al.* (2005) state that smallholder farmers in South Africa face both physical and institutional infrastructure challenges.

Frisch (1999) relates that physical infrastructure consists of road condition, telecommunication, sale pens and cattle handling facilities which are either in poor condition or not functional. Bailey *et al.* (1999) concur by revealing that the most important physical infrastructure weakness for communal cattle farmers in South Africa is transport and holding facilities. According to MacLeod *et al.* (2008), institutional infrastructure such as NGOs, private financial services and public support services are important in ensuring that poor farmers participate in the formal economy. Case studies by Llanto (2012) and Binswanger *et al.* (1993) in China and India reveal that through infrastructural investment and development, smallholder livestock farmer's market participation has increased. It is therefore evident that infrastructure plays an important role towards farmer market participation, ultimately improving the potential to progress into commercialisation.

Market and market access

Smallholder farmers market access plays a crucial role towards making the transition to commercial farming in relation to crops and livestock (Kibirige 2013a). Furthermore Coetzee *et al.* (2005) state that markets play a significant role in the progress potential of smallholder livestock farmers. Markets are the institutions which provide the necessary opportunities for farmers to sell their product at market related prices. Nonetheless, livestock smallholder farmers in South Africa face numerous market related constraints, according to Kepe *et al.* (2002).

Limitations such as restricted access to market information, poor market infrastructure, limited institutional support and poor animal living conditions (Coetzee *et al.* 2005). Market availability and market access play a vital role when it comes to smallholders progressing into commercialisation. It is through markets that farmers can trade with buyers, thus positioning themselves to achieve higher revenue, and thereby improve their livelihoods status.

Information access

Agricultural information related to livestock production is a key element for agricultural development for smallholder farmers in developing areas. Information enables for smallholder farmers to make rational, accurate production decisions, especially when doing transactions with buyers to avoid exploitation (Musemwa & Mushunje 2011). Furthermore, information needs for smallholder livestock farmers range from production techniques, market conditions, product quality and quantity as well as price (Musemwa *et al.* 2008). Nonetheless, information access channels such as cellular network systems, television, and newspapers have been provided; however, smallholder livestock farmers still remain uninformed about market trends, market opportunities and new technologies related to their livelihood. It is through efficient extension services, especially to training and educating smallholder farmers to improve their capacity to accessing relevant information as well as knowing how to utilize the information in their farming practices.

Land availability

Land owned by farmers is predominantly used for crop production, while communal land is the main source of grazing land. Research has shown that communal rangelands play an important role in livestock nutritional requirements. However, in such areas, land used for livestock grazing is subject to poor management, resulting in its degradation (Moyo *et al.* 2008). Furthermore, poor infrastructure such as fencing, security have been identified as hindering factors when it comes to implementing successful grazing management strategies to improve rangeland conditions (Cullis & Watson 2005). Rotational grazing is a strategy that has been implemented in countries such as Zimbabwe and Botswana; however, due to limiting infrastructural or traditional ownership elements; such initiatives have failed within these countries (Malope & Batisani 2008). There is a need to rapidly control grazing land degradation if smallholder farmers are to progress into commercialisation. This is the main source of feed for such farmers and so it

requires farmers, agricultural extension officers as well as traditional authorities to buy into ensuring rangeland sustainability. The contribution of crop lands towards smallholder farmer progress to commercialisation is an important factor, whereby crop residues can act as an affordable feed source for livestock.

Socio-economic and demographic factors

The literature shows that socio-economic characteristics play an important role when it comes to the successful transition of smallholder livestock farmers to commercialisation. Age, gender, education, income level and farming experience are key elements contributing to smallholder commercialisation potential (Kirsten *et al.* 2012). For example, poor education and low literacy levels may result in poor networking; poor market skills such as negotiation and poor understanding and adoption of production related technologies. Agwu *et al.* (2013) state that as years of experience increase, the probability of progressing into commercialisation also increases. Furthermore, farming experience is known to enhance farmer decision making ability and increase knowledge of production techniques. Another socio-economic factor is willingness, where farmers reveal their desire to become commercial producers.

Herd size

Livestock numbers per household are related to smallholder commercialisation potential. Results from research by Lubungu *et al.* (2012) in Zambia agree with this statement by revealing that smallholder farmers with larger herd size are more likely to sell their cattle than those with smaller herds. Similarly, Sikhweni and Hassan (2014) reported that in South Africa, herd size was the main determinant of a farmer's ability to participate within the formal economy. Herd size plays an important role when it comes to ensuring the farmer's ability to sustain market demand. The key is to ensure that smallholder farmers have the livestock numbers to sell at a continuous rate if progress is to be made into the commercial economy.

Rural livelihoods and livestock

Livestock play an important multifunctional role in rural livelihoods and their sustainability. According to Stroebel *et al.* (2011), livestock provide services (e.g. draught power, insurance and savings), food (e.g. meat and milk), non-food products (e.g. hide or skins) and less tangible

benefits such as status. Moreover, livestock contribution varies by agro-ecological zones, production systems and socio-cultural context (Otte *et al.* 2012). Additionally, research by Grwambi *et al.* (2006) confirms that farmers in Limpopo keep livestock as a source of income, social status, draught power, investment and for socio-cultural aspects (weddings and traditional ceremonies). This prioritisation is then integrated into the livelihood asset base to further illustrate the contribution of livestock towards rural livelihoods.

5.2 Research Methodology

A purposive sample of 120 (30 from each diptank) smallholder cattle farmers were systematically selected from top four diptank that had the highest number of cattle according to data provided by agricultural extension officers. These were Zineshe, GG area, Gedleza and Umthala. Participants were selected based on owning more than 10 cattle. A structured questionnaire was administered as well as Focus Group Discussions. (Chapter 3).

5.3 Results

Socio-demographics

Table 5-1: Gender distribution of farmers participating in the study (n=120)

Gender	Frequency	Percent (%)
Male	78	65
Female	42	35
Total	120	100.0

The results show that more males (65 percent) were involved in cattle farming than their female counterparts (35 percent). Female participation is influenced by men migrating to urban areas in search of employment, voluntarily deciding to participate in cattle farming or through family inheritance. Commonly, family inheritance occurred after spousal death.

Table 5-2 : Age distribution of the sampled farmers (n=120)

Age group	Frequency	Percent (%)
Youth (18-35)	26	21.7
Middle age (36-59)	50	41.7
Old age (> 60)	44	36.7
Total	120	100

Table 5-3 Education level of respondents (n=120)

Education level	Frequency	Percent (%)
No education	41	34
Primary education	37	31
Secondary education	34	28
Tertiary education	8	7
Total	120	100

The majority of the sampled farmers primary education (30 percent), or no formal education (34 percent), while 28 percent had secondary school education.

Table 5-4: Household income distribution

Income amount per household	Frequency	Percent (%)
Below R1000	16	13
R1001-1500	70	58
Above R1500	32	27
No salary	2	2
Total	120	100

Of the sampled farmers, the majority earned between R1000 and R1500 (58 percent) in terms of average income per household. These farmers depended on government pensions or casual employment on surrounding commercial farms or in Jozini town. Farmers who earned more than R1500 (32 percent) were either self-employed or had permanent high paying jobs in Jozini town.

Assessment of the potential of smallholder farmers to progress to commercialisation

Table 5-5: Prevalence of Farming Experience of sampled farmers

Years of farming experience	Frequency	Percent (%)
<5years	15	12.5
6-10years	45	37.5
>10years	60	50.0
Total	120	100

The results show that the majority of the sampled farmers had more than 10 years farming experience (50 percent) or between 6-10 years farming experience (37.5 percent), respectively. Farming experience contributes to progress potential in the manner that farmers who have accumulated experience through their livelihood tend to be more knowledgeable, make better decisions and adopt new technologies easier than farmers with minimal experience. (Sebatta *et al.* 2014).

Table 5-6: Herd size distribution of cattle

Herd Size	Frequency	Percent (%)
Large >20	34	28
Small <20	86	72
Total	120	100

Of the surveyed sample of farmers, 72 percent had a small herd, while 28 kept a large herd. Herd size was transformed into dichotomous variables with small being < 20 and large having >20 animals.

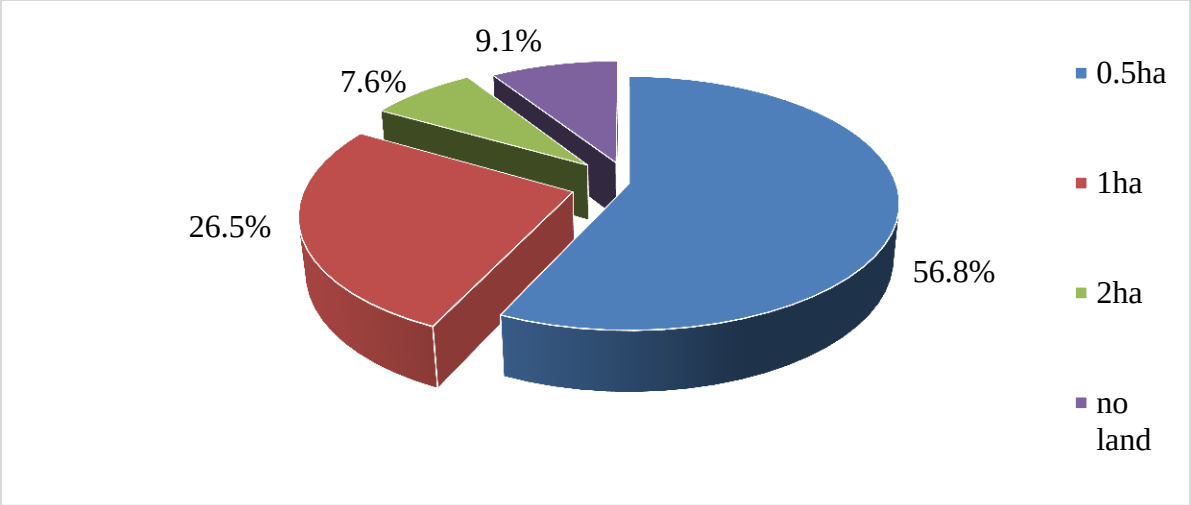

Figure 5-1 Size of land owned by farmers

The study examined the land ownership share of Jozini smallholder cattle farmers. This was due to land being an important asset when it comes to commercialisation. Figure 5.1 shows the results concerning land ownership in Jozini. Some 56.8 percent of the sampled farmers owned 0.5ha, while 26 percent owned 1 hectare. Farmers indicated that land was predominately used for crop production such as sugarcane or maize; however, due to drought there were no crops planted during this study. The relevance of this is that crop residues were used as a source of supplementary feed for cattle farmers. Furthermore within the FGD, farmers mentioned that land ownership was a challenge to them as cattle farmers. Land used for cattle grazing was communal, and so it had to be shared. It resulted in over-grazing, erosion and poor natural pasture management strategies ensuring that availability of grazing land was sustained.

According to the chi-square test, other determinants such as market access, infrastructure, and willingness to progress and information access were examined in the study. Most farmers (52.5 percent) indicated that they did not have any form of access to livestock markets, while 50.8 percent of the farmers mentioned that the condition of infrastructure was poor.

Table 5-7: Factors influencing farmer potential to progress and their significance to the farmers (n=120)

Variables influencing farmer potential to progress	Yes (Freq)	No (Freq)	Percentage (%)		Sig
			YES	NO	
Market Access	57	63	47.5	52.5	NS
Infrastructure	59	61	49.2	50.8	NS
Willingness to progress	78	42	65	35	*
Information Access-diptank meeting	66	-	55	-	NS

*=Significant at the P<0.05 level, ns=not significant

The results show that the majority of farmers were willing to progress into commercialisation (65 percent). Such farmers were younger in age, had some form of education, access to markets, and information related to cattle production. Farmers mentioned that information was accessed through dip tank meetings (55 percent) and contact with other farmers (45 percent). Furthermore the results revealed that there was a significant difference between willingness to progress and demographic variables being age (P<0.001) and income (P<0.001) respectively.

Table 5-8: Summary of farmer status in relation to factors influencing commercialisation

Variables influencing farmer potential to progress	Current farmer status in Jozini	Progress into Commercialisation
Herd size	- Small herd size more prominent amongst farmers	Is compromised, farmers with smaller herds may find it a challenge progressing into commercial farming
Willingness to progress	- Large contingent of farmers willing to progress	Is not compromised, farmers are willing and looking for higher income levels thus enhanced livelihoods
Ability to access information	- Farmers relying on dip tank meetings and other farmers - Agricultural extension accessibility is poor as an information source and support system	Is compromised, farmers need to have access to accurate and relevant information Agricultural extension support is crucial in this instance
Age of farmers	- Majority are middle to old age - Low percentage of youth involvement	- Is compromised, older generation farmers may prioritise socio-cultural values more than economic - there is little youth involvement in cattle farming currently
Education level	- Farmer education level poor (majority have no formal education)	-Is compromised, poor education level for majority of farmers. -Increased literacy level is reported to enhance more adoption towards technology and new learning.
Farming experience	- Most farmers sampled are very experienced (between 6-10 years or more of experience)	Is not compromised, most farmers sampled possess vast amounts of experience However, such farmers are older in age

Continued

Markets and market access	- No formal market available in Jozini - More than half sampled farmers state poor market access being experienced - FMD control measures limiting cattle marketing - Location of farmers limiting factor for customers	- Is compromised, market access influences commercialisation - Markets are an important aspect of commercialisation potential - Farmers product must be accessible to customers - Transboundary diseases such as FMD must be addressed in Jozini, limits cattle marketability
Land availability	- Owned land primarily used for crop production - Communal grazing acts as the main feed source	Is not compromised, large areas available for grazing However, no strategies to maintain grazing availability
Infrastructure (communication lines, roads, market sale yards, diptank,	- Roads are in poor condition - Sale yards have no cattle handling facilities - Diptanks are functional	Are compromised, poor road conditions, poor condition of market yards (cattle handling facilities, loading ramps etc.)

In table 5.8, a summarising matrix has been constructed to link between factors influencing farmer potential, current farmer's status and probability of progressing into commercialisation. Based on land availability, willingness and farming experience the potential to progress is not undermined. However, assessing factors such as market access, infrastructure, herd size, education level, age, and information access commercialisation potential is compromised. Market access plays a crucial role towards commercialisation of smallholder livestock farmers.

Table 5-9: Chi-square test for association of determinants influencing farmer potential with the potential to progress to commercial farming (n=40 farmers)

Determinants influencing commercialisation potential of farmers	P value	Significance
Age	.625	NS
Education level	.233	NS
Farming Experience	.416	NS
Herd size	.195	NS
Average income	.102	NS
Land availability	.426	NS

NS= not significant * sig P<0.05

Presented in Table 5.9 are factors influencing commercialisation potential in the attempt to find out which farmers were the closest to progressing into commercialisation. Differentiated variables (i.e. factors that were the same) were not mentioned because there was no significant difference between them. Of the determinants presented in the table, herd size (P=0.195) and average household income (P=0.102) tended to be significant with regard to determining the closest group of farmers who could successfully make the transition into commercial cattle keeping.

Table 5-10: Odds ratio estimates of cattle farmer's likelihood to progress from smallholder into commercial

Odds Ratio Estimates and Profile-Likelihood Confidence Intervals						
Effect	**Unit**	**Estimate**	**95% Confidence Limits**		**Sig**	**P=value**
Gender 1(male) vs 2 (female)	1.0000	0.604	0.218	1.588	NS	
Age 1(young) vs 2 (old)	1.0000	1.228	0.307	5.501	NS	
Farming Experience 1 (<10years) vs 2 (> 10 years)	1.0000	3.527	1.216	10.860	*	0.0228
Herd size 1(small) vs 2 (large)	1.0000	1.106	0.375	3.206	NS	
Education 1(not educated vs 2 (educated)	1.0000	1.506	0.513	4.713	NS	
Market access 1(yes) vs 2 (no)	1.0000	1.227	0.487	3.143	NS	
Income level 1 (low) vs 2 (high)	1.0000	7.383	2.677	22.348	**	0.0002

(*p<0.05; **p<0.01; NS not significant p>0.05)

The odds ratios of farmer's likelihood to progress into commercial cattle farming are shown on Table 5.10. The farmers who had > 10 years farming experience were 3.53 times more likely to be able to progress from subsistence cattle farming to commercial, when compared to farmers who had < 10 years farming experience. Farmers who had higher income levels were 7.38 times more likely to be able to progress to commercial farming, compared to those who had lower income levels.

Livelihoods

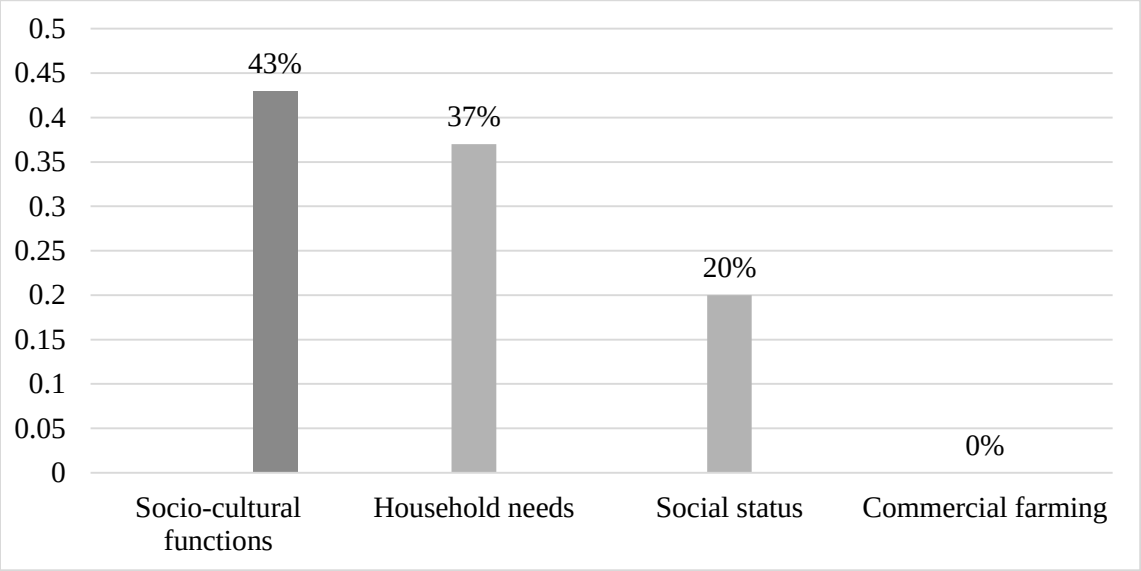

Figure 5-2: Main reasons for keeping cattle according to the farmers

The results presented in Figure 5.2 revealed that the main purpose indicated for keeping cattle as by farmers was socio-cultural functions (43 percent), followed by household needs (37 percent) and social status (20 percent). Commercialisation (0 percent) was not a priority compared to the other reasons as to why cattle were kept. When asked what socio-cultural factors farmers prioritised, farmers highlighted bride price (*Lobola*), ceremonial gatherings and ancestral rituals as cultural practices that required the use of cattle. This was supported in the FGDs where farmers stated that in Jozini, families who had sons were more likely to stock a number of cattle for use when their sons wanted to marry. Cattle were the only way families accepted payment and this was due to embedded cultural practices amongst the rural people of Jozini. Social status looks at the degree in which rural livestock owners are viewed within their community. For example, a farmer with a large herd of cattle is deemed to be wealthy and in a better position to someone with a smaller herd, therefore gaining a higher social status amongst community members.

With regard to household needs, farmers indicated that an animal was slaughtered annually for children and family members returning from urban areas or when there was no food. Besides that, slaughtering was not practised regularly as cattle have more of a financial value and

importance for the farmer. Furthermore, farmers indicated that with no electricity availability in the poorer areas, manure plays a crucial role when it comes to cooking and land fertilization for crop production. Draught power and transportation with cattle were still being practised in Jozini but by very few households. FGDs revealed that work related to transportation or work that required animal power was being replaced by mechanisation.

Table 5-11: Distribution of farmers indicating the importance of cattle

Cattle Importance to farmers	Frequency	Percent (%)
Financial instrument	69	57.5
Store of wealth	51	42.5
Commercial business	0	0
Total	120	100

Most of the sampled farmers indicated that the importance of cattle for them was financial security (57.5 percent). Farmers stated that cattle acted like a savings account and so whenever they needed immediate cash for household requirements such as paying of school fees, hospital bills and or purchasing of food, they could sell an animal. Cattle acted as a store of wealth and status (42.5 percent) more than being a potential commercial asset. Of the sampled farmers, 95 percent indicated that they sold cattle, while 5 percent mentioned that they did not sell cattle. The main reason for selling cattle was for immediate cash needs (94 percent).

Furthermore, the majority of the sampled farmers (95 percent) highlighted that the time of selling was determined by how financially constrained they were within their households, while 6 percent stated that cattle were sold if there was a customer looking to purchase an animal. Supporting information gathered from FGDs revealed that farmers prioritised cattle more for their ability to act as financial instruments and as a store of wealth compared to them being a commercial asset. Moreover, farmers disclosed that the reason for not seeing cattle as a commercialised entity was because this was their only form of savings account they had and so commercialisation would put that at risk.

Table 5-12 Livelihood assets in relation to cattle farming and farmer potential to commercialise

Livelihood Assets in relation to cattle keeping	Potential to progress to commercialisation
Social Asset: - Strong communication/network system amongst farmers - Positive trust relations and understanding amongst farmers	- Support services must utilise such networks to transfer necessary information and production resources - Develop strong relation between public and private institutions
Human Asset: - Majority of farmers have poor education levels - Farming experience is prominent within the sampled group - Family labour used as herdsmen, knowledge and skill gained through experience of cattle herding	- Equip farmers with basic livestock training and skills through developmental programs - Expose farmers to livestock information days, and field visit of successful commercial operations
Natural Asset: - Communal land available for grazing - Privately owned land exists for crop production - Water currently a scarcity due to drought in Jozini	- Propose grazing management strategies to farmers and traditional authority - Seek to maximise crop land potential for supplementary cattle feeding purposes - Suggest water conserving practices (e.g. livestock dams within dip tank areas
Physical Asset: - Poor infrastructure (roads, telecommunication, market sale yards, dip tank facilities etc.) - Cattle have poor status (nutritionally and health wise)	- Improve infrastructural conditions - Enhance cattle condition status, improved nutrition and health practices - Support services (extension officers) vital and must be continuous
Financial Asset: - Cattle viewed as store of wealth (savings, investment, banking system) - Cattle considered as a financial instrument	- Expose farmers to economic benefits of cattle farming (commercial agriculture) - Improve market access opportunities for farmers

Presented on table 5.12 is the summary of livelihoods assets in relation to smallholder cattle farmer status. The results look to address how livelihood assets contribute towards farmer potential to progress into commercialisation by highlighting the current asset status and proposing ways to improve livelihood asset base in relation to the potential to progress into commercial farming. Therefore, the outcome expected is enhanced rural livelihoods.

5.4 Discussion

From the socio-demographic results, it can be concluded that cattle farming in Jozini is a male dominated practice. Female participation occurs when males migrate to urban areas in search of jobs or through family inheritance. This agrees with research findings of Assan (2014) which indicated that livestock keeping by woman faces multiple constraints such as cultural values and norms as well as decision making power. Furthermore, with regards to farmer age, the results reveal that most farmers who participated in the study were middle aged or older. This had its advantages and disadvantages. The advantage was that older farmers bring wisdom, the ability to make mature decisions and farming experience. The disadvantages were that older farmers tended to prioritise socio-cultural practices more than making sound economic decisions. More so, the ability to adopt new technologies and change their farming methods becomes a challenge. Farmers who had between 6-10 years' experience accounted for 36.7 percent of the total sample size of this study. The relevance of age in this study is that it is a factor which influences farmer's potential to progress into commercialisation.

The education level of farmers sampled in Jozini was poor. The majority of farmers examined either had no formal of education or they had only completed primary education as their highest level of education. With poor education levels, farmers tend to find it a challenge adopting new technologies, reading relevant information, keeping records, organising, managing and embracing new market orientated technologies (Jaleta *et al.* 2009). Research by Renkow *et al.* (2004) indicates that well educated farmers have more capabilities of operating, managing and co-ordinating commercial production systems efficiently.

The high odds ratio estimates for farming experience can be attributed to age and income level of farmers. Those who were older had accumulated years of experience farming with cattle, compared to younger farmers. Therefore, the likelihood of progressing into commercial farming

was higher. Additionally, high odds ratio estimates for income level can be ascribed to farm or non-farm activities. In the case of this study, farmers were employed in surrounding commercial operations or had private business to increase income levels. Such farmers had higher income levels, thus the likelihood of progressing into commercial farming was prominent (Zindove & Chimonyo 2015).

The results presented in Table 1.4 shows that the majority of farmers earned between R1000-R1500 average monthly incomes. Sources of income were government pension or casual employment. A significant relationship was discovered between farmer income and potential to progress. The significance of farmer income regarding the potential to progress to commercialisation is that farmers who have higher income levels are more willing to progress than those with lower income levels. Farmers with lower income levels tend to be more subsistence-orientated and they avoid taking risks, whereas higher income farmers are exposed to more opportunities such as access to transport for their cattle, ability to purchase feed upon requirement, ability to access support services (private health specialists or livestock consultancy) and access markets. Farmers with higher average income levels would find it easier to progress into commercial farming than those who had lower income levels. This is relevant to the study due to positive financial status contributes towards a sustainable commercial production system. This concurs with research by Akankwasah *et al.* (2012) where smallholder participation within the formal economy in Uganda had a positive outcome with regards to improved household income levels.

Highlighted within the results are variables which influence smallholder farmer potential to progress into commercial farming. The majority of cattle farmers sampled have the farming experience and willingness to make the transition into commercial agriculture. Furthermore the concern due to these results is that farmers who have the necessary experience are older and with poor youth involvement, and it means that farming expertise will not be passed down to next generation farmers, thus jeopardising the sustainability of this livelihood. Additionally, other determinants which assess smallholder potential to commercialise are summarised in table 2.3 and Table 2.4. It is evident from the results that elements such as herd size, information access, land availability and infrastructure in relation to current farmer status indicate that the potential to progress into commercial farming is compromised. Moreover, with market availability and

market access playing such a crucial role when it comes to commercial potential, it means that Jozini cattle farmers will continue to find it a challenge progressing because currently there is no active market system. Therefore, there is need to collaborate efforts between public institutions such as the Department of Agriculture within the area and other key stakeholders of livestock farming so that a sustainable market system is developed in Jozini.

There was a relationship between factors influencing the potential to progress to commercial farming. Poor infrastructure limits farmers' ability to access markets and position themselves to sell cattle effectively. Herd size determines whether smallholder farmers can participate in commercial agriculture. Poor information access results in farmers not knowing how the market is performing, new technologies available that could improve existing production systems or what market opportunities exist. With regards to these fundamental determinants and the integration thereof, it can be concluded that Jozini smallholder farmer potential of smallholder farmers in Jozini to progress to commercial livestock farming is currently compromised.

Cattle numbers are an important factor when it comes to commercial farming mainly because farmers who have smaller herds find it difficult to adopt commercial selling practises due to their smaller cattle numbers. Further, with cattle playing an important socio-economic role, commercialisation might not be prioritised by farmers with smaller herds. This concurs with research by Fratkin and Roth (2006) in Kenya that farmer potential to commercialise is influenced by larger livestock herd numbers.

Lastly, livestock play an important role in rural livelihoods. The prioritisation of cattle within the livelihoods of Jozini smallholder cattle farmers is presented in Figure 3.1 and Table 3.2, respectively. Jozini smallholder farmers prioritise socio-cultural functions, household needs and status more than cattle being considered as a commercial asset. This relates to findings by Raju *et al.* (2006) that resource-poor farmers value livestock as a socio-economic asset in developing countries. Further, it can be seen from the results that Jozini farmers viewed cattle as a financial instrument. This means that cattle are only sold when there is an immediate need for cash, health, education or food purchase costs etc. Cattle also serve as a store of wealth against potential risks or exposure to potential shocks or changes. From the results, it is evident that the sampled cattle farmers do not prioritise their cattle towards commercial farming, or opportunity. This influences the potential to progress to commercial farming because in order to actively participate within

the formal economy, there is a need to adjust existing priorities. Currently, however the results reveal that it is not the case and so farmers' potential to progress is compromised, thus limiting the ability to enhance rural livelihoods.

5.5 Conclusion

The aim of this study was to determine the potential of Jozini smallholder cattle farmers to progress into commercial farming for enhanced rural livelihoods. Socio-demographically, Jozini smallholder cattle farmers are older in age, have low education levels, and depend on government financing systems (pensions, casual employment etc.) for sources of income.

Jozini smallholder cattle farmers possess the potential to progress into commercial farming given their level of experience, the willingness to progress into commercial farming and land availability, however their inability to access markets, poor infrastructure, low education, age of the farmers, limited access to relevant information and small herd size compromise this potential. Farmers closest to progressing into commercialisation predominantly had larger herd sizes and higher average income levels. It shows that there are farmers who currently can make the transition into commercialisation; however, limiting factors highlighted with the results prohibit farmer development in terms of the livelihood asset base.

Cattle are of great importance for Jozini smallholder farmers. The role cattle play with regard to socio-cultural functions, household needs and social status ranked higher than considering them as a commercial asset. If farmers could feed their families, provide cash when needed by selling an animal and satisfy their socio-cultural responsibilities proved that commercialisation was not their main priority. This linked with the farmer's livelihood asset base status which presented the role cattle played in relation to the five livelihood assets, being human, financial, capital, natural and physical assets. Conclusively the current situation with regards to farmer livelihood status and how farmers view cattle contributes to their potential of progressing into commercialisation being compromised.

Chapter 6 : Conclusion and Recommendations

The study demonstrated that smallholder cattle farming in Jozini are male dominated, despite the results indicating higher percentage of females practicing this livelihood source as well. Smallholder farmers in Jozini are middle to old age, which puts at risk the sustainability of the livelihood once farmers have successfully progressed to commercial livestock farming. Education is critical when it comes to farming, and farmers who had higher education levels were more likely to adopt new technologies related to cattle production easier. The majority of sampled participants had no form of education, implying that farmers would find it challenging to execute the necessary skills towards production system, therefore influencing negatively the potential to progress.

One of the specific objectives of the study was to assess the cattle nutrition and health status in Jozini. The lack of availability of good quality grazing land was highlighted by farmers as impacting negatively on the animal nutrition status. Cattle walked long distances in search of better grazing, which means that a lot of energy is used, thus affecting their body condition. The majority of the sampled farmers did not practise supplementary feeding due to limited financial resources. Instead finances were directed to ensuring the household was food secure. Jozini was experiencing a severe drought, impacting on the animal nutritional status as well as body condition. With smallholder farmers having limited resources, intervention strategies are required, especially when environmental conditions are negatively affecting farming. Short term interventions could be providing animal feed to farmers. Medium to long-term solutions could be training the farmers how to better manage grazing lands, fence off grazing camps where cattle entrance is controlled. This would involve tribal authority, given that cattle graze on communal land.

With regard to cattle health status, there was a low tick count on the animals. This was due to a strict dipping program that farmers used, which agricultural extension services supervised. Despite this, farmers highlighted that there were challenges. The late arrival of acaricides meant that dipping dates were delayed, thus exposing their animals to higher tick loads. Vaccinations were administered, but late arrivals resulted in the cattle not being vaccinated on time. Given that smallholder cattle farmers in Jozini rely extensively on agricultural extension services, there is

need to improve the efficiency of this services to them. Furthermore, if agricultural extension services cannot meet the demand of farmers, the Department of Agriculture should then consider employing private consulting companies on contract basis to equip farmers with basic health management skills and provide the necessary acaricides and vaccines.

The other objective of this study was to determine the potential of Jozini smallholder cattle farmers to progress to commercial farming. This potential was based on eight factors namely being; infrastructure, markets and market access, socio-economic factors, information access and the role of livestock towards farmer livelihood. Based on the assessment of these factors, it can be concluded that Jozini smallholder cattle farmers possess the potential to progress into commercial farming; however, this potential is compromised by poor infrastructure conditions, lack of market knowledge and ability to access markets, limited exposure to information related to cattle production, and poor herd sizes. Progressing into commercialisation requires the total buy-in of the farmers themselves. The results suggest, farmers prioritised socio-cultural values more than the element of becoming commercial cattle farmers. This could be attributed to poor education levels and limited exposure and information regarding the advantages of commercial cattle farming.

Cattle play a crucial role in the livelihoods of farmers. Cattle are the only form of financial security and wealth, and so trading of their cattle will only occur if there is immediate need for cash within the household. With cattle not being viewed as a commercial commodity and the literature indicating that commercialisation potentially increases income level, the results suggest that the financial asset within the Sustainable livelihood framework is compromised. With regard to the potential to progress to commercialisation, improving the current livelihood asset base in relation to table 5.12 is paramount. This must occur without eliminating farmer belief and priority when it comes to cattle keeping. Farmers must be made aware of the advantages of farming commercially, and this could be through information days directed by agricultural extension officers, farmers days where experienced commercial farmers are invited to share their insight about progressing to commercialised cattle farming. Improving infrastructure conditions in rural areas will contribute to farmers being able to sell their animals and also be accessible to buyers interested. Strategies such as grazing systems, erecting rain fed livestock dams, maximum

usage of arable land through crop production for supplementary feeding during dry periods would bode well for cattle farmers willing to progress into commercialisation.

In relation to policy recommendations, the study identified that the potential to commercialise existed; however, certain determinants compromised this potential. Access to relevant information means that farmers can be aware of production and market expectation at a commercial level. Such information could be market pricing, ways to increase current production levels in order to sustainably supply the market and exposure to health and nutrition related products.

The study revealed that agricultural extension services are critical for the farming operations of smallholder farmers. However, there are challenges such as inefficiency and unreliability of these services to farmers. This needs to be improved if Jozini smallholder farmers are to progress successfully into commercialisation. Existing programmes related to training and empowering farmers with the necessary skills need to be effectively implemented, support services in terms of providing vaccinations and acaricides have to be more consistent and reliable. When developing policies, farmer's knowledge and input has to be considered if such policies are to help smallholder farmer's progress to commercial cattle farming.

The study provided baseline information on the current cattle status in Jozini as well as the smallholder farmer potential to progress to commercialisation. It has been identified that the potential and willingness to progress to commercialisation exists amongst majority of farmers, however, some of the investigated determinants tend to compromise this potential. Further research is needed to investigate if commercialisation would indeed enhance farmer livelihood in Jozini.

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Appendix 1: survey questionnaire

Survey questionnaire on the potential of Jozini smallholder cattle farmers to graduate from subsistence to commercial cattle farming in for enhanced rural livelihoods

Introduction

My name is Sinelizwi Fakade. I am currently a student of University of Kwa-Zulu Natal in South Africa in Food Security. Currently I am undertaking Master of Agriculture research in Livestock Production Systems and would like to conduct research on cattle farming production management practices by smallholder farmers. The questionnaire consists of a number of questions which are subdivided into four sections; household demographic information, cattle breeding, cattle nutrition, cattle health and livelihoods. The questionnaire may take a maximum of 45 minutes. The information obtained from this questionnaire will be handled confidentially. The results will be used to write M-Agric Thesis. The recommendations of the study will be shared with extension officers, decision makers and smallholder cattle farmers. Do you have any questions?

I _____ (full name and surname) hereby confirm my understanding of the questionnaire and I understand that I will not be exposed to any risk during the study and that I may withdraw from participating at any point in.

Date: _____ Signature: _____ Cell number: _____

Section a: household demographic information

1. **Gender**

   1 Male ☐ **2** Female ☐

2. Age _____

3. Marital status

1	Single	
2	Married	
3	Divorced	
4	Widow/widower	

4. How many children do you have? _____
5. How much land do you own (ha):_____
6. How much land is arable (ha):_____
7. Do you use communal land for grazing (ha): 1 Yes ☐ 2 No ☐
8. Level of education

1	No formal education	
2	Grade1-4	
3	5-7	
4	8-10	
5	11-12	
6	Tertiary education	

9. Source of Income

1	Wages	
2	Salary	
3	Pension	
4	Grant	
5	Other	

10. Average money in the household

1	Below R1000	
2	R1001-R1500	
3	R1501-R3500	
4	Above R3500	

11. What cattle breed do you have?

1	Mixed Breed	
2	Bonsmara	
3	Brahman	
4	Nguni	

12. Herd Composition

1	Calves < 7 months	
2	Cows	
3	Oxen	
4	Bulls	

13. Cattle acquisition

1	Inherited	
2	Bought	
3	Donated	
4	Other (Specify)	

(Specify): _____

14. How many cattle did you begin farming with? (Tick one or more)

1	Between 0-10	
2	Above 10 less than 20	
3	Greater than 20	

15. Owner of cattle

1	Community	
2	Father	
3	Mother	
4	Co-operative	

16. Cattle farming period

1	< 5 years	
2	5-10 years	
3	> 10 years	

Section b: Cattle production management

Cattle breeding

1. What are the characteristics you look for when selecting a cow, rank them: **1- Most important**; **2 moderately important**; **3- least important**; **4 not important**

1	**Reason for keeping the breed**	**Cow**	**Bull**
2	High growth rate		
3	High milk yields		
4	Adaptability		
5	Temperament		
6	Mothering ability		
7	Big calves		
8	Affordability		
9	Availability		
10	Colour		
11	Size		
12	Meat quality		

13	Well attached Udder		
14	Good sized teats		

2. How are your animals identified?

1	Ear- tag	
2	By names	
3	Colour	
4	Branding	
5	Other (specify)	

(Specify):_____

Cattle nutrition

1. What are the sources of feed used for your cattle?

1	Natural Veld	
2	Planted pasture	
3	Crop residues	
4	Bought in feed	
5	Other (specify)	

2. Do you practice some form of supplementary feeding as a cattle farmer

1 Yes ☐ 2 No ☐

3. If yes, then what strategies of supplement feeding you use

1	Crop residues	
2	Hay-bales	
3	Salt licks	
4	Other (specify)	

4. How do you describe the condition of the veld as a cattle farmer: (Tick 1 or more?)

	Condition of veld	
1	Extremely deteriorating- very poor condition little grass	
2	Good- plenty of grass	
3	Deteriorating- poor condition but some grass	

4	Fair- reasonable amount of grass	
5	Very good- improving	
6	I don't know	

5. What do you perceive as the reasons which have led to the selected veld condition? (Tick 1 or more)

1	Poor grazing management	
2	Over-stocking of animals	
3	Erosion	
4	Fire	
5	Poor Soils	
6	Low rainfall	
7	Bush encroachment	

6. What measures do you take to ensure adequate feed supply during winter and periods of feed shortage?

1	Stored feeds	
2	Bought-in feeds	
3	Borrow from other farmers	
4	Sell cattle	
5	Do nothing	

7. What is your perception with regards to the condition of your cattle (Tick 1 option):

1	Excellent	
2	Good	
3	Poor	
4	Very poor	

8. Which class of cattle do you give supplements and why (Rank according to importance and tick next to class)

1	**Class**	**Tick**	**Reason**
2	Cow		
3	Bull		
4	Oxen		
5	Steer		

CATTLE HEALTH

1. How many cattle have died over the last year? (Tick one only).

1	None	
2	One	
3	More than one	

2. What is causing the animals to die? (Tick one or more)

1	Parasites	
2	Diseases	
3	Other (specify)	

(Specify):_____

3. If your animals get sick, what do you do (Tick 1)

1	Nothing	
2	Treat it	
3	Other (specify)	

(Specify):_____

4. If your animal gets sick, whose advice do you seek (Tick 1 one or more)

1	No one	
2	Neighbours	
3	Veterinary	
4	Extension	
5	Other cattle farmers	

5. Do you practice any form of vaccination for your cattle against diseases, internal parasites or external:

1 Yes ☐ **2** No ☐

6. If yes, then indicate what remedy and times within a year:

External Parasites:

Type of parasite	Type of disease	Conventional remedy type	Traditional/herbal remedy type	No. of times/year
Ticks				
Worms				

7. How often do you see a vet (Tick 1 only in opposite column):

1	None	
2	One per year	
3	More than once per year	

8. How often do the cattle get dipped (Tick 1 option):

1	Weekly	
2	Every two weeks	
3	More than two weeks	

9. How do you dip your animals

1	Plunge	
2	Spray	
3	Pour on	
4	Other (specify)	

(Specify)_____

Livelihoods

1. What is your major objective of keeping these cattle: (Tick 1 or more options and Rank?)

	Objectives	Tick
1	Major source of income	
2	Self- sustainability and consumption	
3	Community status and respect	
4	Lobola and cultural ceremonies	

5	Commercial farming	
6	Wealth	

2. How many cattle are dedicated to Lobola and other cultural practices in your household

1	None	
2	One	
3	More than one animal	

3. Do you sell cattle

1 Yes ☐ **2** No ☐

4. If yes, when do you sell your cattle?

1	Monthly	
2	Every three months	
3	Once per year	
4	Other times (specify)	

Why do you sell your cattle (Tick 1 or more?)

1 Emergency cash needs

2 Cultural reasons

3 Other (specify)

5. Do you use members of the family to manage your cattle herd?

1 Yes ☐ **2** No ☐

6. Are the household members involved with cattle healthy and able to the work required?

1 Yes ☐ **2** No ☐

7. Do they possess the necessary skills and knowledge to work with cattle?

1 Yes ☐ **2** No ☐

8. If yes, how have they come to acquire such skills as well as knowledge (Tick 1 or more)

1	Agricultural training and workshops	
2	Experience and observation	
3	Other farmers	
4	Other (specify)	

(Specify):_____

9. Are you happy with the progress being made on your cattle farming, if so explain in detail why that is the case?

10. Are you part of any livestock committee or organization in your community?

11. If yes, then indicate below

1	None	
2	Co-operative	
3	Livestock association	
4	Other (Specify)	

(Specify):_____

12. How do you gain information related to cattle production in Jozini? (Tick one or more)

1	Communication through cellphones	
2	Dip-tank meetings	
3	Other farmers	
4	Other (specify)	

(Specify):_____

13. Why is cattle farming so important to you, and where do you see yourself with this livelihood in the future. Tick one option only

1	Financial security	

2	Commercial business	
3	Cultural wealth and status	

Are there functional dip-tanks in your community?

1 Yes ☐ **2** No ☐

14. Is the infrastructure such as roads, cattle handling facilities functional and in good condition?

1 Yes ☐ **2** No ☐

15. Do you have easy access to cattle markets in and around Jozini?

16. Do you think you have the potential to progress from your current cattle farming system into commercial farming?

1 Yes ☐ **2** No ☐

17. If yes, then indicate where do you see yourself:

1	Smallholder cattle farmer	
2	Emerging cattle farmer	
3	Commercial cattle farming	
4	Other (specify)	

(Specify):_____

Thank-you for answering this questionnaire

Compiled by Sinelizwi Mbande: University of Kwa-Zulu Natal, South Africa

Appendix 2: focus group discussion

Focus Group Discussion and Questionnaire

Topic: The production management and potential of Jozini smallholder cattle farmers to graduate from subsistence cattle farming for enhanced rural livelihoods

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Section a: household demographic information

17. Gender

1 Male ☐ **2** Female ☐

18. Age _____

19. Marital status

1 Single

2 married

3 Divorced

4 Widow/widower

20. How many children do you have? _____

21. How much land do you own (ha):_____

22. How much land is arable (ha):_____

23. How much land is used for grazing (ha):_____

24. Level of education

1	No formal education	
2	Grade1-4	
3	5-7	
4	8-10	
5	11-12	
6	Tertiary education	

25. Source of Income

1	Wages	
2	Salary	
3	Pension	
4	Grant	
5	Other	

26. Average money in the household

1	Below R 500	
2	Above 1000	

27. What cattle breed do you have?

1	Mixed Breed	
2	Bonsmara	
3	Brahman	
4	Nguni	

28. Herd Composition

1	Calves < 7 months	
2	Heifers	
3	Steers	

4	Oxen	
5	Bulls	

29. Cattle acquisition

1	Inherited	
2	Bought	
3	Donated	
4	Other (Specify)	

(Specify): _____

30. Owner of cattle

1	Community	
2	Father	
3	Mother	
4	Co-operative	

31. Cattle farming period

1	< 5 years	
2	5-10 years	
3	> 10 years	

Nutrition Management

1. What are the nutritional challenges faced by Jozini smallholder cattle farmers

i. How do you go about addressing these challenges and also ensuring that cattle nutrition levels are constantly being met, explain in detail

ii. What is the understanding when it comes to nutrition and cattle farming, explain in detail

iii. Explain the what supplement feeding is and the role it plays towards sustaining cattle nutrition levels

iv. If cattle are viewed as important assets in ensuring enhanced livelihoods, explain the role of cattle nutrition towards achieving that

Health Management

2. What are the health constraints faced by cattle farmers in Jozini, explain in detail

- **i.** In relation to ticks, worms and diseases
- **i.** How are these constraints addressed and what measures are taken in ensuring that they addressed, elaborate
- **ii.** How do you go about ensuring that cattle remain healthy throughout the year, explain in detail
- **iii.** What is your perception with regards to cattle health management as a farmer
- **iv.** How do you view cattle health in relation to improving your current farming status

Livelihoods and Cattle Farming

3. In farming here in South Africa, there are 3 categories of farming; subsistence, smallholder and commercial. Where do you see yourself currently?

- **i.** Why do you view yourself in that specific category, explain in detail

Market Access for smallholder farmers

- **ii.** What is the perceived quality attributes used to evaluate quality cattle for market
- **iii.** What is the understanding of cattle markets and importance of consistent supply , explain in detail

Value of owning cattle & perceived contribution to livelihoods

- **iv.** What is the value of cattle for you as a farmer -
- **v.** Do you ever aspire to improving your current livelihood status, explain how this will achieved

Appendix 3: Condition scoring method

- the loin area (between the hip bone and the last rib) which incorporates the spinous and transverse processes of the lumbar vertebrae, and
- the area around the tail head

Condition Score	Label	Description
1	Thin-Severely Emaciated	This animal is weak, starved, has no fat detected in the tail-head area, ribs prominently visible, all skeletal structure clearly visible and sharp when touching. This animal is most likely infected by some disease but under normal beef production systems this is very rare.
2	Thin-Very thin	No fat over ribs or brisket but the backbone is clearly visible. The muscle condition is slightly improved though
3	Optimum- moderate	There is increased fat around the ribs, there is good fat deposit around the tail-head area but this is not excessive
4	Over Fat	Cow appears fleshy and caries fat over the back, tail-head and brisket, ribs are not visible, area of vulva and external rectum contain moderate fat deposits, may have slight fat in udder.