RURAL HOUSEHOLD PERCEPTIONS AND WILLINGNESS TO PAY FOR DONKEY FARMING: A CASE STUDY OF BLOUBERG MUNICIPALITY, CAPRICORN DISTRICT, LIMPOPO PROVINCE

BY

TSHETSHEMI JOEL MALEPENG

Dissertation submitted in fulfilment of the requirements for the degree

MASTER IN AGRICULTURAL MANAGEMENT (AGRICULTURAL EXTENSION)

In

DEPARTMENT OF CENTRE FOR RURAL COMMUNITY EMPOWERMENT

In the

SCHOOL OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES

FACULTY OF SCIENCE AND AGRICULTURE

At the

UNIVERSITY OF LIMPOPO

SOUTH AFRICA

SUPERVISOR: Dr T.J Nesengani

CO-SUPERVISOR: Dr M.A Nkoana

2025

DECLARATION

For the Master of Agricultural Management (Agricultural Extension) programme, I hereby declare that I have not previously submitted the research study report titled " **RURAL HOUSEHOLD PERCEPTIONS AND WILLINGNESS TO PAY FOR DONKEY FARMING: A CASE STUDY OF BLOUBERG MUNICIPALITY, CAPRICORN DISTRICT, LIMPOPO PROVINCE** " for credit towards any degree from this or any other university. I also attest that this is my original work in design and implementation and that all pertinent information has been properly acknowledged.

Signed: _____ Date: ___01 July 2024_____ Tshetshemi Joel Malepeng

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

Signed: __ _____ Date: _01 July 2024

Dr TJ Nesengani (Supervisor)

Signed: Date: __01 July 2024

Dr MA Nkoana (Co-supervisor)

DEDICATION

This thesis is dedicated to the memory of my late grandmother, Ramanna Sarah Mmonwa, who left an educational legacy in my family, and my late parents, Koena Pheeha Johannes Malepeng and Mmachuene Maria Malepeng. My late grandmother always emphasised to me that if I do not work hard, I will clean up after my peers. You will always remain in our thoughts. The thesis is also dedicated to my children and wife, Mrs. Malepeng, for their unwavering encouragement and support throughout difficult times. Lastly, I would like to dedicate it to my committed supervisors, Dr TJ Nesengani and Dr MA Nkoana.

ACKNOWLEDGEMENTS

To begin with, I want to express my gratitude to God, who made this job possible. I am grateful to the Lord for providing me with the knowledge, direction, and strength to get through this difficult time. I also sincerely thank my supervisors, Dr TJ Nesengani and Dr MA Nkoana, for their crucial advice, extra hours put into my project, and patience with my mistakes. Thank you.

A special word of appreciation to my late grandmother, who raised me to become the man that I am today. I wish you were alive to see the fruits of your love and dedication. May your soul rest in peace.

I also want to express my gratitude to each respondent who took the time to complete the questionnaire. I could not have completed this thesis without your cooperation. I would like to thank my enumerators, Mr. K. Modikoa (for map designs), Mr. L. Malepeng, Mr. M. Moneatse, and Ms. M. Maphoko, for their commitment to data gathering. They performed an excellent job, and it is important to recognise that. I also want to express my gratitude to the Limpopo Department of Agriculture for helping with collecting data, identification, and location of donkey farmers in rural households. Many thanks for it.

My wife, in particular, your belief in me motivated me to work harder. I appreciate your support. I also want to thank my kids and nephews for being there for me and for their words of encouragement. Friends and colleagues, I apologise for not being able to address each of you by name, as there are so many of you, but I am much indebted to all of you for your moral support.

Abstract

In rural households, donkeys are frequently seen as significant assets that support sustainable revenue generation and a way of life. Donkey farming is negatively perceived or viewed as a low-class or old-fashioned type of farming system compared to other livestock farming. Nonetheless, a few studies have been conducted on donkey farming, but very few have focused on perception and willingness to pay for donkey farming in Blouberg Local Municipality, Capricorn District, Limpopo province, South Africa. Furthermore, arguably, little or no research has been conducted to determine rural household's perceptions and willingness to pay for donkey farming. As a result, this study was conducted to fill the above-mentioned research gap and to attract relevant policy insinuations to increase the welfare of rural households through the application of perceptions and willingness to pay for donkey farming. The main aim of the study was to analyse rural household's perceptions and willingness to pay for donkey farming. To achieve this, the specific objectives were to profile the socio-economic characteristics of donkey farmers, determine the level of perceptions of rural households towards donkey farming contributions and determine the socio-economic factors influencing willingness to pay for donkey farming contributions towards household welfare. The simple random sampling method was used to obtain a representative sample. Using probability proportional to size, 120 rural households were drawn from three villages (Aurora, Earlydown and Oldlongsine). Face-to-face interviews using semi-structured questionnaires were used to collect data from respondents.

To profile the socio-economic characteristics of donkey farmers, descriptive statistics were employed in the study. The Likert scale model was used to determine the level of perceptions of rural households towards donkey farming contributions. A binary logistic regression model was applied to determine the socio-economic factors influencing willingness to pay for donkey farming contribution towards household welfare. The results obtained from the survey showed that most respondents are over 60 years of age, with ages ranging from 18 years to 81 years. Moreover, results showed that the study area

was dominated by male rural households, the household size average of the respondents was 5 members, and the household income of the respondents was social grants. Results found that respondents who were married and single had the highest numbers of over 50. The lickert scale results have shown that the perceptions of rural households towards donkey farming are strongly agreed as important to the livelihoods. Moreover, very few respondents have strongly disagreed with the perception that donkey farming is important. It was found that rural households in Blouberg's Local Municipality are willing to pay for donkey farming. Furthermore, the Binary Logistic Regression Model results showed that age, marital status, occupation, household size, religion, and culture significantly affect rural households' willingness to pay for donkey farming.

The study's recommendations are based on empirical data. They suggest that the local development plan considers the willingness of the government, community members, and various stakeholders (NGOs, research institutions, and municipalities, to mention a few) to pay for donkey contributions to household welfare. The study, therefore, recommends enhancing donkey farming at all levels, including policy and livestock programme priorities.

Keywords: Rural households, perception, willingness to pay, the probability to sample size, descriptive statistics, Likert scale, binary logistic regression.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

BC	Before Christ
BLM	Blouberg Local Municipality
BLRM	Binary logistic regression model
DAFF	Department of Agriculture, Forestry and Fisheries
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Price
GOK	Government of Kenya
IDP	Integrated Development Plan
KENDAT	Kenya
KES	Kenya Shilling
OLS	Ordinary Least Squares
SANAT	South African Network of Animal Traction
SPSS	Statistical Package for Social Sciences
SSA	Sub-Saharan Africa
StatsSA	Statistical South Africa
TREC	Turfloop Research Ethics Committee
UK	United Kingdom
UN	United Nations
USD	United States Dollar
VIF	Variance Inflation Factor
WTP	Willingness to pay

CHAPTER 1 INTRODUCTION

1.1 Background of the study.

The advancement of modern farming techniques, particularly the increased use of motorised vehicles, resulted in a significant drop in the employment of donkeys (*Equus africanus asinus*) as animals of burden, primarily used in the transportation of goods and people (Vincenzetti *et al*., 2014; Raw *et al*., 2021). There are 189 donkey breeds worldwide, with varying body weights (Polidori *et al*., 2016; Camillo *et al*., 2018). Around 44 million donkeys are registered worldwide. Over 60% are raised in Africa and Asia. South Africa has over 300,000 working (traction or draught) horses, including donkeys, which assist mechanisation in communities with low resources (Wells and Krecek, 2020; Maggs *et al*., 2023). According to Hasaan *et al*. (2022), donkey populations worldwide and in Southern Africa are threatened by many rising socio-economic forces, primarily a lack of welfare and effective regulations to manage their killing. Donkey products have recently acquired popularity in various regions of the world as prospective alternative meat and milk sources for human consumption (Hasaan *et al*., 2022). Most donkeys are owned by private persons as a means of income, which has a significant positive impact on both domestic economies and global economies (Valette, 2014). However, rural households' perceptions of and willingness to pay for donkey farming remain critical in determining the practice's long-term viability and expansion.

In rural households, donkeys are frequently seen as significant assets that support sustainable revenue generation and a way of life (Tuaruka and Agbolosu 2019). According to Lemma *et al*. (2022), the financial advantages of donkey farming have a considerable impact on rural households' opinions and willingness to pay. Donkeys are seen as having a high value among rural households because of their economic significance in supporting transportation, transportation-related activities, and other labour-intensive duties (Maggs *et al*., 2023). In addition to financial gains, cultural importance has a significant impact on how people view donkey farming and their willingness to pay for them (Maggs *et al*., 2023). The significance of donkeys in Southern African rural communities in terms of culture and symbolism is highlighted in a study article by Tuaruka and Agbolosu (2019). Donkeys are frequently connected to customs, history,

and prestige, which influences rural household owners' favourable opinions and investment choices (Starkey and Rushton, 2006).

According to Department of Agriculture Forestry and Fisheries (2015), primary agricultural production in South Africa was valued at R233,2 billion in 2015 and contributed an estimated R66,7 billion to the country's GDP. The economy of South Africa has expanded quicker in other sectors over time than in the sectors of Agriculture, forestry, and fishing. As a result, agriculture's GDP share decreased from over 6% in the 1970s to 1.9% in 2015. Despite this, primary agriculture still contributes significantly to the South African economy and is a major source of employment, particularly in rural areas, as well as foreign exchange earnings. Furthermore, the economy's significant indirect role in agriculture results from its backward and forward linkages with other sectors. Purchases of products like chemicals, fertilisers, and equipment create backward linkages with the manufacturing sector, but providing raw materials to the manufacturing sector creates forward connections. In South Africa, the sector uses over 70% of its agricultural output for intermediate products (Yirga, 2007). For this reason, the agricultural sector is vital to the overall growth of the South African economy.

Even if there are not many studies on this subject in Southern Africa, what is known about the elements that affect rural households' perceptions and willingness to pay for donkey farming is not revealed by the available studies. For instance, Muhumuza *et al*.'s (2017) research in Uganda looked at the socio-economic implications of donkeys and how they affected rural people's means of subsistence. The study emphasised the critical part that donkeys play in improving income production and diversifying livelihoods for rural populations. Additionally, a study conducted in Ethiopia by Gizaw *et al*. (2019) looked at the cultural and traditional beliefs around donkeys and their impact on how people perceive and value these animals. The study demonstrated the cultural significance of donkeys in rural communities as markers of status, tradition, and money.

While these elements offer a basic insight, it is critical to look at the context of rural communities in South Africa and the interaction of several effects on attitudes and willingness to pay for donkey farming. By considering these factors, policymakers and practitioners can develop targeted interventions and support programmes that address

rural household owners' specific needs and concerns in South Africa. The research findings will contribute to the existing literature on human-animal interactions, rural livelihoods, and sustainable agriculture. Furthermore, the results can inform policymakers, development agencies, and animal welfare organisations in designing targeted interventions that support rural household donkeys and promote the sustainable utilisation and well-being of donkeys (Kubasiewicz *et al.,* 2020). In short, this study aims to fill a crucial research gap by examining rural household perceptions and willingness to pay for donkey farming. This study seeks to provide insights that can facilitate the development of evidence-based policies and interventions, ultimately benefitting rural communities relying on donkey farming, academic literature, and government policymakers.

1.2. Problem Statement

There is little knowledge of rural households' perceptions and willingness to pay for donkey farming in Blouberg Local Municipality despite the potential economic and cultural benefits associated with donkey farming (Binda, 2019). The creation of suitable policies and interventions to promote sustainable donkey farming practices and maximise the potential socio-economic advantages in the area is hampered by this information gap. To ascertain if rural families would be prepared to pay for such endeavours, the research investigated the perspectives, attitudes, and other aspects that affect their readiness to engage in donkey farming. This research aims to assist policymakers, development organisations, and rural communities with evidence-based suggestions for promoting sustainable donkey farming and enhancing rural livelihoods in Blouberg Local Municipality by identifying important drivers and impediments.

Donkey ownership and practice have a unique promise and problems for supporting sustainable agricultural practices, transportation, and livelihoods in rural South African communities (Blench, 2000; Mariani, 2008). The results of numerous studies on various aspects of donkey ownership and usage in South Africa must still be compiled and synthesised to identify the most significant knowledge and comprehension gaps. Despite playing a critical role in providing transportation, food security, and income generation for some of the poorest and most marginalised households, the contributions of donkeys to

human livelihoods have received comparatively little attention (Geiger *et al*., 2020). Most of these studies also have limited scope, emphasising specific aspects like socio-economic contributions, cultural significance, or welfare assessment while ignoring other crucial aspects like economic valuation, adoption of better healthcare practices, and challenges rural households face (Keitshweditse, 2019). Assuming the viability of donkey farming, this study examined rural household perception and willingness to pay for donkey farming in the area to determine the possibility of donkey farming in Blouberg local municipality. A complete understanding of the various elements influencing donkey farming and use in South Africa is also lacking due to the lack of thorough qualitative research methods. For instance, studies on rural households and factors influencing attitudes and willingness to pay for donkey milk (Keitshweditse, 2019) have been conducted.

Donkey farming is mostly used by rural households to fury water, furniture, sand, woods, transportation, and ploughing for their income generation. This is supported by Food and Agriculture Organization (2014), which asserts that in less economically developed countries such as South Africa, donkey farming plays a fundamental role in several sectors, particularly agriculture in rural areas and the transport of agricultural products and people. By rendering such services, they both provide indirect and direct income to the households, making important contributions to the families' access to goods and services. The potential benefits of donkey farming are not fully untapped in rural communities. In rural areas, most households do donkey farming but cannot generate any income.

It is, therefore, necessary to conduct a comprehensive study that synthesises the available data and fills in the information gaps about the factors influencing donkey ownership and utilisation in rural communities in South Africa. In less developed and developing countries, donkeys receive no or less attention in terms of health, working conditions, and policy adjustments (Geiger *et al*., 2020). The invisibility of donkey farming and their roles is increased by insufficient statistical data and a gap between research and technical information (FAO, 2016; Maggs *et al*., 2021). Most rural households in the study area employ donkeys for transportation and labour-intensive tasks (such as farming and fetching water and sand)

despite paying them little to nothing for their services (Binda, 2019). The study would provide a nuanced understanding of the socio-economic, cultural, environmental, and welfare-related aspects of donkey farming and utilisation, allowing for the development of targeted interventions and strategies that support sustainable donkey management practices, enhance donkey welfare, and improve the standard of living for rural communities in Blouberg Local Municipality, Capricorn district, Limpopo province, South Africa. To encourage their use, the research closed the knowledge gap on rural household donkey perceptions and willingness to pay for donkey farming. The results of this study will help researchers, extension professionals, and donkey farmers gain insight into how people view and are willing to pay for donkey farming.

1.3. Aim and objectives of the study.

1.3.1. Aim of the research

The aim was to investigate rural household perceptions and willingness to pay for donkey farming in Blouberg Local Municipality in Limpopo province, South Africa.

1.3.2. Objectives of the research were:

i. To profile the socio-economic characteristics of donkey farmers in Blouberg Local Municipality.
ii. To determine the level of perceptions of rural households towards donkey farming contributions in Blouberg Local Municipality.
iii. To determine the socio-economic factors influencing willingness to pay for donkey farming contribution towards household welfare in Blouberg Local Municipality.

1.4. Research Hypotheses

i. There are no socio-economic characteristics of donkey farmers in the study.
ii. There is no difference in the level of perceptions of rural households' donkey owners towards donkey farming in the study area.
iii. The socio-economic factors do not influence rural households' willingness to pay for donkey farming contribution towards household welfare in the study area.

1.5. Organisation of the study

The logical progression of the study's chapters is described in this section. There are five chapters throughout the whole dissertation. A fundamental overview of the study,

background information, the problem statement, the rationale, the study aim, and objectives, and, finally, the research hypothesis the study is addressing are all provided in Chapter 1. A review of previous studies that were done on this topic by other researchers is included in Chapter 2. The study's methodology, including the study area, data collection, and analytical methods, is presented in Chapter 3, along with the study's limitations. The study's findings and an analysis of each one are presented in Chapter 4. The summary, conclusions, and policy suggestions are given in Chapter 5.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

The literature review explores the perceptions and willingness to pay for donkey farming among rural households. Donkeys play a significant role in many rural communities, serving as drought animals and providing transportation, particularly in Blouberg's Local Municipality, which has limited access to modern machinery. Understanding the perceptions and economic valuation of donkey farming can contribute to sustainable donkey management and welfare. This review examines relevant studies that have instigated rural households' attitudes, beliefs, and economic preferences regarding the use and ownership of donkey farming. Different regions of the world with different terrain and climates have led to the emergence of multiple donkey species that reflect the unique characteristics of the various locales (Buneveski *et al*., 2018). Carneiro *et al*. (2018) state that *Equus asinus africanus* in the northeastern part of Africa, and *Equus asinus Europeans*, known to have come from the Mediterranean basin, are believed to be the original ancestors of donkeys.

There are numerous yet undiscovered economic benefits to donkeys (Geiger *et al*., 2020). Chinese medicine treats human illness with gelatin, which can be found in donkey hides (Bennet and Pfuderer, 2020). Also, donkey milk is used in numerous world regions to make cosmetic products and for human use (Camillo *et al*., 2018). Besides, Polidori *et al*. (2008) found that donkey meat has a substantial amount of protein, a low cholesterol and fat content, and a high potassium content. To the best of our knowledge, nevertheless, no review that details people's opinions and financial desire to support donkey farming has been published. Therefore, the current review aimed to determine how rural households regard donkey farming and how willing they are to pay for it. The results of this study will help researchers, extension professionals, and donkey farmers gain insight into how people view and are willing to pay for donkey farming.

2.2. Definition and Concepts of Terms

2.2.1 Perception

The primary cultural elements producing perceptual diversity are values and attitudes, worldviews, and social organisations (Qiong, 2017).

2.2.2 Willingness to pay (WTP)

WTP is defined as the maximum amount of monetary a consumer would pay in exchange for a product/good. WTP, therefore, gives a purchase price that is valued according to the proposed product gained. According to Brown *et al*. (1999), policymakers should be provided with information regarding the economic value of nonmarket and environmental assets, such as inputs to cost-benefit analyses. This study's willingness to pay is the extent to which rural households are willing to sacrifice in donkey farming. In this study, willingness to pay does not certainly mean financial payment.

2.2.3 Rural Household

The household is a fundamental socio-economic unit in human society that consists of a group of people who come together to share the costs of living and make major decisions about the family members who live there, such as childrearing, health care, education, consumption, saving, and participation in the labour force (UN, 2017). According to Deressa et al. (2009), larger households must devote a portion of their workforce to nonfarm activities to earn more money and impact their consumption pressure.

2.3. Backgrounds of donkeys and relation with people.

2.3.1. The Evolution of Donkeys and Their Use in Human Livelihoods

The African Wild Asses are the ancestors of the domestic donkey (*Equus asinus*). *Equus asinus atlanticus*, *Equus asinus africanus*, and *Equus asinus somalicus*, the Somali Wild Ass, and the North African Wild Ass were the three subspecies that were separated from them. Even in Roman times, *Equus asinus atlanticus* had become extinct (Kugler *et al*., 2008). The donkey was first domesticated between 7000 and 6000 BC in what is now Libya, in North Africa. Therefore, one of the few remaining African livestock species is the domestic donkey. Even now, Bedouins utilise donkeys significantly fewer times than nomads in North Africa. The donkey, which may number in the thousands, was the most

valuable animal in ancient Egypt (Polidori and Vincenzetti, 2017). The Nile donkey was domesticated in the Nile valley as early as 4000 BC. Donkeys were frequently depicted as grey with crossed shoulders on tombstones (Polidori and Vincenzetti, 2017). In commerce caravans travelling from Egypt to Nubia, donkeys were employed as pack animals instead of camels until the late Egyptian era (715–322 BC). The donkeys were valued pack animals by the nomads. Donkeys were also used by the established farmers for carrying, planting seeds, threshing, and processing wheat, among other tasks (Kugler *et al*., 2008).

Donkeys arrived in Europe in 2000 BC and were most likely brought by the Etruscans. The donkey travelled across Morocco to reach Spain and Italy. There are 2000 BC rock paintings seen on both the Iberian and Apenine peninsulas that depict donkeys being used as domesticated animals (Kugler *et al*., 2008; Polidori and Vincenzetti, 2017). Donkeys and mules were employed in the army, transportation, and agriculture across Greece. The value of these animals varied depending on the location: donkeys were carefully bred in certain areas, but in others, they were viewed as inferior animals and treated as such. During their invasion expedition, the Romans brought the donkey further into Europe, from Spain to Hungary, Germany, and Great Britain (Polidori and Vincenzetti, 2017). After the Roman Empire fell, they vanished once more in most of the provinces. Nonetheless, donkeys continue to play a significant role in agriculture in the Mediterranean regions, where they grow wine and olives. In mountainous regions, donkeys were frequently employed as pack animals because of their dexterity. The donkey was brought back to Central Europe throughout the Middle Ages by monks, who used it for farming, trade, building supplies for castles, and grain mills (Polidori and Vincenzetti, 2017).

According to Epstein (1971), early research on donkeys suggests that they have been in Africa since the 4th millennium when they migrated from the Atlas Mountains to the Red Sea and beyond. Most households that domesticate donkeys do not use them as traditional food sources; rather, they employ them as draft animals. Nonetheless, there are few examples of donkeys working at a young age because donkeys are seen negatively by people in traditional society. Donkeys are regarded as low-status animals,

yet because of their importance to human life, they have gradually spread to most parts of the world, including West and South Africa (Blench, 2004). For example, donkey use gained popularity in West Africa during Nigeria's economic slump in the 1980s. Due to the recession, donkeys were forced to be used unprofitably to survive throughout Africa's difficult environments. This is clear from the fact that farmers claimed to have used donkeys instead of cattle when droughts proved to be chronic (Mutua, 2004).

Donkeys are traditionally utilised in Africa for household duties and transporting agricultural commodities. Due to unfavourable conditions for oxen, their use for tillage has increased recently (KENDAT, 2015). Donkeys are less popular than oxen because of their smaller stature and lower energy content (Mutua, 2004). However, huge animals like oxen have found it difficult to adapt to changes in agricultural systems, dwindling grazing fields, and the incidence of disease, which has given donkeys an advantage (Fernando and Starkey, 2004). With the growing human population and the worsening droughts, the issue only becomes worse. Working donkeys are thought to directly help over 7 million people in Kenya (KENDAT, 2015). The main obstacle in the history of the donkey is the dearth of empirical research, especially in South Africa, that can accurately estimate their impact. This has played a major role in the dearth of donkey-specific policies. For instance, working animals have received less attention than dairy and meat in livestock policies. Furthermore, most nations have undervalued working animals' contribution to the GDP (gross domestic product) (Behnke and Muthami, 2011). This undervaluation also results in the underrepresentation of working animals in national policy development.

2.3.2. The History and Distribution of Donkeys in Sub-Saharan Africa

Genetic research has shed significant new information on the origins of donkeys, dividing them into two evolutionary groupings. Clades I and II, as they are commonly known, are found in nearly similar amounts worldwide, with no discernible regional trend (Kimura *et al*., 2013). Clade I is closely related to the Nubian wild ass (*E. africanus africanus*), one of the African wild ass's two surviving but genetically distinct subspecies (Kimura *et al*., 2011; Mitchell, 2017). However, other than excluding the only living subspecies, the Somali wild ass (*Equus africanus somaliensis*), it has not been feasible to identify the ancestry of clade II (Kimura *et al*., 2011). This is consistent with the paucity of evidence

for hybridisation between this subspecies and domestic donkeys (Kebede 2013). An extinct wild relative of both subspecies is a possible alternate ancestor for clade II (Kimura *et al*., 2013; Mitchell, 2017).

A recent study has underlined that those early pastoralists in Northeast Africa likely found African wild asses (*Equus africanus*) increasingly helpful as a substitute for cattle in moving water, fuel, and their things as the Middle Holocene became dried. Asses are not only suited to hot, dry environments, but they also require less food, can digest coarser grasses, and have several water-saving adaptations (Kimura *et al*., 2013). Significant morphological change may have taken a long time to manifest, with osteological damage caused by carrying high weights being more reliable evidence of domestication than size reduction (Rossel *et al*., 2008). According to the archaeozoological record, donkeys were in use in Egypt and had spread into the Near East by the beginning of the third millennium BC, were common in Sudan by the following millennium, and had reached southern Kenya/northern Tanzania and the central Sahara by or shortly after 3000 years ago. They are linked to human populations who raised cattle and caprines in all these habitats.

However, while other domestic livestock species expanded as far as southern Africa in the last couple of centuries BC (Orton, 2015) and were subsequently kept in large numbers thereby, both Khoe-speaking herders and (from the middle centuries of the first millennium AD) Bantu-speaking agropastoralists (Huffman, 2007; Sadr, 2013), donkeys remained in East Africa. Given their many benefits to East African pastoralists today, their widespread use by more settled, agricultural populations in the Sahel, North Africa, and elsewhere, and their presence in East Africa before herders moving south from there, this needs to be explained unless it is the result of widespread taphonomic bias.

2.3.3. History of Donkey Breeds

Due to a scarcity of clear archaeological material, the early history of the African donkey is difficult to investigate. The donkey's wild ancestors have been persecuted to extinction. The domestic donkey originated in Africa and is divided into two clades, with a single domestication in Africa around 7000 years ago, followed by additional growth in that continent and Eurasia, and eventually a return to Africa (Wang *et al*., 2022). The number of donkeys reared worldwide in 2014 was roughly 43 million, which has remained steady

over the last two decades (Camillo *et al*., 2018). However, Europe accounts for only 1.6% of total global production (Asia 42.6%, Africa 38.7%, and the Americas 17%) and is less than half of what it was 20 years ago (967,000 asses in Europe in 1994 and 515,000 in 2014) (Camillo *et al*., 2018).

The Amiata donkey breed is found in Tuscany as an endangered breed and originates from Mount Amiata, which is in the provinces of Siena and Grosseto in southern Tuscany (Sargentini *et al*., 2018). The physical traits of the Amiata donkey breed are inherited from its progenitors (the *Equus asinus africanus* and the *Equus asinus somaliensis*) (Sargentini *et al*., 2018). While the origin of the Czech Republic donkey is unknown, it has been traced back to *Equus asinus somaliensis* and *Equus asinus africanus*, as well as several European donkey breeds (Kosuková *et al*., 2015). According to Ayad *et al*., 2019, the Algeria donkey is predominantly found on the northern side of Alegria. Hannani *et al*. (2020) discovered that the Algerian donkey descended from the African Wild ass donkey through genetic analysis. The Nubian wild assailant is the ancestor of the central highland Kenya donkey (Angare *et al*., 2011; Maswana *et al*., 2022). According to Vlaeva *et al*. (2017), the current Bulgarian donkey breed descended from the Nubiana wild ass and the Somali wild ass. The D/Kudu donkey is prominent in Kano State, which is in northern Nigeria (Khaleel *et al*., 2020). Both the Balkan and Banat donkeys are indigenous breeds of Serbian donkeys, according to Stanisic *et al*. (2020). The colours were grey, chocolate brown, black, and roan, and while grey is the most prominent colour for donkeys, which sort of grey is dominant is unknown (Maswana *et al*., 2022).

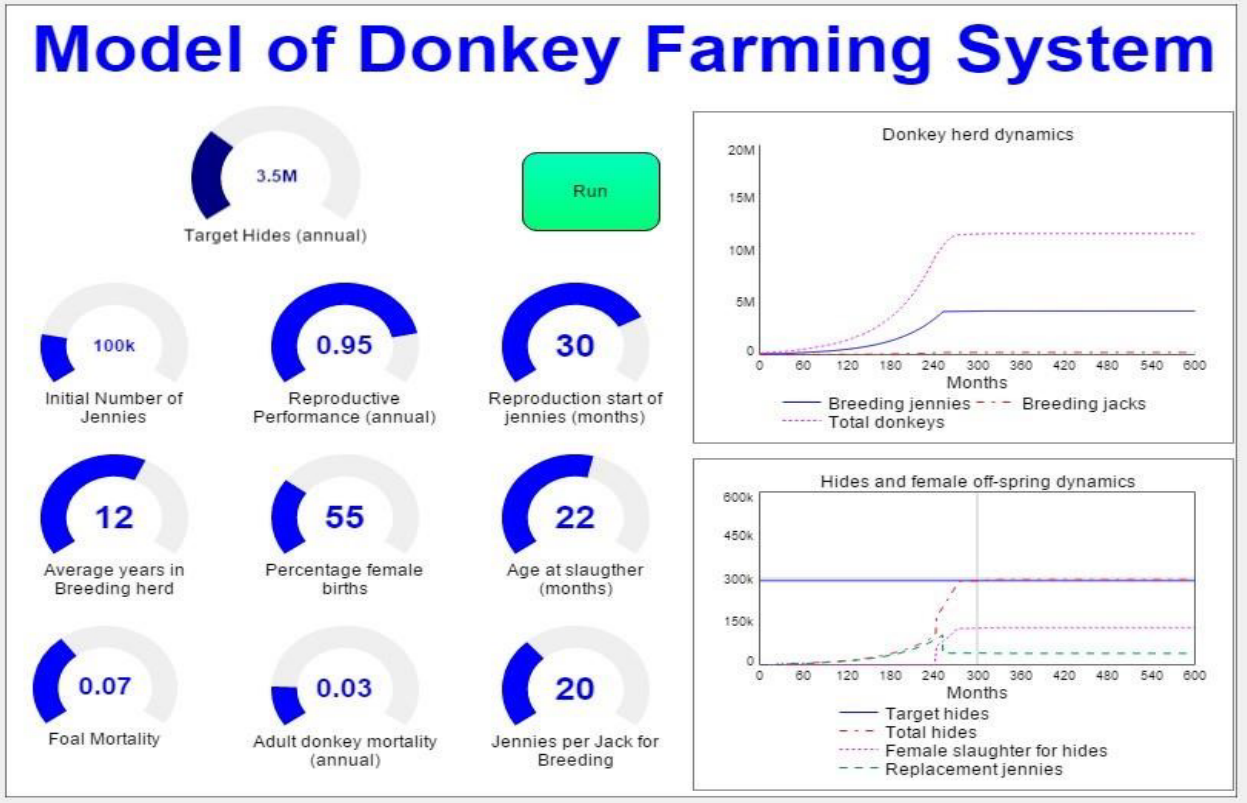
2.4. Donkey Farming System Models

In the second step, a model of a farming system is applied to shed light on the likely time frame for developing a large-scale donkey farming system and the herd characteristics of such a system. In the farming system model, stocks of male and female donkeys are modelled as different sub-models. Each sub-model has four equivalent stocks: (1) a conveyor stock from birth to slaughter maturity, (2) a reservoir stock at slaughter age, (3) a conveyor stock from slaughter age to reproduction age and (4) a reservoir stock of breeding donkeys. Bennett and Pfuderer (2020) stated that the model has enabled such

uncertainties and their effects on the speed with which the donkey population and output of hides can be increased to be explored and assessed.

2.4.1 Donkey farming model approach.

2.4.1.1 Farming approach model



Based on an in-depth knowledge of the production characteristics of donkey breeds, models for their use in the production of meat and/or milk should be developed and improved (Ivankovi¨c *et al*., 2023). The traits of the donkey carcass and the chemical makeup of the meat were greatly impacted by the production technique (extensive and intense farming) (Polidori *et al*., 2021). The prerequisites for creating breeding programmes give an insight into the major production trait preferences, selection criteria, and major constraints. Indigenous donkey breeds are important because of their adaptability under low-input and extensive production environments where disease is the major constraint (Wassie *et al*., 2023). Maswana *et al.* (2022) found that growth rate and body size were among the most important characteristics in choosing donkeys to be the parents of the next generation.

2.5. The selection of breeding donkeys

According to Mthi and Nyangiwe (2020), the poor reproductive performance of animals can be attributed to communal farmers' inadequate breeding management practices. Because they may be used for ploughing and draft power, donkeys have become more and more popular as cow substitutes in recent years (Harago *et al*., 2015). Donkeys are highly resilient to sickness and can withstand stress in addition to having a powerful draft power (Tuaruka and Agbolosu, 2019).

Donkey selection in rural families was mostly based on disease resistance and growth performance, with body size being the second most important attribute (Wassie *et al*.. 2023). Moreover, rural households indicated that colour and temperament were significant selection factors. Selecting animal parents that will improve the genetic quality of offspring is a critical component of animal breeding (Xu *et al*., 2020). When selecting breeding animals, small-scale farmers prioritised physical characteristics such as body size, illness resistance, growth performance, and coat colour (Abebe *et al*., 2020). Wessie *et al*. (2023) claimed that coat colour was not a determining factor in selecting donkeys to breed, possibly because coat colour is unpredictable.

To satisfy the growing demand for hides, it will take at least ten to fifteen years to build up the donkey population. Bennett and Pfuderer (2020) demonstrate that the size of the initial female breeding herd, reproductive performance, age of reproduction, percentage of female births, and average breeding life of donkeys are key variables affecting this time.

2.6. The challenges faced by donkeys.

Worldwide, animal draught power is viewed as an outdated technology not as beneficial for modern living (FAO, 2010; Zantsi and Bester, 2019). The little consideration it receives from scholars, practitioners of development, and educational institutions is evidence of this. Despite establishing the SANAT, very little research on animal traction has been done in South Africa (Joubert, 2016). For example, there are generally few or no components on animal power in the South African university curriculum for individuals considering positions in agricultural extension. This is among the causes of the dearth of trustworthy data in animal traction studies. Furthermore, the media's ongoing promotion

of motorised power as the ideal answer for all farming problems contributes to the unfavourable impression of animal traction. The most frequently cited challenges to using animal power are also as follows: insufficient spare parts, the difficulty for humans to educate animals, and the state of the animals when they are ploughing (FAO, 2010; Starkey *et al.*, 1995).

In rural villages, donkeys labour in a harsh atmosphere. When viewed compared to other domestic livestock animals, they are perceived negatively. Various communities hold different opinions on donkeys, some of which are symptomatic of unfavourable sentiments towards the animals (Fernando and Starkey, 2004). The community's negative perception of donkeys has been exacerbated by this. People consider donkeys to be less valuable than other household animals. This, therefore, impacts on how disputes involving donkeys are resolved, which may result in poisoning or other harmful damage that could be fatal. How people treat animals can be influenced by their attitudes and ideas about them (Perry, 2017).

Inappropriate harnesses and cart designs, among other dangerous working instruments, have been linked to workplace injuries (Pearson *et al*., 1999; Biffa and Woldermeskel, 2006). Inadequate or subpar traction equipment will cause wounds and other welfare issues for the animal. Access to cutting-edge technology tools could improve the productivity of working donkeys (Valette, 2015).

The theft and cruel killing of donkeys by dishonest traders who are part of a wider global network involved in the trade in donkey skin and flesh is a growing problem in Africa (Donkey Sanctuary, 2017). This technique poses a hazard to the donkey population in Africa and worldwide if it is not adequately inspected (Lumumba *et al*., 2019). Moreover, donkey welfare was put at risk by these illegal trading activities (Garden Veterinary Services Limited, 2017). In the past, donkeys were taken and killed without humane care, and their flesh was falsely advertised as beef.

Donkey meat was legalised primarily to export donkey meat and skin, which was in high demand in China (Khumalo, 2017). Challenges regarding the mistreatment of donkeys at market yards and during transport to the slaughterhouses, as well as the appalling

handling conditions within those slaughterhouses, emerged after the legalisation of donkey meat in Kenya (GoK, 2012). According to Garden Veterinary Care Limited (2017), these difficulties ranged from animal injuries (15%) to death (10%) and a lack of donkey welfare provisions within the abattoir premises (71%) (such as a lack of shelter, veterinary care, feed, and water supplies). Furthermore, these slaughterhouses needed a steady supply of donkeys, which were imported from Africa and other nearby nations. Due to the decline in donkey populations and accidental breeding, it was likely that shady businesspeople began importing donkeys from neighbouring countries like Namibia, Botswana, Lesotho, and Zimbabwe, or they stole donkeys from unknowing owners. Future donkey populations are threatened by donkey theft and a lack of breeding initiatives. According to Lumumba *et al*. (2019), 15% of the population of donkeys have been killed at export slaughterhouses in less than three years. All else being equal, there would not be any donkeys in the upcoming years due to the yearly rate of donkey slaughter (5.1%) being five times larger than the annual rate of donkey population growth (1.04%).

The Department of Roads and Transport, under the Traffic Act, categorises donkey carts as non-motorised transport. Despite being permitted to drive like other drivers, they are subject to frequent, fast-moving collisions along the Blouberg Road Highway, which has serious ramifications for high-traffic accidents. This damages their cards and causes injury or even death to the donkeys (Pearson *et al*., 1999). To address the issue of road accidents, several road safety efforts have been carried out, including education about road safety for donkey cart users, the use of reflective jackets and cart reflectors, and the installation of road signage alerting drivers to the potential dangers of donkey carts.

The performance of working donkeys was affected by diseases (Pearson and Vall, 1998). Donkeys in good health and receiving regular treatment are more productive and have longer lifespans. Diseases including gastrointestinal parasites (Mulwa *et al*., 2020), skin disorders, ectoparasites, and trypanosomiasis (Mukiria *et al*., 2010) are common in donkeys.

Important barriers to animal production are tick-borne illnesses (Muhanguzi *et al*., 2017). Although trypanosomiasis affects donkeys of all ages, young donkeys are more likely to

develop clinical illness. The prevalence was 3.1% and 7.5% in the wet and dry seasons, respectively, and was mostly spread mechanically by biting flies like *Tabanus* and *Stomoxys* and biologically by the vector Glossina. Among other clinical symptoms, the condition showed decreased red blood cell count and pale mucous membranes.
According to Muhanguzi *et al*. (2017), the prevalence was 32.4% in Uganda. Trypanosoma congolense was frequently the aetiology of the illness (Mukiria *et al*., 2010; Muhanguzi *et al*., 2017).

Donkeys were 77% afflicted by external parasites. Ticks accounted for 74% of the parasite population (Kyeswa, 1996). In Ethiopia, ectoparatises (22.1%) was the most common skin ailment affecting donkeys, followed by wounds (82.3%). In that investigation, the ectoparasites that were found were mange mites (1.6%), lice (11.2%), and ticks (10.4%). Injuries frequently came from harsh whipping, as well as from dangerous carts and harnesses. In working donkeys, they were found to be a serious health issue (Biffa and Woldemeskel, 2006).

Intestinal parasite prevalence was 71.6%, with Stronglus vulgaris (52.8%) being the most prevalent helminth species. The other internal parasites found were eggs from the Habronema species, Anaplocephala magna, and Triodontophorus serratus (Mulwa *et al*., 2020). The most frequent cause of death for working donkeys was helminth infections. They were also linked to growth retardation, a reduction in productivity, and colic-related pain and discomfort (Saul *et al*., 1997).

Donkey cases of African horse illness were more common following the rainy season than during the dry season, when the disease's vector, Cullicoids, was more prevalent in the wild. In the rainy and dry seasons, its incidence was 35% and 28%, respectively. Clinically, the disease can present as either a moderate or severe form in donkeys, with symptoms including respiratory tract and head oedema and breathing difficulty. Although the disease may be lethal in donkeys, only 2% of them died from it. Blindness was common in recovered instances (Gichure, 2012).
The burden a donkey can draw or carry depends on its body weight (Pearson *et al*., 1999). The environment is underweight due to insufficient quantity and quality of feeds, and an

animal's genetic makeup determines its growth (Pearson and Oussat, 1996; Maswana *et al*., 2022). For working donkeys, various phenotypic traits and body measurements have been offered elsewhere in the world, such as in Ethiopia, Zimbabwe, West Africa, Morocco, and South Africa (height at withers, body length, heart, or umbilical length. The weight scale is used to determine body weight; however, when one is inaccessible, body length and heart circumference measurements are used to create weight estimation formulas (Mustefa *et al.,* 2020; Moswana *et al*., 2022).

A crucial part of any farm's management is feeding. The degree of nutrition affected the donkeys' ability to work (Ram *et al*., 2004); consequently, Aganga *et al*. (2000) identified the work potential and output of these animals. In the highlands, working donkeys frequently graze on natural pasture to consume crop waste. Donkeys are grazers and browsers by nature (Aganga *et al*., 2000). They are preferred over cattle in dry regions because they consume a wider range of foods in semi-arid habitats, such as grasses, bushes, and tree bark (Smith and Pearson, 2005). In sub-Saharan Africa, working donkeys' growth and productivity are impacted by the availability of sufficient and nourishing feeds (Pearson and Vall, 1998).

2.7. The declining of the donkey population.

The most recent global donkey population estimate is 45.8 million (FAO, 2019). Donkeys have traditionally been and continue to be used mostly for propulsion and transport of goods and people. As a result, economic growth, such as the mechanisation of transportation and agriculture, has had a significant impact on donkey populations (Arsenos *et al*., 2017; Camillo *et al*., 2018). Donkey populations in Europe have fallen by more than 80% since World War II. Countries with high donkey populations in the past, such as Greece and Italy, have experienced more than 95% reductions (Camillo *et al*., 2018). Between 1990 and 2018, when the Chinese economy was booming, the donkey population in China fell by 77%, from 11.1 million to 2.5 million donkeys (FAO, 2019; NBSC, 2019). Given the substantial reduction in donkey numbers in other nations with high economic development, it does not appear appropriate to blame the ejiao sector for the decline in the China donkey population (Bennett and Pfuderer, 2020).

2.8. The role of gender in working donkeys

Women's participation in profitable market-oriented agriculture is restricted in rural developing nations due to the strong gendered ownership, usage, and management of assets between men and women (Quisumbing, 2015). However, there are obstacles that women must overcome, like not having control over livestock revenue. This affects their socio-economic power since it restricts their ability to make decisions on farms (Quisumbing, 2015).

Due to men migrating to urban regions for non-farm employment, many smallholder farms are experiencing a workforce shortage. In many communities, the number of households led by women has increased in tandem with the separation and death of males (Fernando and Starkey, 2004). As a result, women farmers have been using donkeys more often for the draft. They discovered that donkeys were less expensive and simpler to handle than oxen, which allowed them to lessen the load of domestic transportation in rural regions (Fernando and Starkey, 2004).

Every household member has access to cattle and participates in production, making livestock activities a daily occupation. Animal species and geographical locations have different gender roles (Mutua *et al*., 2014). Men are frequently the owners, carers, decision-makers, and recipients of money from livestock when it is raised for financial gain. Then, women help the males with the tasks involved in caring for the animal (IFAD, 2009). As a result, women worked unpaid labour on their farms and were crucial to the socio-economic advancement of their households and the nation (Roy *et al*., 2017). Women have continued to be underrepresented in other livestock-related tasks, but in communities that raised donkeys, they were heavily involved as the primary carers for the animals (Brooke, 2014). Recognising the gender role in donkey work will boost productivity and, consequently, the money generated by the donkeys.

2.9. The animal power industry's profitability

There is little research on donkey profitability because most studies have been done on oxen and camels, donkeys have receive less academical interest due the perception as

cultural indigenous animal. Nonetheless, a few research concentrated on the overall role that donkeys play in household livelihoods. For instance, an Ethiopian study revealed that donkeys are profitable since they boost household savings returns by USD 330. Avomyo *et al*. (2015) discovered that owning a donkey was profitable in Ghana, with a household with a single animal generating up to USD217 in net annual earnings.

2.10. South African large stock production

Livestock is important in South Africa because it provides food, security, fertilizer, fuel, and a variety of other products and services (Burditt *et al*., 2000). Furthermore, livestock produces meat and milk, which are key components of many people's diets, as well as by-products obtained from livestock processing businesses such as wool, mohair, hides, and skins, which are utilised by people for a variety of purposes (Cole, 1966; Cupps, 2001). Furthermore, livestock dung contributes significantly to soil fertility (Burditt et al., 2000; Cole, 1966), and in some developing nations, manure is utilised as fuel rather than fertilizer (Burditt *et al*., 2000).

In addition, animals supply more protein than calories. According to Burditt *et al*. (2000), animals provide one-third of the protein consumed globally. The author said that meat, milk, and fish provide the essential protein to civilisation, accounting for 35%, 34%, and 27% of global protein, respectively. Cattle, sheep, goats, pigs, donkeys, and chickens are examples of commonly produced domestic animals around the world. According to Cupps (2001), these livestock animals contribute around 28% of the overall value of agricultural goods worldwide.

2.11. Perceptions on donkeys

2.11.1. Farmers' perception of the indigenous donkey traits

There has been a slow rate of genetic development for productive qualities in animals, especially in donkeys (Maswana *et al*., 2022). The inability to conduct structured selection and breeding programmes because of a lack of accessible, well-organised recorded data on donkey performance has been a significant contributing factor (Wassie *et al*., 2023).

Shape, size of the home, colour, resistance to disease, tolerance to drought, ability to adjust to high and low temperatures, temperament, pulling prowess, growth performance, and longevity of donkeys were the most sought-after attributes (Abebe *et al*., 2020). Donkeys with the ability to adjust to different temperatures are the most desirable during selection (Maswana *et al*., 2022). When making judgments between competing things, the strength of preference can be utilised as a valuable guide. It was also discovered that disease resistance was crucial. African native donkeys had a high level of disease resistance and a favourable intensity preference (Wassie *et al*., 2023). The ability of donkeys to withstand drought varies by Southern African region. Native African donkeys in Southern Africa had a great tolerance for drought and a good preference for intensity. Wassie *et al*. (2023) claim notable differences in each country's ability to adjust to low temperatures.

2.11.2. Consumer perception of donkey products

In some Southern African countries, such as South Africa, cultural beliefs and food taboos are followed strictly in some communities, influencing their food consumption and, consequently, their health (Chakona and Shackleton, 2019). Most of the taboos are passed down from previous generations, but some knowledge is transferred among different social groups (Chakona and Shackleton, 2019). Food taboo practices result from religious and secular factors (HLPE, 2017). Consumer preference for other sources of milk and meat is considered one of the factors deterring the introduction of donkey products into the food chain. Although there is some acceptance of donkey products in countries such as France, Italy, and other parts of Europe, its introduction to the food chain in Africa will take some time. Since what consumers want can change with new facts and scientific evidence, it is worth continuing to research the neutraceutical properties of donkey products. Atabek (2019) revealed that food products are very sensitive to consumer perceptions, particularly dairy products. Furthermore, Yegbemey *et al*. (2014) and Keitshweditse (2019) state that older people tend to have a positive perception of the consumption of donkey milk, which could be attributed to health concerns that older consumers might have. Tackling the negative impacts of food norms

is crucial because they are considered some of the important drivers of food security (Alonso *et al*., 2017; Olum *et al*., 2017).

2.12. The benefits derived from donkeys.

2.12.1. Donkey nutritional factors.

Donkeys are herbivores and have a big gut that serves as the principal site of microbial activity in the cecum and colon. The information on nutritional requirements is contradictory (Hassan *et al*., 2022). For example, donkeys' daily dry matter consumption is estimated to be 1.75-2.25% of their body weight (McCarthy, 1989), although Fielding and Krause (1998) estimate it to be 2.5-3%.

Although donkeys are highly efficient at digesting low-nutritional-value fibre, providing small amounts of concentrate feed (0.3-0.5 kg per animal) would likely be more advantageous than supplemental fodder (Hassan *et al*., 2022). An adult donkey's protein intake is estimated to be around 40 g crude protein (CP)/100 kg body weight (BW) per day (Fielding and Krause, 1998). Summer and winter energy requirements are approximately 14.4 and 17.1 MJ DE/day, respectively (Burden, 2012). However, whether this is a practical solution for impoverished farmers in underdeveloped and developing countries is debatable. Owners must justify spending extra money on nutrition, which would mean returns in the form of milk and meat. Burden *et al*., 2009 contend that donkeys do not require energy-rich cereal grains or molasses-rich products, which are frequently connected with the development of health problems such as laminitis, stomach ulceration, hyperlipaemia, and colic. The contradicting information on donkey nutritional requirements may make determining the best solutions difficult. According to Aganga *et al*. (2000), donkeys must have access to supplementary feed when they are expected to do extra work or when the grazing range is exhausted. However, donkey owners and handlers rarely show an interest in the donkeys' consuming intake capacity, resulting in poor feeding welfare.

2.12.2. The donkey milk

Although many donkey breed populations in Europe have been declining, there has been a rise in the number of donkey dairy farms and some breeds bred for milk production (mostly Ragusana and Amiata) in my nation in recent years (Altomonte, 2019).

Furthermore, some studies suggest that donkey's milk may benefit babies with cow milk protein allergy (Martini *et al*., 2018a), as well as later in life and specific health situations (e.g., elderly persons, in cases of dyslipidemia and obesity). Donkey milk has a low-fat content (less than 1%), making it acceptable for low-calorie meals, but a genetic line generating higher-fat milk would be more suited for non-weaned babies' diets (Martini *et al*., 2018b). According to Altomonte (2019), consumers in Italy frequently perceive animal well-being as an indicator of healthier and tastier products; thus, welfare elements in dairy donkey farming are critical for consumers seeking 'healthy and natural food'.

2.12.3. The donkey meat

Donkey meat has never been recognised as a high-quality cuisine, owing to the hardness of the product (DAD-IS, 2021). China produces the most donkey meat, followed by Niger (see table below). Horse meat has a different reputation from equid meat, as it is often considered a good alternative to red meat, with nutritious features that customers value (Polidori *et al*., 2021). For these reasons, there has been a large increase in horse meat consumption in Spain, France, and Poland in recent years (Lorenzo *et al*., 2014; Belaunzaran *et al*., 2015). Equid meat is distinguished by low total fat and cholesterol levels, a positive saturated-to-unsaturated fatty acids ratio, and high iron content in horses and donkeys (Belaunzaran *et al*., 2018). Consumers today are particularly interested in leaner meat with minimal fat content, as well as animal nutrition management (Hamdi *et al*., 2021). A significant number of consumers prefer extensive feeding systems, which are primarily used in donkey breeding because feeding the animals on natural pastures can have a significant effect on meat and carcass quality, as previously reported on Navarra and Burguete foals (Cittadini *et al*., 2021a,b), while data on the effects of different feeding strategies on donkey meat are scarce.

Table 2.1: Donkey meat production in the world

Countries	No. Donkeys	Production of meat (Tn/yr)
China	2,249,807	183,755
Niger	124,319	9946

Burkina Faso	72,372	4342
Senegal	52,581	3155
Mali	50,598	3036
Mauritania	22,920	2521
World	2,569,520	207,172

Table 2.2. Livestock Comparison: Breeding and Slaughter Indicators

S.A Livestock	Period of Gestation	Ration of birth (Average)	Slaughter age (Average)
Goat	5	1-3 birth	3-5yrs
Pig	4	10-12 birth	6 months
Donkey	12-14	1 birth	3 months
Cow	9	1	1.5yrs
Sheep 5	5	1-2	6-8 months

Donkeys, as substantially more time-intensive livestock than others found in South Africa, would not only require more resources yearly as a farmed versus free-range animal but also more resources per farmed lifespan than the norm (Binda, 2019). With foals staying with moms for an average of 4-6 months, a breeding female after two and a half years of age can be predicted to have one foal every other year (Dai *et al*., 2017). On a three-year lifespan, expenses for one animal must be accounted for, as well as the fact that donkeys are rather difficult animals to breed in commercial settings because they are easily agitated and prone to aborting fetuses in artificial conditions (The Donkey Sanctuary UK, n.d.). Donkeys are known to be extremely social, require a relatively high level of mental stimulation in enclosed settings, form close bonds with one another, and become highly distressed upon the death or disappearance of a herd member, making welfare considerations a difficult issue (DSUK, 2017). It is implausible that a commercial farming business can secure not only the physiological welfare of donkeys over their three-year existence but also their emotional and mental well-being (DSUK and WHW, 2017).

Furthermore, incentives for giving adequate food and water, which may apply to livestock produced for meat consumption, do not exist in the case of donkey hides because hides are easier to take from dehydrated, underweight animals (Binda 2019).

2.13. Customers' willingness to pay (WTP) for a product and the variables affecting it

The greatest amount a person is willing to give up receiving a good is known as their willingness to pay (WTP). It measures consumer preferences, which might change depending on the goods and the home (Kontoleon *et al*., 2002; Van Loo *et al*., 2011). For instance, in a study conducted in 2010, Brooks and Lusk utilised WTP to respond to a series of discrete questions about the type of milk each participant would purchase if they were shopping. The options were determined by the cost per gallon, fat percentage, and cloning technique.

Based on consumer WTP for food products, there are multiple ways to organise consumer divisions (Hu *et al*., 2009). Aizaki *et al*. (2011) found that age, education, income, and personal attitudes and perceptions are among the variables that could influence a consumer's willingness to pay (WTP). Their study focused on consumers' views regarding the consumption of cloned beef.

According to Carlberg *et al*. (2007) on WTP for brand-named beef in Canada, people's WTP for four beef brands under investigation decreased with age. Older respondents are less likely to deviate from their regular diet, and most are pensioners with lower incomes than necessary for additional expenses. Jerop (2012) discovered a similar association between customer WTP for goat milk and age, finding that younger consumers were more prepared to pay a premium for the product. However, El Hatmiet *et al*. (2014) found that older respondents had a higher WTP for processed camel milk than younger respondents. Voona and Agrawal's (2011) study revealed that participants with higher educational attainment were more open to purchasing organic fruits. This suggests that education encourages an optimistic outlook on change. Conversely, Senturk (2009) investigated WTP for genetically modified foods in Turkey and discovered that the likelihood of WTP for the premium price dropped with a marginally higher level of education.

According to various studies, the largest percentage of European buyers are motivated by health and safety concerns (Botonaki, 2006). Furthermore, an increasing health concern is linked to the consumption of organic food, according to a study conducted in 2010 by Radam et al. on consumer views on organic foods. In a similar vein, RoitnerSchobesberger *et al*. (2008) discovered that health concern was the primary driver of organic food purchases in Thailand.

Given that larger households need more food to feed their members, household size and total food expenditure may be related. Smaller households spend less money than bigger households. This is because the number of people living in a home increases the need for food, which means that larger families can have less money available for additional premiums, particularly if there are more unemployed people overall in the household (Jerop, 2012).

People's purchasing decisions and processes may be influenced by the attitudes and opinions of consumers. A study by Voona and Agrawal (2011) found that willingness to buy a product will be positively influenced by subjective norms. According to Ramadam *et al*. (2010), perceptions are the development of a unique mental state that is influenced by social, cultural, and economic factors.

2.14. Rural household socio-economic characteristics

2.14.1 Size of household

Household size has a significant impact on farmers' ability to adjust to farming changes. According to Deressa et al. (2009), larger households must devote a portion of their workforce to non-farm activities to earn more money and impact their consumption pressure. This means that large families in the study area have higher opportunity costs when it comes to adopting other livelihood strategies and, as a result, prefer to adhere to locally based-solutions. Another explanation for such results could be that most forest-dependent households in the study areas reported transitioning out of the forest sector, starting enterprises, engaging in agricultural production, finding informal jobs, and home gardening to improve their welfare outcomes. Other elements (such as access to credit, extension services, and access to animals) must also be considered while adapting to these livelihood adaptation measures. Without access to land, for example, the household

would find it difficult or impossible to engage in agricultural activities. Even if the coefficient on the adaptation alternatives was positive, increasing household size did not necessarily enhance the probability of adaptation for most adaptation strategies. Furthermore, it is unnatural to conclude that the larger the household size, the greater the likelihood of adapting to farming methods. Each adult household member may also be a source of information or a recipient of agricultural farming. As a result, as family size grows, so does the likelihood of coming across agricultural farming, improving agricultural productivity and decreasing household food insecurity.

Food insecurity affects larger households more than smaller households (Nabikolo *et al*., 2012). One possible explanation is that larger households demand more money than smaller households (Shongwe, 2014). Larger households, combined with a greater need for food, should incentivise farmers to participate in farming to secure food availability for their family members (Shongwe, 2014). Farming, on the other hand, is based on people's capacity to perform farming tasks. A farmer with a large family size can readily participate in agricultural initiatives while delegating other critical chores to other household members and vice versa (Nabikolo *et al*., 2012). Each adult household member may also be a source of information or a recipient of an agricultural project. As a result, as family size grows, so does the likelihood of coming across an agricultural project, improving agricultural productivity, and decreasing household food insecurity.

2.14.2. Age, gender, and marital status of the household

Age is one factor that may prohibit farming households from reaching their goals. Because younger individuals are more likely than older people to adopt new farming methods, age is projected to have a favourable effect on long-term household food availability. On the contrary, it indicates that people get more eager to accept risks as they age. They do, however, work fewer hours, which could affect their food security. Younger farmers are expected to labour on larger acreages because they are stronger than elderly farmers. Several research studies have revealed that age, gender, and marital status are major determinants impacting perception and adaptive decision-making at the farm level (Nhemachena and Hassan, 2009). Female-headed rural households are more likely to

adjust to climatic conditions, according to Dolisca *et al*. (2006) and Nhemachena (2008), because they oversee much of the agricultural work and have more experience and access to knowledge on farming practices. Most farms are one-of-a-kind, with various men and women, resources, ideas, tastes, and priorities. Given all of this, it stands to reason that there will be discernible gender disparities in priority settings when it comes to group-based climate change adaptation measures. Existing conventions, duties, and obligations, as well as how adaptation techniques reinforce or distort these, determine men's and women's adaptation priorities. A substantial amount of research from around the world demonstrates that men's and women's roles in farm and natural resource management are defined by culturally unique gender norms. According to Deressa's (2011) empirical study, male-headed families adapt to climate change more easily. Maleheaded families were 9% more likely to conserve soil, 11.6% more likely to alter crop kinds, and 10% more likely to plant trees than female-headed households. Furthermore, the age of the household head indicated experience and influenced climate change adaptation. For example, the possibility of planting trees and establishing an irrigation system increases with the age of the household head.

According to the United Nations Food and Agriculture Organisation (FAO), sfemale-headed families want to complete more activities. As a result, there is insufficient time and energy to devote to agriculture or work activities that can boost household finances. The Food and Agriculture Organisation (2013) has recognised a movement from women-coordination to men-coordination as one of the moves from smallholder farming to commercial farming as one of the ways that the gender issue might be manifested in a household's food security status. Tazeze *et al*. (2012) discovered that younger farmers are more inclined to participate in agricultural projects because they are more likely to be inventive and like to try new things. According to the Food and Agriculture Organisation (2013), elder farmers typically have greater expertise and may have seen or witnessed the benefits of participation in agricultural initiatives. Gbetibouo (2009) discovered that if men and women were more equally involved in agriculture, production would increase, and hence food security would improve. As a result, in terms of agricultural output, male-

headed families are predicted to surpass female-headed households. This is most likely because men do less home duties than women. Because they are responsible for other responsibilities, women have less time to dedicate to farm labour. Even if agricultural production increases because of participation in food security programmes, female-headed households may still confront food shortages. Farm output is usually considered to drop as farmers age, so farming requires a strong, healthy individual and older farmers are less eager to convert to new farming practices that may boost agricultural output.

According to Stutley (2010), males are regarded to be better equipped to tolerate the hard demands of farming practices. Women, on the other hand, have made great advances in agriculture and are now seen as important farmers and cattle herders. This is because rural households increasingly focus on agri-business and farming types catering to women. Female farmers have greater social networks and are, hence, more likely to participate in agricultural projects. Male farmers, on the other hand, control and have access to resources. Males make up most community decision-makers, making them ideal candidates for agricultural projects.

2.14.3. Household or farmer experience in farming

According to Barrett *et al*. (2009), home farming experience is the time rural households have been involved in farming. A well-established household is more likely to have farming experiences based on agri-business knowledge and abilities, minimising negative effects on food availability. An experienced farmer understands insecticides, pesticides, disease, and fungus control management, as well as local climate conditions. Participation can be both positive and bad. This statement is justified by the fact that while new technology may be thrilling in the beginning and may succeed, it will not become fascinating as farmers become older and weaker.

2.14.4 Farm income, non-farm income, and unearned income

Farm, non-farm, and unearned income contribute to the farmer's total family income and play an important role in agricultural production (Tazeze *et al*., 2012). These factors influence small-scale maize producers' agricultural climate change adaptation strategies of choice. Households with numerous income sources can possess and purchase more products and services, and they are better positioned to adapt to climate change for long-

term well-being. According to Deressa *et al*. (2009), having enough money to buy inputs (such as paraffin, electricity, fertilizer, improved crop varieties, and irrigation infrastructure) relieves monetary restrictions in rural communities. Tazeze *et al*. (2012) discovered that the income level of the families examined has a positive and significant influence on soil conservation, crop variety utilisation, and planting date adjustments. With each unit rise in revenue, farmers' chances of responding to climate change rose. Farmers tend to invest in productivity-smothering options (adaptation options in this case) such as soil conservation, crop variety diversity, and changing planting dates rather than planting trees for shade, which compete for the limited land available when farming is the primary source of income. Furthermore, farm and non-farm revenue improves the possibility of adapting by planting trees, adjusting planting dates, and employing irrigation. A unit increase in nonfarm income increased the likelihood of planting shade trees by 0.004 and the likelihood of modifying planting dates by 0.001%, respectively. Although not statistically significant, nonfarm income was found to have a negative connection with using different crop varieties and adopting soil conservation practices. These findings imply that when farmers have nonfarm income possibilities, they can afford to plant trees on limited available land, pay for irrigation, and employ fewer agronomic practices such as soil conservation and crop variety diversity.

2.15. Conclusion and summary of the chapter.

Donkey farming is not well received worldwide, especially in the African continent. The farming system is well-known and is in use in Ethiopia and Egypt, two countries in northeastern Africa. Donkey farms have long existed in Europe and a few other nations; this is not a novel agricultural practice. The donkeys are used as drought power in most communities across the world and locally and are perceived as poverty-oriented animals. Meat and milk have traditionally been products. In some nations, donkey meat is prized as a delicacy, and in Europe, it is used to make salami. Donkey milk is highly sought after in the medical and cosmetics industries. Additionally, there have been initiatives in the market for expensive cheese. Despite modest production rates, this has increased the profitability and diversity of farming returns. The non-governmental organisations have emphasised that official data regarding donkey husbandry lacks information

heterogeneity. There is a wealth of data regarding how socio-economic factors influence perception toward and willingness to pay for donkey farming. Moreover, there is a lack of information about South Africa's donkey farming, perceptions, and willingness to pay.

CHAPTER THREE
METHODOLOGY AND ANALYTICAL PROCEDURES

3.1. Introduction

The methodology used in the research is outlined in this chapter. This covers the selection of the research area, data collection tools, sample procedures, and the empirical data analysis model. The study area is briefly explained before techniques, procedures, and data collection methods are discussed. An overview of the research area (Capricorn district) is also given in this chapter, together with information on its municipality (Blouberg Local Municipality) and three chosen villages (Aurora, Oldlongsine, and Earlydown), as well as information on its economic activities, agricultural output, and donkey farming. After that, the conceptual framework and the empirical model that are utilised to address each study objective are explained, along with the rationale behind the model selection for data analysis.

3.2. Study location.

The research study was conducted in Blouberg Local Municipality of Capricorn District Municipality in Limpopo Province, South Africa. Most community households in Blouberg Local Municipality are using donkeys (Binda, 2019). According to Integrated Development Planning 2021-2026, Blouberg Local Municipality's growth and development plan, Vision 2040, the municipality has 41416 residences and 175 753 inhabitants, or 13.2% of the district's total population (Statistics South Africa, 2016). The area (22.9947ºS, 28.8597ºE) is well known for being extremely hot (average low temperature is 12.10ºC and high temperature of 26.02ºC, frequently dry summers, and pleasant, typically frost-free winters). The area receives 455mm of rain annually, with afternoon thunderstorms accounting for most of this total between November and March.

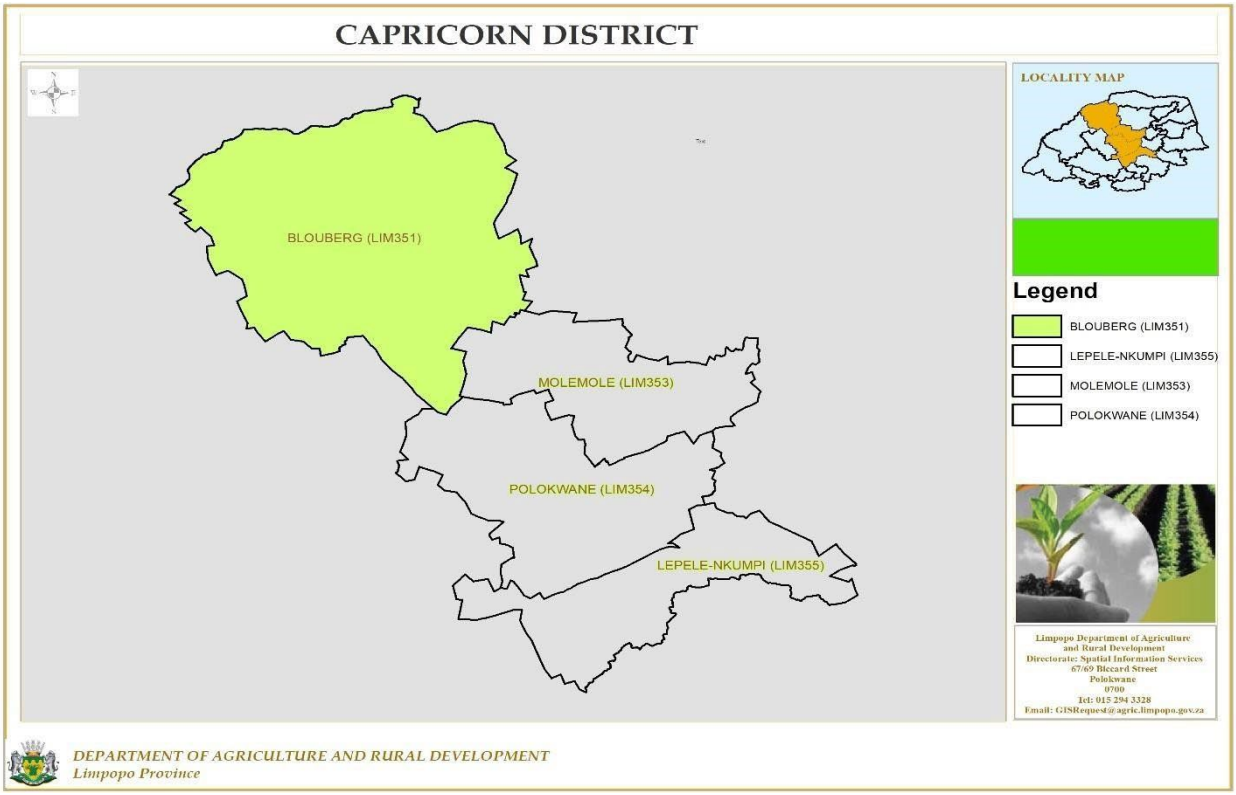


Figure 3. 1 The study area showing of map Capricorn District
Source: Designed by Kabelo Modikwa, Department of Agriculture and Rural Development.

Located in the middle of the province of Limpopo, Capricorn District borders the Mopani District to the east, the Sekhukhune District to the south, the Vhembe District to the north, and the Waterberg District to the west. The district, which includes the province's capital, the City of Polokwane, is at the centre of the province's economic development. The Latitudinal Tropic of Capricorn crosses the northern portion of the district, hence the district's name, Capricorn District Municipality. The district is divided among municipalities such as Blouberg, Lepelle-Nkumpi, Molemole, and the merging of Aganang and Polokwane (Figure 3.1). The district is situated far north of Blouberg Municipality. The Blouberg Local Municipality has selected Senwabarwana (Bochum), Alldays, Eldorado, Buffelshoek, Makgabeng (Oldlongine and Earlydown), and My-Darling as growth spots. Of the four municipalities in the area, which comprise about half of the district, this one is the largest, measuring 9 540 km² and bordering both Zimbabwe and Botswana.

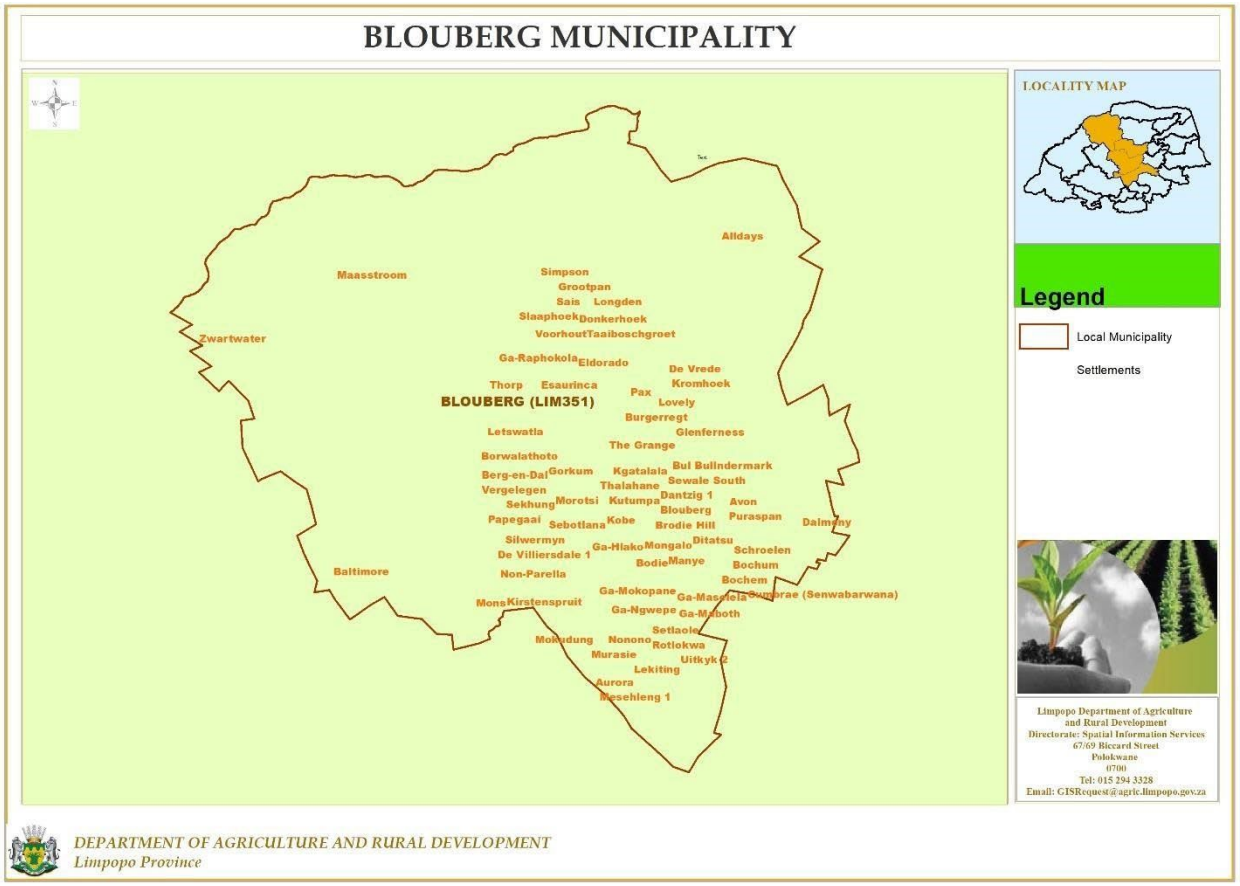


Figure 3. 2 The study area shows a map of Blouberg Local Municipality. Source: Designed by Kabelo Modikwa, Department of Agriculture and Rural Development.

Blouberg Local Municipality is in the far northern part of the district area. Reaching a total area of 9 540 km², the Blouberg Local Municipality is the largest of the district's four municipalities, which comprise about half of the district. It borders both Zimbabwe and Botswana. Some of South Africa's most amazing rock climbing can be found in Blouberg Local Municipality. It is well-known for its 350-meter-long, big-wall natural climbing routes. At the base, the vegetation is subtropical savanna, whereas on the summit, it is alpine. Its name derives from the Blouberg (blue mountains), a group of mountains northwest of Vivo that lies west of the Soutpansberg Mountain group's western edge. Blouberg is a warm region with 380–550 mm of yearly precipitation. During the summer, there is the most rainfall. During the wet season, evapotranspiration is extremely high. Frequent droughts are common in the area, which negatively impacts the local economy. The Mogalakwena

River is the sole perennial river in the area, providing the only pipeline water source—the Glen Alpine Dam. Tourism, mining, and agriculture are the primary economic drivers.

3.3. Data collection instruments

Qualitative data were used in the research study. The permission was granted by the University of Limpopo's Turfloop Research Ethics Committee (TREC) (TREC/1595/2023: PG) before collecting the data. Beforehand surveying, the questionnaire tools were clarified to the traditional leaders and the heads of the households. Data was collected from the middle of November 2023 to the middle of January 2024 by a team of four enumerators who spoke the Sepedi language. Before data gathering in the field, the enumerators received two days of training elaborating and discussing the content of the questionnaire and how to conduct interviews.

Pre-testing was conducted before distributing the questionnaires. Through the pre-testing period, a random sample of 10 heads of households from the three villages was questioned. During the questionnaire's pre-testing phase, questions that overlapped were removed, and unclear others were edited to guarantee clarity and so that relevant information linked to the objectives of the study was achieved. Pre-testing the questionnaire also aided in its refinement of which subtopics to include in survey questions and allowed for the flow of enquiries. In the study of research, the units are the heads of households. The interviewed household head is the person who makes all or most farm management and livelihood decisions that affect the well-being of all household members. Members of the households who make such decisions were interviewed in their absence.

The primary purpose of these inspections was to familiarise researchers with the research topic and to design the empirical data-gathering processes that would follow. Community assessment, key informant interviews, group discussions, and observations were used to get a deeper grasp of the local context. Members of the community took part in focus group discussions to learn more about subjects such as population demography, farming dependence, and so on. Discussions with key informants (such as ward councillors, chiefs, elders, community members, agricultural advisors, and various gender groups) were also held to obtain context-specific information relevant to the study, such as

population dynamics, community-level statistics, and farming status over time. Meetings with agricultural consultants, members of Blouberg Local Municipality, and Department of Agriculture and Rural Development representatives were organised, and discussions focused on demographics, administration, infrastructure, occupational structure, socio-economic situations, and how people utilise and view donkey farming. Members of the community discussed donkey husbandry and donkey welfare.

Key informant interviews and focus group talks were conducted to gain information on subjects mentioned in the survey questionnaire. Members of diverse social groups in the neighbourhood were recruited as key informants. An elderly villager who has been in the hamlet since birth, as well as an educator, traditional leader, headmen, and community members, were chosen and questioned. Following the qualitative data gathering processes, household surveys employing a comprehensive questionnaire were done to generate primary data. The relationship between the head of the family and household members, age, gender, marriage status, work status, and educational level were all collected as basic socio-economic household characteristics. The questionnaire also included measures of household socio-economic characteristics, level of perception of rural households towards donkey farming's contribution, factors influencing willingness to pay for donkey farming's contribution towards household welfare and factors influencing donkey farming's contribution towards household welfare. Furthermore, questions were devised to elicit rural households' perspectives on donkey farming and its challenges. The poll also enquired about people's perspectives of donkey farming and its implications, as well as their livelihood plans and reliance on farming techniques.

3.3.1. Sample size and sampling procedures.

Sampling is the process of selecting units from a population of interest to examine the sample and generalise the results to the population from which the sample was drawn (Greene, 2003). The study did not include all the household heads in the study area, but it drew a reasonable or representative sample of the intended participants. According to Fisher (2004), the sample's characteristics should be like those of the population. Because the data from a sample was extended to the full population, the selection of

sample units was crucial. A representative sample should have a sufficiently large sample size for meaningful statistical analysis. According to Gujarati and Porter (2009), a sample size of at least 30 units is required for meaningful statistics. The study's target demographic was the heads of households in the three Blouberg Local Municipality selected localities. A simple random selection strategy based on probability proportion to sample size was used to select household heads in each neighbourhood. The study used both qualitative and primary data. Face-to-face interviews with structured and semi-structured questionnaires were used to obtain qualitative data. Between mid-November 2023 and January 2024, 120 heads of households were interviewed at the study sites. A basic random sampling strategy based on probability proportionate to sample size was investigated (Table 3.1). The strategy helped by supplying a total number of household heads that were eventually interviewed.

Table 3.1: Sample size in the respective household heads based on probability proportion to sample size.

Villages under Blouberg Local Municipality	Total number of heads of household	% ages	Probability Proportional to sample size per village	Heads of the household interviewed
Aurora	48	27	0.27	32
Earlydown	67	38	0.38	45
Oldlongsine	63	35	0.35	43
Total	178	100	1	120
Total sampled donkey farmers (67% of the sampling frame of 178)				120

Based on the likelihood proportional to sample size, 27, 38, and 35% of the total number of heads of household in Aurora, Earlydown, and Oldlongine, respectively, were questioned (Table 3.1). A total of 120 heads of families from a sample frame of 178 were surveyed using a structured questionnaire in three villages under Blouberg Local Municipality in Capricorn District, Limpopo Province. A total of 27% of Aurora's heads of household, 38% of Earlydown's heads of home, and 35 of Oldlongsine's heads of

household. This was followed by the formation of the planned sample size of 120 household heads. Data was obtained from heads of households in each hamlet using a proportional sample size of more than 10%. This sample covers 67% of the total number of heads of household in Capricorn District, Blouberg Local Municipality villages.

3.3.2. Data integrity

Data integrity refers to the accuracy and consistency of data acquired or stored (Dosal, 2013). Data integrity is important because it decreases data corruption while data reading, writing, or storing (Crespi, 2007). The data-gathering technique was monitored regularly to fix any difficulties that appeared. To adjust for any missing variables, the researcher and enumerators returned to the individual sampled rural households in the study area. Continuous spot checks were also carried out to verify that all pertinent data was collected.

3.3.3. Data processing

To process the data from the questionnaires, the following methods were used:

1. Transferring the data to a spreadsheet for processing
2. The detection and correction of inaccurate data entries from questionnaires were referred to as data cleaning. It required locating incomplete, erroneous, inaccurate, or irrelevant data items and then replacing, modifying, or removing the unclean or erroneous data, and data validation entailed analysing the data for correctness and meaning.

Descriptive statistics aided in the description of rural households' socio-economic characteristics, institutional variables, and attributes. Donkey farming by rural households and their perceptions are portrayed in Capricorn district’s Blouberg Local Municipality.

3.3.4. Data analysis

Field data was edited, coded, and cleaned to guarantee consistency, uniformity, and accuracy. The data was fed into computer software for analysis. IBM SPSS version 29.0 and Microsoft Excel computer tools were used to process the data. The collected data were investigated in four ways: descriptive, lickert scale, ordinary Least Squares, and binary logistic regression model.

3.4 Analytical techniques

3.4.1. Descriptive analysis

The first objective of the study is to profile the socio-economic characteristics of donkey farming owners' descriptive statistics were employed. Semi-structured questionnaires were used to gather the data, and Statistical Package for Social Sciences (SPSS 29.0) was used to analyze the collected data. Descriptive statistics such as frequency distribution table, mean, maximum, minimum, standard deviations (SD), pie charts, and percentages were used to analyse the data collected.

3.4.2. Likert scale

To determine the level of perceptions of rural households towards donkey farming contributions as compared to the tractor, motor vehicle, horse farming, mule farming, and large stock farming, A 5-point Likert scale with the following values: strongly agree = 5, agree = 4, neither agree nor disagree = 3, disagree = 2, and strongly disagree = 1 was used together with descriptive statistics analysis. To determine whether respondents thought favourably or unfavourably of the statements used in the study, the Likert mean score was used. The weighted mean of the scaling statement for the rate/level of respondents' perception was 1+2+3+4+5= 15/5 = 3, which was the Likert mean determined by dividing the total of the Likert scale's five points by five.

The Likert scaling type measuring instrument is represented by the formula:

$X = \Sigma Fx / N$

Where X = mean score

Σ = summation sign

F = frequency

N = no of respondents 120

x = For the rate of donkey farming perception compared to other farming types and mechanisations in this survey by rural families, the nominal values of each response category are 5 + 4 + 3 + 2 + 1/5 = 3. Consequently, the weighted mean for the perception of donkey farming about other farming practices and mechanisations is 3.

Decision rule: Any mean score value less than three indicates that respondents had a negative perception of the assigned statement or item regarding donkey farming, or that they indicated they disliked the meat. Conversely, any mean score value greater than or equal to three indicates that respondents had a positive perception (or one of the reasons they like donkey farming). Nevertheless, when it comes to how respondents felt about donkey farming in comparison to other mechanisations and farming systems, any mean score value larger than three indicates that respondents felt positive about donkey farming more than they did about its compared counterpart; a value equal to three indicates that respondents felt the same way about donkey farming as they did about its compared counterpart; and a value less than three indicates that respondents felt negative about donkey farming in comparison to its compared counterpart.

3.4.3. Binomial Logistic regression model

To achieve the third objective of this study, which is to determine the socio-economic factors influencing willingness to pay for donkey farming contribution towards household welfare, the binary logistic regression model was used. A categorical variable (often dichotomous) was used to predict using binary logistic regression using a collection of predictor variables (Wuensch, 2015). The binary regression model allows one to compute the likelihood that an exact event will occur (Greene, 2003). Das and Rahman (2011) state that the model assumes a linear relationship between the independent variables' independent variables and the outcome's logit (log-odds). The dependent variables were coded properly since the binary regression model implies that P (Y=1) represents the probability of the event occurring (Blackwell *et al*., 2006). Tu (1996) asserts that the logistic regression models' convergence condition is the maximisation of a likelihood function. Marginal effects were accounted for to control how much alterations in the explanatory variables influence rural households' willingness to pay for donkey farming contribution towards household welfare.

The general Binary Logistic Regression Model is expressed as follows: Y_i =

$$In\left(\frac{pi}{1-\mathrm{pi}}\right) = \beta_0 + \beta i X_1 i \ldots\ldots\ldots \beta k X k + U i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where, for i=n observations

Where: Y_i signifies the dependent variable

Where: $In\ (\frac{pi}{1-pi})$, signifies the natural log of the odds

Where: Pi signifies the probability that the rural households are willing to pay for donkey farming contribution towards household welfare.

Where: $1 - Pi$ signifies the probability that the rural households are not willing to pay for donkey farming contribution towards household welfare.

Where: β_0 is the intercept,

$\beta_1, \beta_2, \beta_3 \ldots \beta_i$ signify a vector of unknown parameters that measures. change

in X_i for a unit in the change in explanatory variables, and

Where: U_i signifies a random disturbance term.

The specific binary logistic regression model of the study is expressed as follows:

$WTP = \beta_0 + \beta_1 AGE + \beta_2 GND + \beta_3 MS + \beta_4 HS + \beta_5 HI + \beta_6 YED + \beta_7 REL + \beta_8 CLT + \beta_9 OCC + \beta_{10} PPT1 + \beta_{11} PPT2 + \beta_{12} PPT3 + \beta_{13} PPT4 + Ui$ ... ... (2)

Table 3.2.: Description of variables in the Binary Logistic regression model

Description of variables Variable	Code	Description	Measure
Dependent			

Willingness to pay	1, if the would be willing to pay available on 0 otherwise WTP	respondent Dummy for rabbit meat if it was a farm,	
Independent variables			
Age	AGE	Age of the respondent	Years
Gender	GND	1, if the respondent is male, 0 female	Dummy
Marital Status	MS	1, if the respondent is married, 0 otherwise	Categorical
Household size	HS	Number of people in the household	Number
Household income	HI	Total household income in the previous 12 months	Rands
Years of education	YED	Number of years spent in school.	Years
Religion	REL	1, if the respondent is a Christian, 0 otherwise.	Dummy

Culture	CLT	1, if culture affects willingness to pay for donkey farming, 0 otherwise	Dummy
Occupation	OCC	1, if the respondent is full-time employed, 0 otherwise	Dummy
Perception 1	Ppt	1, If donkey farming is better than tractor, 0 otherwise 2. If donkey farming is better than motor vehicle, 0 otherwise 3. If donkey farming is better than mule farming, 0 otherwise 4. if donkey farming is better than horse farming, 0 otherwise 5. if donkey farming is better than large stock farming, 0 otherwise	Categorical
β1-β13 are parameters to be estimated, Ui is the error term			

3.5. Scientific contribution

The study offered a thorough overview of the varied viewpoints surrounding donkey husbandry by looking into different areas of rural household's opinions of donkey farming, including its significance to livelihoods, cultural significance, and environmental

sustainability. The study findings benefit most rural households (exactly the study region). Farming donkeys, particularly donkeys, play an essential role within the local farming system by providing food safekeeping and guaranteeing livelihood nourishment, and economy. The discoveries can subsidise the expansion of policy interferences aimed at safeguarding willingness to pay for donkey farming. The information generated from this study will assist in decision-making for efficient and beneficial working donkeys for the coming generations. Eventually, this study subsidises the enlargement of the literature on perceptions and willingness to pay for working donkeys in South Africa and the world.

3.6 Ethical consideration

3.6.1 Ethical clearance

The Turfloop Research Ethics Committee (TREC) approved this study and ensured that it adheres to the University of Limpopo's ethical guidelines prior to implementation.

3.6.2 Confidentiality and Anonymity

The primary aims of ethical research procedures were participant anonymity and confidentiality (Annexure A, subsection 4). Both these perceptions and the WTP study duly considered the respondents' (rural families') right to privacy and personal data. The names of the participating rural households, which are an essential part of their identity, were never revealed to the public by the study, and the data they gave the enumerators was only used to support the study's objectives. Consequently, the respondents' anonymity and privacy were upheld. Rural households were offered the option to participate freely or not, and respondents were told about the nature and objectives of the study prior to its commencement.

3.6.3 Study permission request

To make sure that the study's design would not harm the participating rural households or have a negative influence on their life, ethics approval was acquired. Lastly, a request for permission to start data collecting was made utilising a TREC ethical clearance letter.

3.7. Summary and conclusion of the chapter

The study area, the research methodology used to address the objectives of the study, and the arrangements for data collection, measurement, and analysis were all described in this chapter. The study was carried out in Limpopo Province Aurora, Earlydown, and Oldlongsine villages, Blouberg Local Municipality of Capricorn District, South Africa. A standardised questionnaire that was given out during in-person interviews was utilised to gather primary data for the study. Respondents at Aurora, Earlydown, and Oldlongsine villages were randomly chosen. Microsoft Excel and SPSS were used to evaluate the gathered data. Applied the Likert scale, the Binomial Logistic regression model, Ordinary Least Squares, and descriptive statistics.

CHAPTER FOUR
FINDINGS, RESULTS AND DISCUSSIONS

4.1. Introduction

This chapter provides results and discusses the descriptive analysis results of the area survey conducted in Blouberg Local Municipality. The data used in this analysis were collected from 120 rural households between mid-November 2023 and mid-January 2024. This chapter is divided into three sections. The survey respondents' demographic and socio-economic features are descriptively analysed, and the results are reported in the first section. The second portion contains the respondents' opinions regarding donkey farming. A final part that discusses the socio-economic elements impacting rural households' willingness to pay for donkey farming wraps up the chapter.

4.2 The socio-economic or demographic characteristics

Age, gender, marital status, household size, household income, religion, culture, number of adults in the household, employment status, number of sources of income, highest educational levels, and farm income per year of the sampled rural households are discussed in this section. According to Cchetri *et al*. (2012) and Bryan *et al*. (2013), these factors are important because the head of the family oversees the primary financial activities of the household and is likely to be impacted by demographic information when making decisions. Once analysing the socio-economic characteristics, economic data of rural households are essential since these characteristics influence households' decision-making capability and economic behaviour. It was expected that these factors would influence rural households' perception and willingness to pay for donkey farming.

4.2.1 Mean and standard deviation distribution for continuous variables

Table 4.1 presents the descriptive statistics for continuous variables. According to the data, household heads were 56.22 years old on average, with an 11.136 SD. This finding implies that the heads of the households were generally responsible grown-ups. The percentage of adult household members is also displayed in Table 4.2 with a mean of 2.31 and an SD of 1.151. A measure of household size that assigns weights to different age and gender categories (adult equivalent) had an average of 4.08 and an SD of 1.476,

whereas families had a minimum age of 28. Furthermore, results showed that the income source of the rural households had a mean of 2.7 and an SD of 0.131.

Table 4.1 Continuous descriptive variables of the sampled rural households under the villages in Blouberg Local Municipality, Capricorn District, Limpopo Province (N=120)

Definition of variables	Mean	Standard Deviation	Min.	Max.
Age	56.22	11.136	28	87
Household size	4.08	1.476	1	10
Number of income sources of the rural households	2.7	0.131	1	5
Total farm income per year 2023	16131.67	11434.615	0	56000

4.2.2 Age of the respondents

Most of the household heads from the three villages in Blouberg Local Municipality are pensioners, persons above 60 age category, followed by the medium age range, which includes the ages of 50–59 and 40– 49 (Table 4.2). The remaining group, which made up the smallest portion of the sample (6.6%), comprised people in the age ranges of 20 to 29 and 30-39. Male respondents comprised just 50.8% of the household heads, with female respondents accounting for most of the distribution (49.2%). This is consistent with Zewdu *et al*., (2013) finding that most livestock producers are elderly, which is typical of most developing nations. However, most donkey farmers in this survey were middle-aged; in Blouberg Local Municipality, farmers aged 30 to 50 owned 76.2 and 79.4% of the donkeys, respectively.

Table 4.2: Age of the respondents in years

Age	Village		Total	% category
	Aurora	Earlydown	Oldlongsine	
20-29	1	0	0	1	0.8%
30-39	5	0	2	7	5.8%
40-49	4	10	8	22	18.4%
50-59	6	16	14	36	30%
≥60	16	19	19	54	45%
N	32	45	43	120	100%

4.2.3 Household size of sampled rural households

The number of persons who shared a meal and a household for six months with the respondent was the definition of household size in this study (Deressa *et al*., 2009). Moreover, adults in the studied rural households are classified as older than 18. A greater range of labour capacity is available in the form of young, middle-aged, and elderly individuals when families are larger. For rural households, labour, especially casual labour, is a vital component of production. The survey's findings show how rural households in the Blouberg Local Municipality sample are organised. The Blouberg Local Municipality's average family size of 5 people suggests that rural families there are between 4 to 9. With three adults on average, most rural households in the surveyed area are probably made up of a nuclear family or a couple plus another adult, who could be an adult kid or an ageing parent. A single-member minimal household size denotes the existence of single people in rural areas. On the other hand, a family with no more than six persons is likely made up of extended families or multiple generations living together, which may require larger living quarters and more income from farming. The sampled average household size was 5 which is greater than the national average, and the average household size in South Africa is 3.1 (DSLSA, 2022).

Important variables impacting the degree of farming activity are household size and the number of adult members (Apata *et al*., 2009; Mabe *et al*., 2014). Mabe *et al*. (2014) and

Tazeze *et al*. (2012) emphasised the significance of the previously described components in the application of adaptation techniques from two angles. The first presumption is that larger families might have to shift some of their workforce onto non-farm pursuits to generate income and relieve the financial strain of having a large family (Apata *et al*., 2009; Mabe *et al*., 2014). Another presumption is that having a large family is usually linked to having a higher labour endowment, enabling a household to handle various agricultural tasks. For example, Tazeze *et al*. (2012) contend that because there are fewer labour shortages during peak times, households with a larger labour pool are more inclined to embrace and deploy agricultural technology more intensively. Shongwe (2014) states that it is anticipated that larger households and the need for more food would encourage farmers to engage in farming to ensure food availability for their families. On the other hand, farming depends on people's capacity to perform farming tasks. A farmer with a spacious home can easily engage in agricultural production while assigning other important responsibilities to other household members and vice versa, according to Nabikolo *et al*. (2012). Moreover, every adult family member could be a recipient of an agricultural effort or a source of knowledge. Deressa *et al*. (2009) state that to increase income and lessen their incentive to consume, larger households must dedicate a portion of their labour force to non-farm pursuits. This indicates that large families in the study are more inclined to continue with locally-based solutions and have higher opportunity costs when identifying alternative livelihood alternatives.

4.2.4. Household income of the respondents

The study area's rural households primarily made their living by selling crops, animals, or other agricultural products. The household income, household food security, per-capita income, and wealth index were the socio-economic factors considered in the study. The annual income of a household was divided by the total number of household members to determine the per capita income of that household. Study results show most rural households lived below the KES 69,350 annual poverty line (or KES 190 per day). The average disposable income of South African households in 2022 was over 50,500 South African rand, or over 2,738 US dollars (Cowling, 2023). This indicates that most rural households that have donkeys are rather low-income, which has an impact on how

resources are allocated to agricultural pursuits and how ready people are to pay for quality donkey breeds. According to female donkey owners, the donkeys they own could range from 30 to 60 per cent of their overall earnings (Maggs *et al*., 2021). Rural households in Aurora had substantially lower per capita incomes than those in Earlydown and Oldlongsine villages, according to comparisons between the three sampled villages. This finding aligns with Binda's (2019) research, which indicates that households in Blouberg Local Municipality have higher rates of overall poverty and Household disposable income per capita in South Africa 2004-2022 (Cowling, 2023).

4.2.5 Sampled number of income sources of rural households.

Table 4.3. Number of income sources of rural household respondents.

Source of income	Number of responds	Per centage (%)
On-farm	40	32.8%
Unearned income generation activities	7	5.7%
Employment	40	32.8%
Off-farm	15	13.7%
Other: Specify	18	14.8%
Total	120	100

The rural household's average income comes from three sources, with a minimum of one and a high of five (Table 4.3). The sampled rural home has significant mean differences in revenue sources, as indicated by the highly statistically significant range result of 4. The percentage of primary sources of income that the study's sampled rural households reported is presented in Table 4.3. It is acknowledged that one of the main factors influencing a rural household's decision to farm with donkeys is the quantity of income sources available to them. Farm, non-farm, employment, and unearned earnings are the different categories into which these components can be divided. All these factors are essential to agricultural productivity and add to the household income. Families with several sources of income are better able to purchase and possess goods and services,

as well as engage in a variety of farming activities. Instead of relying mostly on agriculture, rural lives are supported by a range of non-farm income-generating activities and businesses (Soltani *et al*., 2012).

The respondents from rural homes in the sample were able to estimate the amounts connected to these categories, but they were unaware of the exact amount they received each month or declined to share it. Income from unearned sources, farm products (grains, legumes, and melons), off-farm sources (firewood, sands, traditional medicinal plants, and commodities transportation), and work resources (self-employed, contract, temporary, and permanent) have been included. Unearned income is any money received by rural households, such as child support payments, disability allowances, old age pension grants, and remittances from relatives without them having to work or render any services. Examples of occupational revenue included sewing traditional clothing and jewellery, manufacturing mats, cooking, decorating, and running a tuck store where they sold bread, airtime, and snacks. Unearned money was mentioned by more than one-third of the sampled rural households in the study area (Table 4.3). Out of 120 rural households that were sampled, 40 (32.8%) listed employment and on-farm income (grains, legumes, and melons) as the key sources. In that order, 18 (14.8%) off-farm income, 15 (13.7%) off-farm income, and 7 (5.7%) unearned revenue generation activities were ranked. Additionally, every rural household in the sample reported receiving farm income in 2022, albeit varying degrees depending on the farm.

4.3. Descriptive categorical and dummy variables

Table 4.4 Descriptive categorical and dummy variables under the villages in Blouberg Local Municipality, Capricorn District, Limpopo Province (N=120).

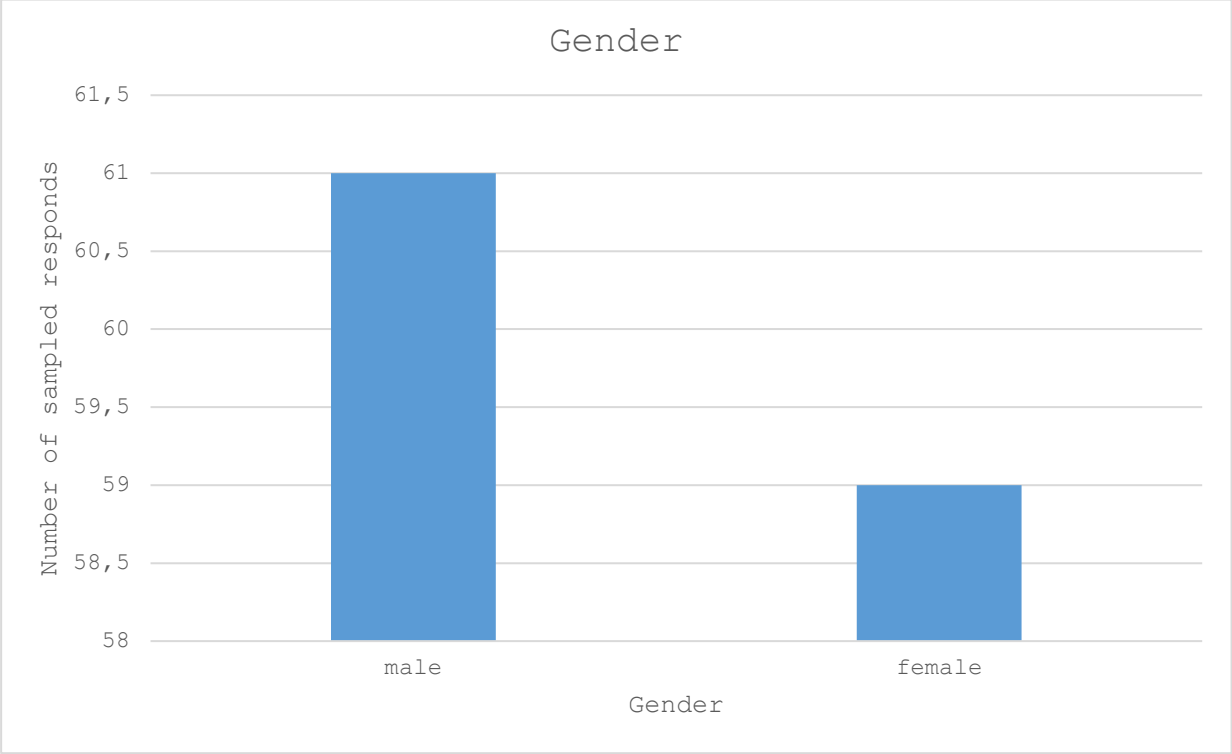
Definition of variables	Mean	Standard Deviation	Min.	Max.
Gender (GND)	1.49	0.502	1	2
Marital status (MS)	1.73	0.879	1	5
Years of education (YED)	2.87	1.152	1	5

Religion (REL)	1.45	0.500	1	2
Occupation (OCC)	1.45	0.818	1	4
Perception 1 (Ppt)	4.04	1.111	1	5
Perception 2 (Ppt)	2.39	1.416	1	4
Perception 3 (Ppt)	3.60	1.325	1	5
Perception 4 (Ppt)	3.61	1.343	1	5
Perception 5 (Ppt)	3.49	1.414	1	5

4.3.1 Gender distribution of sampled rural households

Figure 4.1 Gender distribution of sampled rural households (N=120)

A high number (61) of respondents interviewed from the sampled rural household (n=120) were male (Figure 4.2). This means that the gender distribution of 61 (50.8%) were male and 59 (48.2%) were female for rural households surveyed, respectively. The study by Kom *et al.* (2020) found that most small-scale farmers were female and that women were the majority of those engaged in agricultural activities. The implication says that most rural households are male-headed in BLM, and female families engaged in rural households are fewer in proportion. There were slight differences (2.6%) in the total percentage of rural households heading the families, almost equal percentages. The outcomes agree with the observations of the earlier study Kom *et al*. (2020). Men, whether in male-headed or female-headed households, are primarily responsible for donkey rearing, whereas, women are responsible for crop cultivation and household chores. This is supported by the fact that the male-headed households in many studies rears donkeys (Melak *et al*., 2020; Ravichandran *et al.,* 2023). The gender of the rural household is an important factor that impacts agricultural production and the yield of exposed rural livelihoods. Most of the research shows that adoption decisions at the farm level are significantly influenced by gender (Apata *et al.,* 2011b; Masuku, 2013; Noko, 2023; Nabikolo *et al*., 2012; Oluwatayo, 2011).



4.3.2 Marital status of sampled rural household

Figure 4.3 indicates the marital status of a sampled household. Based on empirical investigations in Africa, Runganga and Mumbengegwi (2020) state that the body of research on farmers' willingness to ensure their farms has shown that married status positively influences this willingness.

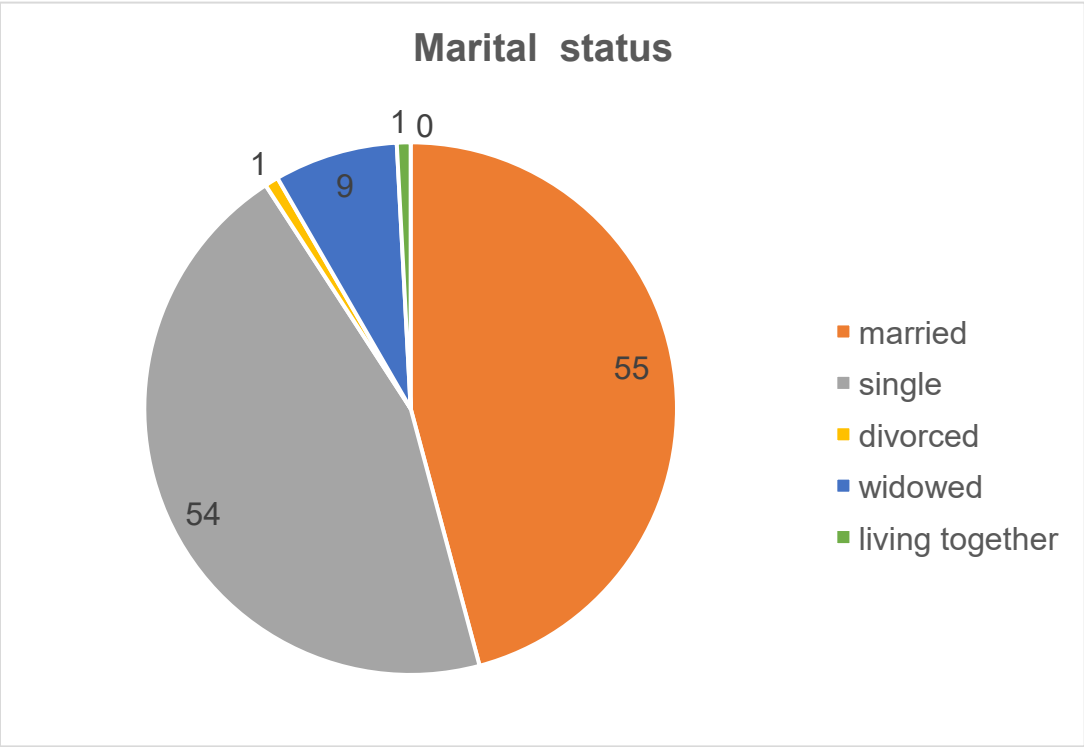


Figure 4.2 Marital status of sampled rural households in BLM (N=120)

In the current study, the majority (almost 90%) of the sampled rural households in the research area are (54) single and (55) married. Deressa *et al.* (2009) and Noko (2023) state that marital status is one of the variables that may have an impact on the variety choices made by small-scale maize farmers and can also be used as a guide when making variety selection decisions in the context of farming. This variable was predicted to impact how rural families felt about donkey farming, how willing they were to pay for it, and how these adaptive measures were chosen for this study. According to the findings, (46 %) of the 120 sampled rural households are married, with (45 %) being single, 7.5% are widowed, 0.8% are divorced, and 0.8% are living together but not married. The marital status of the rural household can influence the extent of perceptions and the willingness to pay for donkey farming. The well-informed and mindful donkey farming, the better informed and experienced the rest of the households. According to Deressa (2010), married and single households share decision-making and are more aware of farming, perhaps because they have stayed around studying for a reasonable time, allowing them to observe farming and pass it on to the rest of the household.

An individual's degree of vulnerability and capacity for adaptation to the donkey farming practice is influenced by their marital status. A significant factor affecting farmers' willingness to pay for donkey farming measures is their marital status. Van Aelst and Holvoet (2016), and Chiwome *et al.* (2019) discovered that marital status had a significant role in influencing the likelihood of different socio-economic and gendered entitlements, such as having access to resources and getting material support from family members. For instance, farmers with varying marital circumstances see opportunities and challenges differently while adjusting to donkey farming practices. Denkyirah *et al*. (2017) found that most farmers who engage in agricultural activities are married.

4.3.3 The educational level of the sampled rural households in Blouberg Local Municipality(N=120)

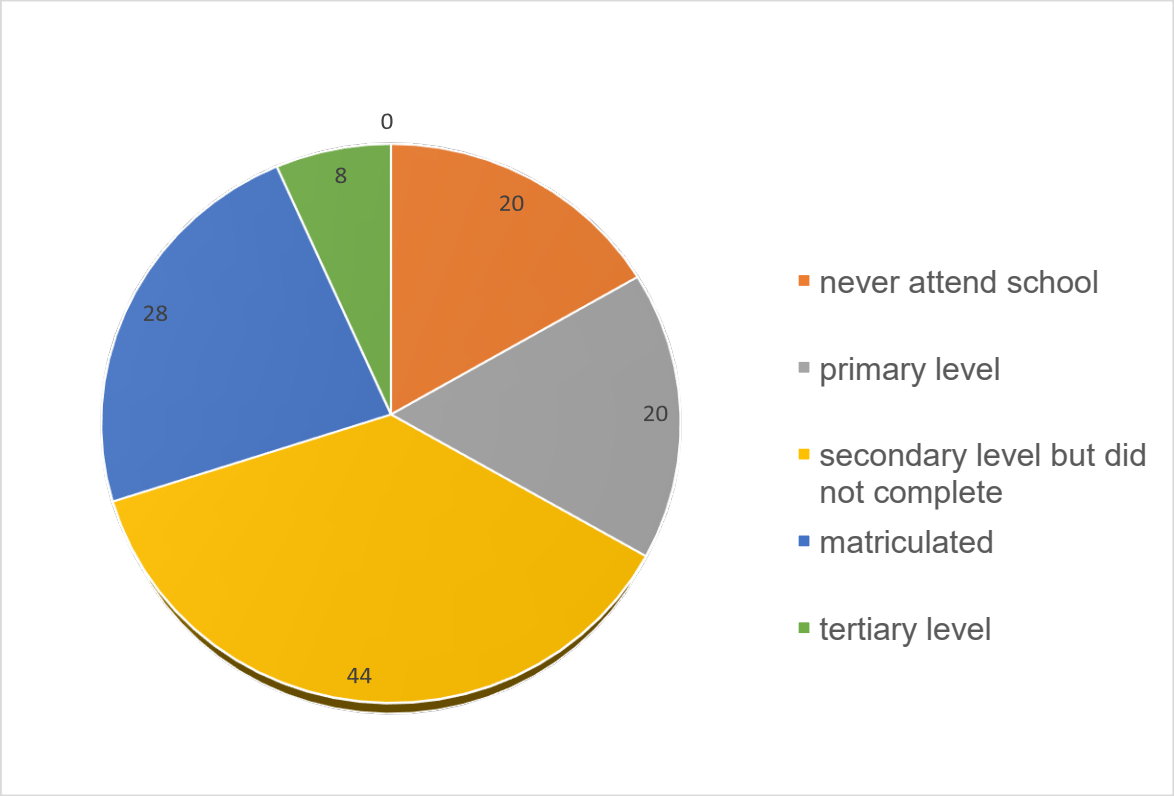


Figure 4.3 Educational level of sampled rural households in BLM (N=120)

Since education affects a consumer's personality, wants, and attitudes, it is one of the most important elements influencing their purchase behaviour (Żelazna *et al*., 2002; Rankoana, 2022). On the educational level of rural households' heads, 20 have never attended school, and 20 primary levels are of the same percentage, 28 of rural households have matriculated but never completed (Figure 4.3). Furthermore, only 8 of the rural households sampled responded that went to the tertiary level. The majority of sampled rural households responded with 44, showing that they had ended at the secondary level but had never completed it.

Furthermore, many rural households completed primary school but dropped out of matriculation. The findings were expected as Xiong *et al*. (2018) also reported that farmers more eager to pursue higher education are more willing to experiment with novel techniques that may enhance their agricultural operations and increase their productivity. This is because the new technology is quite simple for these farmers to learn and has a

beneficial impact on their WTP (Somanje *et al*., 2021). As a result, the degree of education attained by rural households influences both their WTP and their decision to have a donkey farming system.

Contrarily, many low-level farmers believe that raising educational standards will increase costs unnecessarily (Ma *et al*., 2020). This explains why they are prone to be uninterested in utilising new farming techniques, as evidenced by the results for rural households. However, Harun *et al*. (2015) contended that the variable education level has no appreciable impact since farmers lack the knowledge to properly assess the trade-offs and implement GM agricultural interventions (Ali *et al.,* 2019).

4.3.4 Occupation of the sampled rural respondents

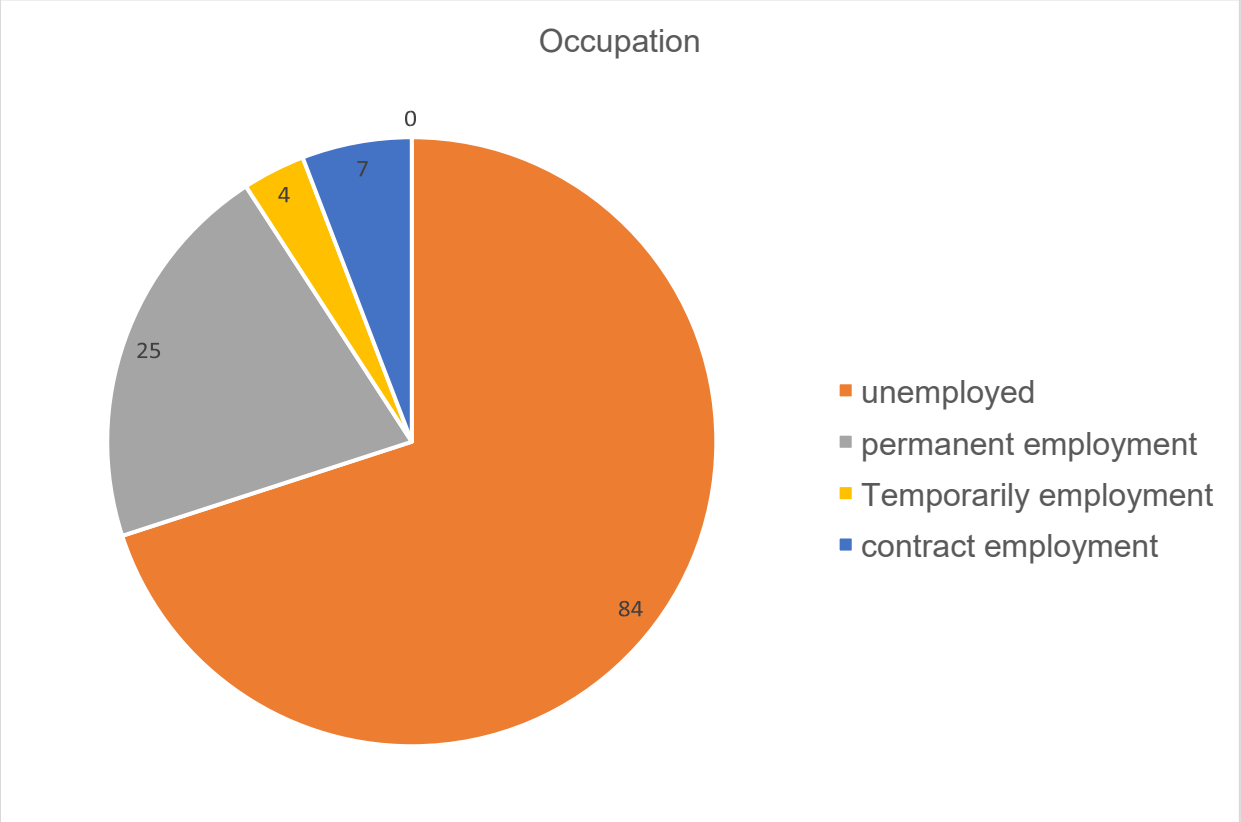


Figure 4.4 Occupation status of sampled rural households in BLM (N=120)

The employment situation of rural households in Blouberg Local Municipality is depicted in the above figure. According to the findings, out of the 120 rural households that were sampled, 25 had jobs, and 84 had unemployment. Four of the respondents from rural homes in the sample had temporary jobs, while seven of the respondents had contract

jobs. The results showed that BLM has a high level of unemployment, and donkey farming is the only means for rural households to feed their families. Our results agree with several studies that reported donkeys being owned by adult, unemployed poor people living in remote, isolated villages (Khan *et al*., 2013; Herago *et al*., 2015). However, the results contradict reports of donkeys being mainly owned and used by uneducated women from hostile environments (Fernando and Starkey, 2004; Avornyo *et al*., 2015). A study conducted in the NCD of Namibia reported that 70.5% of male-headed and 55% of female-headed households owned and used donkeys (Mudamburi, 2003).

4.4. Rate of perception level of donkey farming

4.4.1. Rural household perceptions of donkey farming as compared to tractors

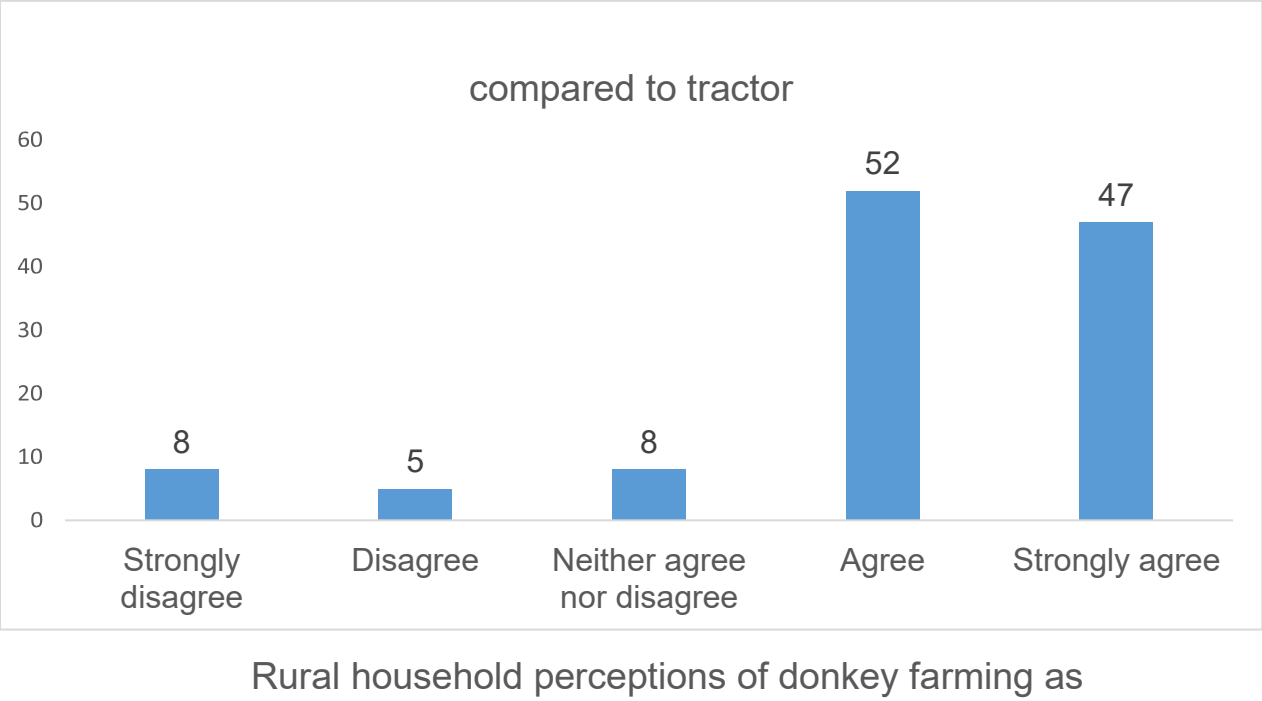


Figure 4.5 Rural household perceptions of donkey farming compared to tractors by sampled rural households in Blouberg Local Municipality (n=120)

The donkey farming system has been around for many years in South Africa, Limpopo province, Blouberg Local Municipality as one of the indigenous working animal tools. Fernando and Starkey (2004) state that given the affordable price of purchase and maintenance, in comparison to small size, simplicity to train and handling, highly effective digestive system, and ability to withstand thirst, donkeys have become popular among rural residents and the impoverished who live in harsh, peri-urban environments without

access to roads or infrastructure. Rural households respond to the number of Likert scale questions, reflected in Finger 4.4, to rate the level of perception between donkey farming and tractors by which they disagree or agree. Most of the rural households interviewed, 47 (39.2%) strongly agree, 52 (43.3%) others agree, followed by 8 (6.7%) rural households who were doubtful or not certain that donkey farming is better than tractors, 5 (4.2%) disagreed and 8 (6.7%) households strongly disagreed that donkey farming not better than tractors. Figure 4.4 indicates how rural households perceive donkey farming compared to tractors.

4.4.2. Rural household perceptions of donkey farming as compared to motor vehicles

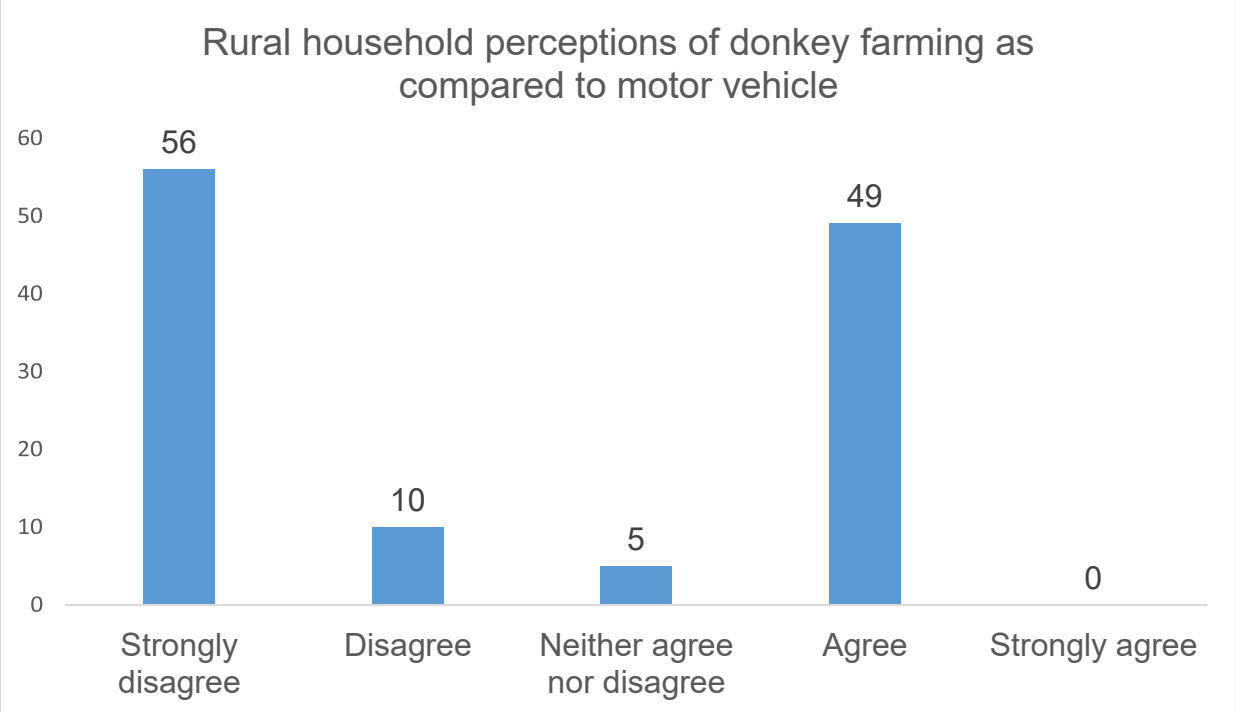


Figure 4.6. Rural household perceptions of donkey farming compared to motor vehicle by sampled rural households in Blouberg Local Municipality (n=120)

None 0 (0%) of the respondents strongly agree that donkey farming is better than a motor vehicle (Figure 4.6). Then, 49 (40.8%) agree that donkey farming is better than a motor vehicle as shown in the study, and 56 (46.7%) strongly disagree that donkey farming is better than a motor vehicle, only 10 (8.3%) of 120 rural households disagreed, and 5 (4.2%) of 120 were neither agreeing nor disagreeing undecided to the comparison.

Theresults study by Samkange *et al.* (2019) confirm that rural households in Southern Africa perceive the use of donkeys in rural areas of Namibia.

4.4.3. Rural household perceptions of donkey farming as compared to truck.

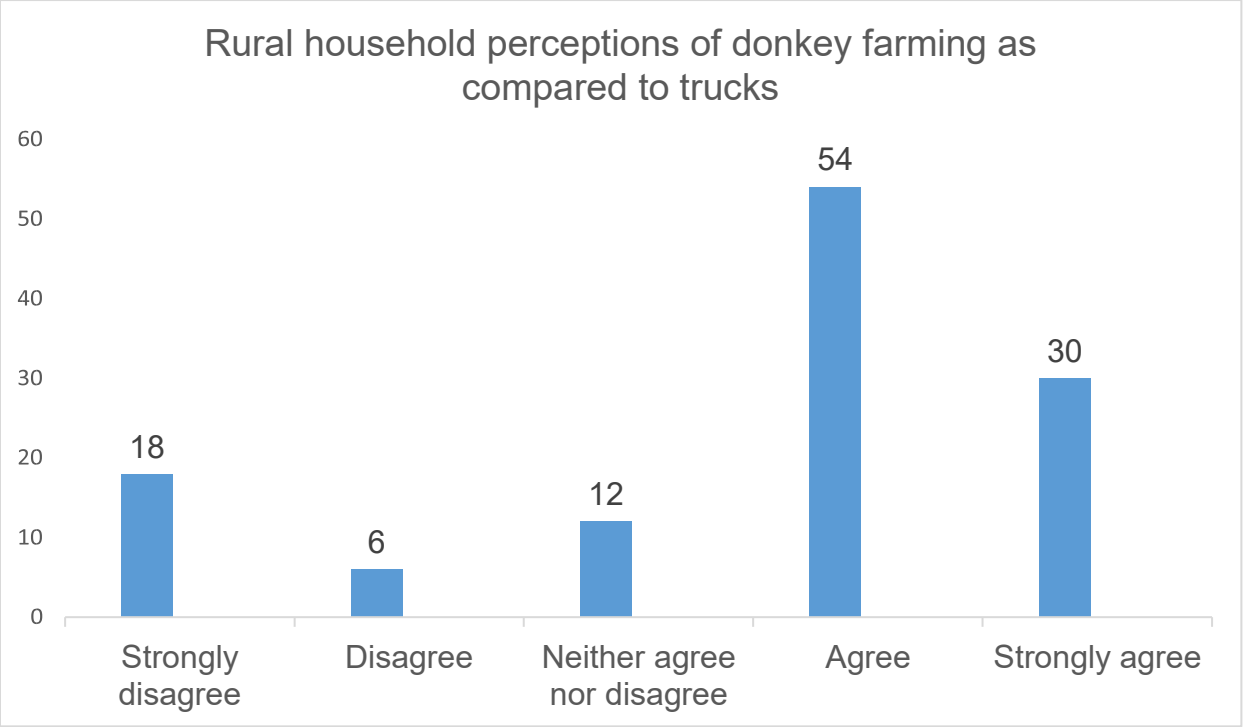


Figure 4.7. Rural household perceptions of donkey farming compared to trucks by sampled rural households in Blouberg Local Municipality (n=120)

The findings of the current study reflect that most respondents from sampled rural households, 54 (45%), agree that donkey farming is better than trucks, followed by 30 (25%) rural households interviewed who strongly agree that donkey farming is better than trucks, 18 (15%) of respondents strongly disagree to fact that donkey farming compared to trucks, 12 (10) respondents were uncertain and lastly 06 (5%) rural households disagree to the comparison of donkey farming be better than trucks (Figure 4.7).

4.4.4. Rural household perceptions of donkey farming as compared to bicycles.

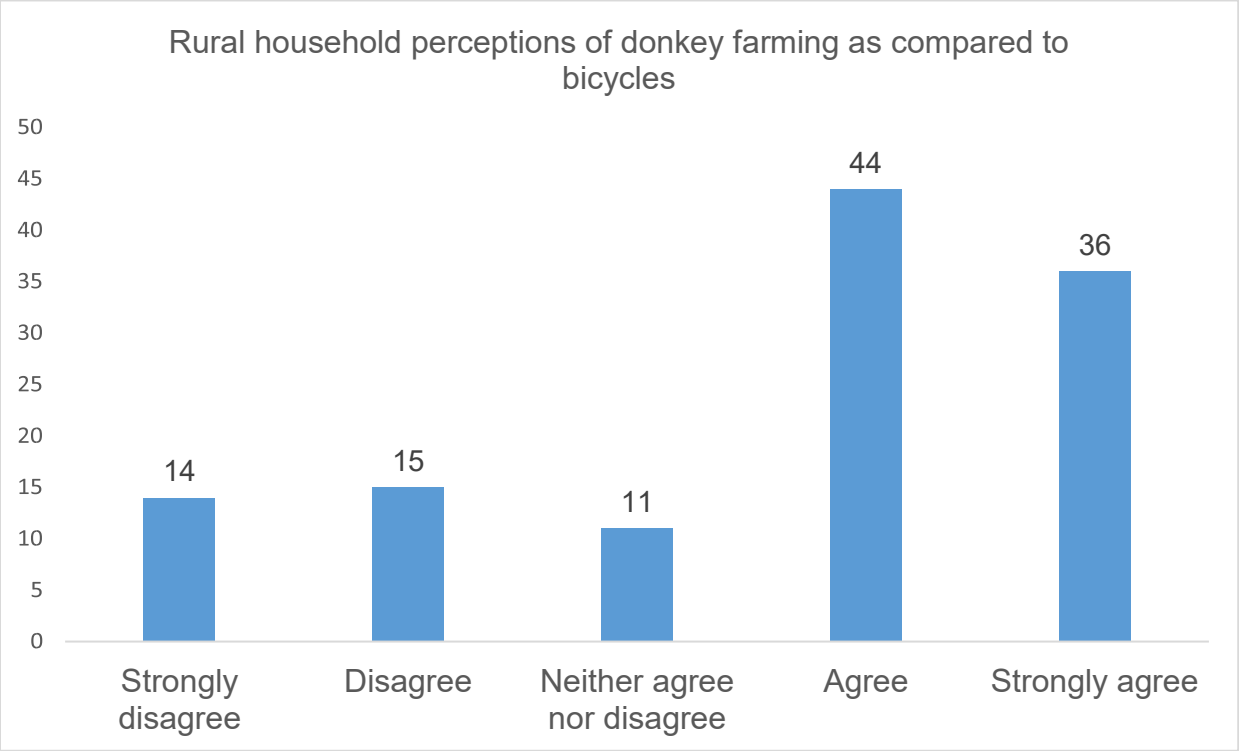


Figure 4.8. Rural household perceptions of donkey farming compared to bikes by sampled rural households in Blouberg Local Municipality (n=120)

The results show that 44(36.7%) agree and 36 (30%) rural households strongly agree that they perceive the use of donkey farming as compared to bikes, 14 (11.7%) strongly disagree, 15 (12.5%) disagree with the perception that donkey farming be better than bikes and 11 (9.2%) rural household respondents interviewed were uncertain or undecided to the comparison between donkey farming and bikes.

4.4.5. Rural household perceptions of donkey farming as compared to large stock farming.

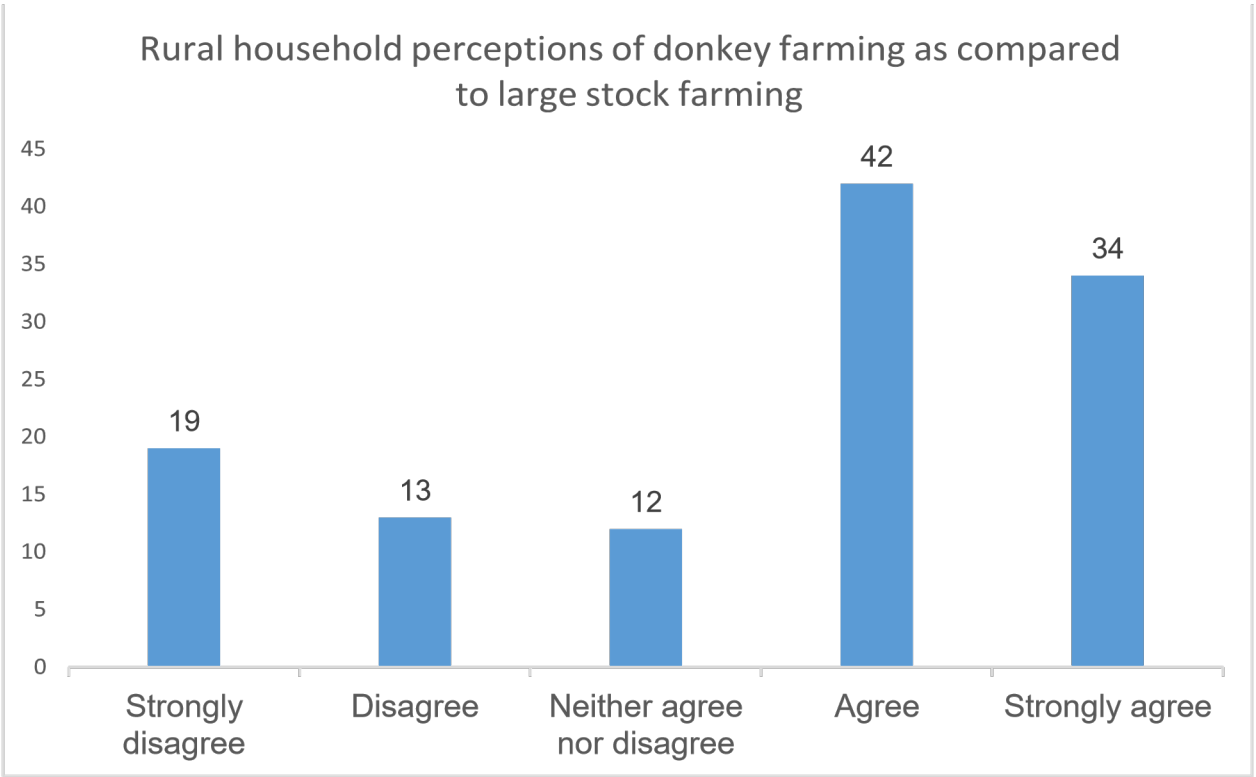


Figure 4.9. Rural household perceptions of donkey farming compared to large stock by sampled rural households in Blouberg Local Municipality (n=120)

Figure 4.8 shows the rate of rural household perceptions of donkey farming as compared to large stock farming in Blouberg Local Municipality. The rural households indicate that 34 (28.3%) strongly agree with the perception that donkey farming is better than large stock farming, 42 (35%) agree, 19 (15.8%) strongly disagree that donkey farming is better than large stock farming. Moreover, 13 (10.8%) disagree that donkey farming is better than large stock farming, and 12 (10%) of the interviewed rural households were uncertain or undecided about the comparison between donkey farming and large stock farming.

4.5. Summary and conclusion of the chapter.

This chapter included the descriptive findings on socio-economic characteristics and perceptions of donkey farming. The average age of the sampled rural households in the study area is 57 years, and the average household size is 6 individuals, based on the age results of the respondents. Males surpass females in rural households by a narrow margin

(1.6%) according to the study's gender distribution. Male and female sampled rural households are involved in a variety of farm activities (such as livestock and crop farming) and off-farm activities (such as transportation and delivery of sands). On an educational level, the majority of the interviewed rural households have never matriculated. According to the marital status results, lots of sampled rural households are married. The research also revealed that donkey farming and grain production accounts for a bigger proportion of farming types. Most of the selected rural households believed that donkey farming is common in the area and very profitable. A greater proportion of the rural households interviewed in the research area obtained more information and understanding about donkey farming. Even though all the rural households conveyed unfavourable donkey farming impacts, the challenges faced by the donkey owners did not deter them. Thus, about 95% of the interviewed rural households perceive donkey farming as essential.

CHAPTER FIVE

EMPIRICAL RESULTS AND DISCUSSIONS

Rural household perceptions and willingness to pay for donkey farming in Blouberg Local Municipality, Capricorn District, Limpopo province.

5.1. introduction

This chapter aims to provide the empirical findings from the model developed in the third chapter. The study's third chapter defines the model specification and the hypothesised variables with expected signs that are employed in this chapter. In conclusion, this chapter presents empirical findings regarding the factors influencing rural families' willingness to pay for donkey farming in Limpopo Province, Blouberg Local Municipality, Capricorn District. A sample of 120 rural households' Binary Logistic Regression Model results are discussed. Similar to the previous chapter, the main objective is to show the empirical results to determine the socio-economic factors influencing willingness to pay for donkey farming contribution towards household welfare.

The model's validity was examined, and conclusions were reached in light of the results. The empirical model specification and definition of the variables, along with their expected signs, open this chapter. The summary is discussed after the important variables. The relationship between rural households' willingness to pay for donkey farming's contribution to household welfare is explained by the model in Chapter 3 of the study. In this chapter, the dependent variable is binary, meaning that there are only two potential values: 1 for rural households ready to pay for donkey farming and 0 for those who are not.

The explanatory variable selections made in the previous section were also influenced by economic theory, the literature, and the availability of data. Table results that summarise the findings of empirical models are displayed, together with estimated coefficients, standard errors, marginal effects, and p-values. However, of dummy variables for a discontinuous change from zero to one, the marginal effects of the explanatory variables on the dependent variables are estimated for a one-unit change while leaving all other

variables fixed at their mean. The results of the multicollinearity tests utilising VIFs and the inverse of the corresponding explanatory variables are shown in Table 5.1 below.

Table 5.1 Diagnostic to assess the degree of multicollinearity problem among the independent variables included in the binary logistic regression model, (n=120)

Independent variables	Collinearity Statistics	
	VIF	1/VIF
Age	2.84	0.35
Gender	1.29	0.78
Marital Status	1.62	0.62
Occupation	2.01	0.49
Household size	1.32	0.75
Household income	1.53	0.65
Level of education	1.82	0.55
Religion	1.43	0.69
Culture	1.90	0.53
Perception 1	1.64	0.61
Mean VIF	**1.74**	**0.60**

The degree of multicollinearity was assessed using the IBM SPSS 25.0 software package. There was no heteroscedasticity since the calculated $\chi 2$ value (2.66 was smaller than the tabulated $\chi 2$ value (3.38) at the 5% significance level and one degree of freedom.

5.2 Empirical model results

5.2.1. Results and interpretations for binary Logistic regression Model.

Table 5.2 presents the results of ten (10) hypothesised socio-economic characteristics that may have an impact on the desire of sampled rural households to pay for donkey farming, which in turn contributes to the well-being of the household. Additionally, these factors underwent empirical testing. The estimated Cox and Snell and Nagelkerke R squares of the model are 39% and 66%, respectively, indicating a rather good goodness

of fit. This is beneficial since it indicates that the model fits the data well, as 39% and 66% of the variation in the dependent variable are explained by the model, while the remaining 61% and 34% are not. The sampled rural household's readiness to pay for donkey farming adding to home welfare was categorised very well (80%) and those not willing to pay (20%), respectively. The model's overall classification accuracy is excellent, at about 60%. This suggests that the explanatory variables account for a good portion of the variation in the small-scale farmers in the sample's willingness to pay for donkey farming. Most of the explanatory variables impacted the likelihood of desiring to pay as expected, according to the estimated coefficients, marginal effect results, and statistical significance levels displayed in the regression results (Table 5.2). Of the ten (10) variables in the model specification, six (06) were found to be statistically significant in both positive and negative ways to the readiness of the sampled rural family to pay for donkey farming, at 1%, 5%, and 10%, respectively (Table 5.2). These variables include the sampled rural households' age, gender, marital status, size, income, years of education, religion, culture, and perception. The findings of the Binary Logistic Regression Model coefficient and marginal effect estimations are displayed in Table 5.2 below.

Table 5.2: Binary Logistic Regression Model results and marginal effect estimates of sampled rural households in Blouberg Local Municipality of the Capricorn Districts of Limpopo Province, 2024 (n=120).

Variable	dy/dx	Coefficient	Std. error	Wald	Significance
Constant	-	4.157	1.174	-3.540	0.000
Age	0.013	*0.379***	*1.174*	*3.007*	0.003
Gender	-0.281	*0.031*	*0.486*	*0.063*	0.528
Marital Status	-0.041	*-1.851***	*0.771*	*2.400*	0.024
Occupation	-0.236	*-0.491***	*0.181*	*2.712*	0.012
Household income	0.043	*0.976*	*0.892*	*1.094*	0.489
Household size	0.055	*-0.623****	*0.164*	*3.798*	0.000

Level of education	0.312	*0.060*	*0.272*	*0.220*	0.526
Religion	0.383	*-1.752**	*0.849*	*2.063*	0.080
Culture	0.510	1.747***	0.504	3.466	0.001
Perception 1	-0.009	*0.298*	*0.885*	*0.336*	0.819

Note: *, ** and *** implies statistical significance at levels; 10%, 5% and 1% respectively
Cox and Snell R2 = 0.395;
Nagelkerke R2 = 0.664;
Sampled rural households's willingness to pay for donkey farming = 80%; Those not willing to pay for donkey farming = 20%;
dy/dx is for discrete change of dummy viable from 0 to 1;
Standard errors are in parentheses;
Number of observations = 120

5.3. Discussion of significant variables

5.3.1 Age of the sampled rural households.

The age of the sampled rural households was found to be positively and highly statistically significant at 10% for willingness to pay for donkey farming contribution towards household welfare. This means that a one-year increase in the age of the sampled rural households increases the probability of willingness to pay for donkey farming when all other factors remain constant. This empirical result is in line with the findings of Mwasame (2020), who discovered that when examining the socio-economic impact of donkey ownership and use on household livelihoods, the age of the rural household, which reflected experience, had a positive and substantial influence. Additionally, several researchers (Etwire *et al*., 2013; Mabe *et al.*, 2014; Jeleta *et al.,* 2020) found that the adoption of conservation measures is correlated with age. However, because they are stronger than older family heads, younger household heads must operate on greater acreage or hectares (Melak *et al*., 2020). Furthermore, research suggests that as rural households get older, they are more likely to be prepared to pay for the contribution that donkey farming makes to their overall well-being.

5.3.2 Gender of the sampled rural households.

One of the significant variables that may affect a rural household's willingness to pay for donkey farming contribution to household welfare is the gender of the household that was sampled. As expected, based on prior knowledge, the sign coefficient parameter for the variable gender, which is measured as a dummy variable (1, male; 0, female), is positive and statistically significant at the 1% level of significance (Table 5.2). The gender-specific positive estimated coefficient parameter suggests that male-headed farmers are more likely than female-headed farmers to pay for donkey farming and contribute towards household welfare. The finding results agree with the study by Wessie *et al*. (2023), who reported that donkey farming is performed by male households (94%). The positive correlation aligns with the findings presented in Chapter 4, which indicate a higher percentage of male-headed rural homes relative to female-headed households (1.6%) difference.

The gender dummy variable's marginal effects showed that male-sampled rural families were more likely to be willing to make a payment. The empirical findings of the study differ from those of Nkoana (2019), who found that gender is highly significant for small-scale farmers willing to pay for climate change adaptation strategies. Therefore, the estimated marginal impact estimates for variable gender suggest that the probability that a unit increase in the number of male-headed people in the research area relative to female-headed people increases their willingness to pay for donkey farming. These findings are consistent with research by Hiko *et al*. (2016) that proven comparable findings at the 1% significance level for socio-economic roles and welfare aspects of donkeys in Ethiopia. This is consistent with Guthiga *et al*. (2004), who reported that household female labour time allocation had a negative relationship with the use of animal traction. The findings of Kong *et al*. (2014) support the favourable empirical outcome; however, in their instance, the gender variable was not statistically significant. Because of this sentimentality, it was difficult to determine how much the ability of small-scale farmers to pay for ecological compensation of the Poyang Lake Wetland area in China was influenced by changing gender. Furthermore, it was assumed that male-headed sampled families would be more inclined to finance donkey farming initiatives due to their advantages in negotiating,

bargaining, owning resource endowments, and upholding market contracts for their long-term viability.

5.3.3 Marital status of the sample rural households.

A further significant aspect of the study is the marital status of the studied rural households. This variable is particularly important for small-scale farming. The sign coefficient parameter for the variable marital status shown in Table 5.2 is positive and statistically significant at the 5% level of significance, which contrasts with established predictions. According to the estimated positive connection between variable marital status and sample size, married rural households are more likely than single-headed sampled rural households to be paid for donkey farming. As compared to single, widowed, or divorced rural households in the research area, the estimated marginal impact estimates for variable marital status suggest that a unit increase in the number of sampled rural households getting married improves their likelihood of being willing to pay for donkey farming. The results of Aydogdu and Bilgic's (2016) research in Turkey, which indicated that a person's willingness to pay for effective irrigation for resource sustainability in the face of climate change was adversely and statistically substantially correlated with their marital status, do not corroborate the findings of this study. The outcome is consistent with the earlier research by Haghjou *et al*. (2013), which discovered that in Tabriz, Iran, customers' prospective willingness to pay for organic food goods was positively and statistically significantly correlated with their married status. Furthermore, the results align with those of Ayedun *et al*. (2017), who discovered a significant correlation between the marital status of groundnut and maize farmers in Northern Nigeria and their willingness to pay for aflatoxin biocontrol products. Nevertheless, since the variable was not statistically significant, there was insufficient evidence of information; hence, this study filled the information gap in the research. The findings of this study may be explained by the fact that married rural households in the sample make joint decisions and work together to accomplish shared farming objectives to maintain a sustainable standard of living.

5.3.4 Household size of the sampled rural household.

Household size is one of the significant factors influencing the dimensions of rural households' willingness to pay for donkey farming practices. In this study, "household size" refers to the number of people who share a pot and live together in each tested rural household for half the year. There was a hypothesis that the dependent variable and the variable measuring household size would have a positive correlation. The empirical findings, as presented in Table 5.2, demonstrated that the sampled rural households' willingness to pay for donkey farming was positively and extremely substantially influenced by their household size. The marginal effects result indicated that the likelihood of a rural household sampled being willing to pay for the contribution of donkey farming to household welfare increased with each additional member. This can be explained by the fact that households with a higher proportion of adult members who have access to higher education are endowed with marketing expertise and knowledge, which opens doors to employment prospects and higher relative incomes. Wassie *et al.* (2023) found that household size is highly significant in donkey production systems and breeding practices. This can be explained by the fact that households with a higher proportion of adult members who have access to higher education are endowed with marketing expertise and knowledge, which opens doors to employment prospects and higher relative incomes. Furthermore, this runs counter to the results of Ayedun *et al*. (2017), who discovered that household size had a negative and significant impact on Northern Nigerian maize and groundnut farmers' willingness to pay for aflatoxin biocontrol products.

5.3.5 Occupation of the rural households.

One of the key elements that can help a rural household easily accomplish basic financial and farm management, finance agricultural marketing concepts, and build business networks because of the potential to generate cash flow revenue is occupation (Geiger and Whay, 2015). Furthermore, employment can increase rural households' ability to compete for farm revenue. The empirical results of occupational level from the sampled rural households (Table 5.2) show positive and statistically significant at the 5% level of significance, and households are willing to pay for donkey farming's contribution towards

household welfare by 5%. The majority of the sampled rural households are unemployed. Agricultural farming is their number one activity, meaning that they are willing to pay for donkey farming. Donkeys generate a lot of economic potential in the rural areas (Binda, 2019). These occupational empirical results mirror those of Geiger and Whay (2015). In rural Africa, donkeys (*Equus africanus asinus*) are frequently employed by their owners for a diversity of daily and income-generating chores. According to Binda, (2019), Blouberg Local Municipality has a high rate of unemployment in households, and 90% of rural households own donkeys for different roles.

5.3.6 Religion of the sampled rural households.

Religion is one of the significant factors influencing the dimensions of rural households' willingness to pay for donkey farming practices. In this study, "religion" refers to the relationship between people and things they believe to be absolute, spiritual, divine, holy, sacred, or deserving of special respect. It is also often believed to include how individuals handle their final worries regarding their existence and what will happen when they pass away. There was a hypothesis that the dependent variable and the variable measuring religion would positively correlate. The empirical findings, as presented in Table 5.2, demonstrated that the sampled rural households' willingness to pay for donkey farming was positively and statically influenced p-0.08 by their religion. The marginal effects result indicated that the likelihood of a rural household sampled being willing to pay for the contribution of donkey farming to household welfare increased with each religious member. These findings contradict Jellason *et al.* (2019) and Kubayi (2021), who found that religion has a negative statistical significance on smallholder farmers' towards the agricultural minimum wage.

5.3.7. Culture of the sampled rural household

As per the prior expectation from the table of variables in Chapter 3, the sign coefficient parameter of culture among sampled rural households is positively and highly significantly p-0.01 associated with their willingness to pay for donkey farming contribution towards household welfare at the significance level of 10%. This means that increasing the number of cultural beliefs among the sampled rural households increases the probability of

willingness to pay for donkey farming's contribution to household welfare. The empirical findings are consistent with those reported by Jellason *et al.* (2019), who found that the cultural beliefs of smallholders in North-Western Nigeria have affected the willingness towards different activities, such as adapting to climate change. Household farmers' chosen donkey qualities were influenced by culture and tradition (Etana *et al*., 2020). This may be ascribed to different cultural beliefs among the sampled rural households.

5.3.8. Discussion of the insignificant variables

Additionally, empirical evidence showed that the gender of the sampled rural household, household income of the sampled rural households, level of education of the sampled rural households, and perceptions of the sampled rural households were negatively associated with the willingness to pay for donkey farming's contributing towards household welfare. The empirical findings from Table 5.2 showed that the abovementioned variables were statistically insignificant ($p>0.05$). There were insufficient findings to suggest the extent to which they can influence willingness to pay for donkey farming's contribution towards household welfare.

5.4. Summary of the chapter.

This chapter empirically researched to determine the socio-economic factors influencing willingness to pay for donkey farming contribution towards household welfare in Blouberg Local Municipality Capricorn District, Limpopo Province. The Binary logistic regression models were used in the study to determine the socio-economic factors influencing willingness to pay for donkey farming contribution towards household welfare in the study area. The dependent variable is to determine factors influencing willingness to pay for donkey farming contributions towards household welfare. As a result, the binary logistic regression model was used in the research study. Furthermore, statistical testing showed that there are no problems with heteroscedasticity or multicollinearity and that the model fits the data adequately. The marginal analysis in the model revealed that age, marital status, household size, occupation, religion, and culture all have a significant effect on rural households' willingness to pay for donkey farming contribution towards household welfare. As a result, the null hypothesis that socio-economic factors do not influence rural

households' willingness to pay for donkey farming contribution towards household welfare is rejected. Chapter 6 details the conclusions and policy implications drawn from these empirical findings.

CHAPTER SIX
SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

6.1 Introduction

The research objectives, methodology, conclusion, and policy suggestions of the study are summarised in this chapter. It also emphasises how the analysis has addressed the study's primary objectives and hypotheses. The goal of this chapter is to present the conclusions derived from the study's major findings, suggest future research directions, and provide policy recommendations.

6.2 Recap of research objectives and methodology

Donkey ownership and practice have a unique promise and problems for supporting sustainable agricultural practices, transportation, and livelihoods in rural South African communities (Blench, 2000; Mariani, 2008). The results of numerous studies on various aspects of donkey ownership and usage in South Africa must still be compiled and synthesised to identify the most significant knowledge and comprehension gaps. Despite playing a critical role in providing transportation, food security, and income generation for some of the poorest and most marginalised households, the contributions of donkeys to human livelihoods have received comparatively little attention (Geiger *et al*., 2020). Most of these studies also have limited scope, emphasising specific aspects like socio-economic contributions, cultural significance, or welfare assessment while ignoring other crucial aspects like economic valuation, adoption of better healthcare practices, and challenges faced by rural households (Keitshweditse, 2019). A complete understanding of the various elements influencing donkey farming and its use in South Africa is also lacking due to the lack of a thorough mixing of quantitative and qualitative research methods. For instance, studies on rural households and factors influencing attitudes and willingness to pay for donkey milk have been conducted (Keitshweditse, 2019).

There is little knowledge of rural households' perceptions and willingness to pay for donkey farming in Blouberg Local Municipality, despite the potential economic and cultural benefits associated with donkey farming (Binda, 2019). The creation of suitable policies

and interventions to promote sustainable donkey farming practices and maximize the potential socio-economic advantages in the area is hampered by this information gap. To ascertain if rural families would be prepared to pay for such activities, this research investigated the perspectives, attitudes, and other aspects that affect their readiness to engage in donkey farming. This research will assist policymakers, development organisations, and rural communities with evidence-based suggestions for promoting sustainable donkey farming and enhancing rural livelihoods in Blouberg Local Municipality by identifying important drivers and impediments.

Three Blouberg Local Municipality villages, Aurora, Oldlongsine, and Earlydown, were selected as case studies to achieve these goals. Using a random sampling technique based on probability proportionate to sample size, a questionnaire survey was utilised to gather in-person data from 120 rural households. The data analysis used the following models binary logistic regression, ordinary Least Squares, lickert scale, and descriptive statistics. Key informant interviews were carried out to acquire information on the topics covered in the survey questionnaire. The results of the econometric model were also supplemented using data from participant observation and key informant interviews.

The specific objectives of the study were to profile the socio-economic characteristics of donkey farmers, determine the level of perceptions of rural households towards donkey farming contributions, and determine the socio-economic factors influencing willingness to pay for donkey farming contributions towards household welfare in Blouberg Local Municipality.

Dominant indicators to profile the socio-economic characteristics of donkey farmers were studied using the Descriptive Statistics Model (DSM). Given the numerous variables applied to study objective 1, DSM was used to analyse and summarise the data with little information loss. To determine the level of perceptions of rural households towards donkey farming contributions, the lickert scale model was used. The rating of the level of perceptions of donkey farming against tractors, motor vehicles, trucks, bikes, and large stock farming was also studied and analysed by using the lickert scale model. The Binary Logistic Regression Model was employed to determine the socio-economic factors influencing willingness to pay for donkey farming contribution towards household welfare.

The results of the principal components are continuous. Therefore, the Ordinary Least Squares model was used to assess the degree of multicollinearity problem among the independent variables, and there was no heteroscedasticity. BLRM address the willingness to pay for donkey farming and the willingness to pay for donkey farming of the rural households.

6.3 Summary and conclusion

Donkey farming is one of the cost-free livestock farming, also profitable in the current China donkey market. Since the introduction of the donkey skin market for Chinese indigenous medicine, the donkey population have declined over the years, yet the market is growing locally and globally. The practice for proper donkey farming is critical as well as the willingness to pay for donkey farming.

The empirical results from the survey show that 95% of the interviewed sampled rural households own donkeys for different reasons: backyard ploughing only, collection of firewood for personal and for hiring, and use for businesses to deliver water, sand and wood, while others own donkeys just for generational purposes. The study can conclude that rural households have high perceptions of donkey farming. The result from the data survey shows that out of 120 sampled rural households, 100 (80%) are willing to pay for donkey farming contribution towards household welfare, and 20 (20%) of sampled rural households are not willing to pay for donkey farming. According to the empirical findings in Chapter 5, the following socio-economic factors influenced the willingness to pay for donkey farming methods of sampled rural households: age, marital status, occupation, household size, household income, level of education, religion, culture, and perception. The current study concludes that the willingness to pay and favourable opinion of the study's donkeys are greatly influenced by age, marriage status, occupation, household size, religion, and culture. As a result, it follows that all the above factors are crucial in influencing the perceptions and willingness of rural households in the research area. Furthermore, these factors must be considered when discussing attitudes towards financial capacity for donkey farming. Furthermore, these results provide a framework or emphasise the role of the public and private sectors, non-governmental organisations

(NGOs), and support services in enhancing the standard of living for rural households. Investments in the farmers' educational potential and loan accessibility, for instance, will increase the rural households' ability and willingness to pay.

Therefore, to support and assist rural household donkey farmers, the government, nongovernmental organisations, and other private businesses must offer the necessary services. This may be done by funding awareness campaigns, workshops, training programmes, and a visitation strategy that informs these rural households of all the services available and addresses their willingness to pay for donkey farming. With the availability of production information on donkey farming, rural home farmers can finance donkey farming and run a successful animal farming enterprise.

It was found that the age, gender, size, and level of education of the sampled rural families all positively correlated with willingness to pay. The study findings indicate a favourable correlation between the level of education of rural households sampled and their ability to pay for donkey farming practices. The study results show that a greater willingness to pay for donkey farming is influenced by the relative age of those surveyed rural households. As a result, younger farmers will consider and use a different strategy for several years before giving it up, therefore, new technology should be introduced to both older and younger rural households. This highlights that increasing public knowledge of the possible advantages of donkey farming is an important step that needs to be considered to enhance the well-being of rural donkey farmers in developing nations. Due to the high transaction costs connected with market access (donkey abattoir), the results showed that sampled rural households distant from markets are less willing to pay for donkey farming. The literature claims that owning a truck or trailer increases prospects for rural households prepared to pay for donkey farming since it lowers transaction costs.

The Likert scale was used to assess rural households' perceptions of the contributions made by donkey farming in the research area. The study revealed that most rural households surveyed (55%) strongly agreed that donkey farming is superior to the equipment (tractors, trucks, and bikes) used in rural areas. Donkeys are thought to be better at ploughing than tractors because they preserve soil, and they can assess or

navigate through undergrowth to reach farms and woods. Then, 20% of the rural households surveyed also concur that donkey farming is superior than machinery. These were followed by 13 rural households that disagreed, 10% of the rural households strongly disagreed that donkey farming is superior to machinery, and only 2% of the rural households were neither in agreement nor disagreement regarding the comparison between donkey farming and machinery.

The data from the sampled rural households that were interviewed shows that (28.3%) strongly agree that donkey farming is a better option than large stock farming, (35%) agree that donkey farming is a better option than large stock farming, (15.8%) strongly disagree that donkey farming is a better option than large stock farming, (10.8%) disagree that donkey farming is a better option than large stock farming, and (10%) of the rural households that were interviewed were uncertain or undecided regarding the comparison. Donkey farming is regarded as the most ethical type of livestock farming in Blouberg Local Municipality's rural areas when compared to large stock farming. Compared to large stock farming, donkey farming is thought to be more cost-effective, produces money on a daily or weekly basis, and the donkeys are more resilient to diseases.

From the objective of determining the socio-economic factors influencing willingness to pay for donkey farming contributions towards household welfare, the Binary Logistic Regression model was used. It was found that the age of the rural household, marital status of the rural household, occupation of the rural household, household size of the rural household, religion of the rural household, and culture of the rural household significantly influenced the rural household’s willingness to pay for donkey farming.

The results demonstrated that the estimated coefficient for perception (BLRM) of rural households had a significant negative impact on willingness to pay for donkey farming, indicating that perceptions of rural households may influence decision-making processes and willingness to pay for donkey farming. Even if the descriptive statistics showed a mixed picture, rural households were generally willing to pay for donkey farming. The willingness to pay for donkey farming was positively correlated with the head of the

household's age. Like earlier research, age has been linked to inconsistent WTP outcomes. This could be explained by the fact that older people are frequently set in their ways and unwilling to pay for the donkey farming that is a part of their traditional farming practices.

Household size from the study was found to be positive and highly statistically significant (*p<0.10*). This implies that the high numbers of members in households generating different incomes from on-farm and off-farm income influence their willingness to pay for donkey farming. Religion of the sampled rural household was found to be positive and statistically significant (*p<0.01*); the correlation between the variable and willingness to pay for donkey farming was positive. This could be that households who are Christians perceive the donkeys as demons type of animals, while non-Christian rural household beliefs contradict the Christians when it comes to donkey farming. The coefficient of culture in rural homes was also found to be highly statistically significant (p<0.10). However, there was a positive association between the variable and willingness to pay for donkey farming. The community may have been engaged in donkey farming for many generations, which explains their willingness to contribute to household welfare through donkey farming.

6.4 Policy recommendations

In accordance with the study's recommendations, some recommendations are shared next.

South Africa has experienced a huge decline in the donkey population in recent years, with increasing demand for donkey skin in China and a high rate of donkey stock theft. The empirical findings recommend that the government introduce policy legislation that protects donkey farming in the country. It is compulsory for donkey animal identification branding or tattooing. Government departments should permit agricultural extension practitioners to provide extension services to donkeys. The two recommendations will reduce high road accident costs by donkeys, reduce donkey theft, improve donkey production and welfare, and increase willingness to pay for an improved quality donkey farming system.

Given that rural household farmers are willing to pay more for donkey farming than large stock, the government could work with NGOs to provide donkeys to resource-constrained rural household farmers to increase the production of donkey farming. They could also create a supportive policy environment, allowing the willing market participants to succeed in this new market. With the support of these programmes, the incomes of rural family donkey farmers with limited resources would rise together with the production of donkey milk, skins, and nutrition security.

Given the results on willingness to pay, other stakeholders in the donkey farming production chain should invest in establishing the donkey-producing business as it is profitable. Through the media, stakeholders must be made aware of the major benefits of donkey farming to increase awareness and, as a result, give prospective farmers accurate information to make decisions.

6.5 Limitations of the study and suggestions for future research

As this study was being conducted, several disadvantages emerged: To support the study, a bigger sample size needs to be employed. Due to multiple modifications that had to be made to the questionnaire to contextually modify the questions, many of which required supervision, data collection did not begin at the scheduled time. To make sure they were applicable in the local language, unclear questions were changed, particularly in the sections on readiness to pay and perception. Part of the delay was also caused by the absence of enumerators. Future researchers may consider broadening the study to provincial or rather national to find if so other rural household farmers have similar responses via perceptions and willingness to pay for donkey farming.

REFERENCES

Abebe, A.S, Alemayehu K, Johansson A.M. and Gizaw S. 2020. Breeding practices and trait preferences of smallholder farmers for indigenous sheep in the northwest highlands of Ethiopia: inputs to design a breeding program. *PLoS One* 15(5), e0233040. doi:10.1371/ journal. pone.0233040

Aganga, A.A., Patrick, C. and Segwagwe, B.V.E. 1999. Animal traction technology in Botswana: potential and constraints. Botswana: potential and constraints. In: Empowering Farmers with Animal Traction. Proceedings of the workshop of the Animal Traction Network for Eastern and Southern Africa held 20–24 September 1999, Mpumalanga, South Africa.

Aganga, A.A, Letso, M. and Aganga, A.O. 2000. Feeding donkeys. Livest. Res. Rural Dev.12. Available online: http://www.cipav.org.co/lrrd/lrrd12/2/agan122.htm (accessed on 12 September 2023).

Aizaki, H., Sawada, M., and Sato, K. 2011. Consumers' attitudes toward consumption of cloned beef: the impact of exposure to technological information about animal cloning. *Appetite*, 57(2), 459-466.

Ali, S., Ghufran, M., Nawaz, M. A. and Hussain, S.N. 2019. The psychological perspective on the adoption of approved genetically modified crops in the presence of acceptability constraint: the contingent role of passion. *GM Crops & Food,* 10(4), 220-237.

Alonso, E.B., Cockx, L. and Swinnen, J. 2017. Culture and Food Security; Discussion Paper 398/2017, No.398/2017; Katholieke Universiteit: Leuven, Belgium.

Altomonte I. 2019. Donkey milk can improve our health, and that's why we should increase donkey milk production. *Journal of Dairy Research 86*, 135. https://doi.org/10.1017/S0022029919000359

Angara, T.E., Ibrahim, A. and Ismail, A. 2011. The use of donkeys for transport: Case of Khortoum State, Sudan. WIT Trans. *Ecol. Environ,* 50, 1743-3541.

Apata, T.G. 2009. Analysis of climate change perception and adaptation among arable food crop farmers in South Western Nigeria. A paper presented at the International Association of Agricultural Economists' 2009 Conference, Beijing, China.

Arriaga-Jordan, C., Pedraza-Fuentes, A., Velazques-Beltran, L., Nava-Bernal, E. and Chavez-Mejia, M. 2005. Economic contribution of draft animals to Mazahua smallholder campesino farming systems in the highlands of Central Mexico. *Tropical Animal Health and Production, 37*(7), 589-597.

Arsenos, G. Gelasakis, A.I. and Papadopoulos, E.I. 2017. The status of Donkeys (Equus asinus) in Greece. J*. Hell. Vet. Med. Soc,* 61, 212-219.

Atabek, G.S. 2019. Consumers' Perceptions on Milk and Other Dairy Products: Effects of Media Misinfor Mation. Online J. Commun. *Media Technol,* 9, e201908.

Avornyo, F., Teye, G., Bukari, D. and Salifu, S. 2015. Contribution of donkeys to household for food security: a case study in the Bawku municipality of the Upper East Region of Ghana. *Ghana Journal of Science, Technology, and Development*.

Avornyo, F.K., Teye, G.A., Bukari, D. 2015. Contribution of donkeys to household food security: a case study in the Bawku Municipality of the Upper East Region of Ghana. *Ghana J Sci Technol Dev, 3*(1), 15-24.

Ayad, A., Aissanou, S., Amis, K., Latrenche, A. and Iguer-Ouda, I. 2019. Morphological characteristics of donkeys (*Equis asinus*) in Kabylie Area, Algeria, Slovakia. *J. Anim. Sci*., 52: 53-62.

Aydogdu, M.H. and Bilgic, A. 2016. An evaluation of farmers' willingness to pay for efficient irrigation for sustainable usage of resources: the GAP-Harran Plain case in Turkey*. Journal of Integrative Environmental Sciences*, *13*(2-4),1-12.

Ayedun, B., Okpachu, G., Manyong, V., Atehnkeng, J. and Akinola, A. 2017. An assessment of willingness to pay by maize and groundnut farmers for aflatoxin biocontrol product in northern Nigeria. *Journal of Food Protection,* 80(9), 14511460.

Barret, C.B. 2009. Smallholder Market Participation: Concepts and Evidence from Eastern and Southern Africa. *Journal of Food Policy*, *33*, 299-317.

Behnke, R. and Muthami, D. 2011. The contribution of livestock to the Kenya economy. *IGAD livestock policy Initiative Working Paper,* 03-11(2),1-62.

Belaunzaran, X., Bessa, R.J.B., Lavín, P., Mantecón, A.R., Kramer, J.K.G. and Aldai, N. 2015. Horse-meat for human consumption—Current research and future opportunities. *Meat Sci,* 1*08*, 74-81.

Belaunzaran, X., Lavín, P., Mantecón, A.R., Kramer, J.K.G. and Aldai, N. 2018. Effect of slaughter age and feeding system on the neutral and polar lipid composition of horse meat. *Animal,* 12, 417-425.

Bennett, R. and Pfuderer, S. 2020. The Potential for New Donkey Farming Systems to Supply the Growing Demand for Hides the Potential for New Donkey Farming Systems to Supply the Growing Demand for Hides. *Journal Animals,* 10, 718

Biffa, D. and Woldemeskel, M. 2006. Causes and factors Associated with Occurrence donkeys: a case study from Eastern Uganda," in Proceedings of the International Animal Traction Network for Eastern and Southern Africa ATNESA'97), Debre Zeit, Ethiopia.

Blackwell, R.D., Miniard, P.W. and Engel, J.F. 2006. *Consumer behavior*, 10th ed., Thomson/Southwestern, Hastings.

Blench, R 2004. The history and spread of donkeys in Africa. In: Starkey P. and Fielding D. (eds), Donkeys people and development. A resource book of the Animal traction network for Eastern and Southern Africa (ATNESA). ACP-EU technical centre for Agricultural and rural Corperation (CTA). Wageningen, the Netherlands p224.

Blench, R.M. 2000. A history of donkeys, wild asses, and mules in Africa. pp. 339-354 in: Blench, R.M and MacDonald, K., (eds), *The origins and development ofAfrican livestock: archaeology, genetics, linguistics andethnography*. University College London Press, London, UK.

Botonaki, A. and Mattas, K. 2010. Revealing the values behind convenience food consumption. *Appetite, 55*, 629-638.

Braimah, M.M. and Akampirige, A.O.M. 2017. Donkeys Transport, Source of Livelihoods, Food Security and Traditional Knowledge, the Myths about Donkeys Usage: A Case of the Bolgatanga Municipality. *Ghana. International Journal of Current Research and Academic Review, 5*(1), 1-13.

Brooke, hospital for animals. 2014. Bearing a Heavy Burden, women donkey contributions.

Brooks, K. and Lusk, J.L. 2010. Stated and revealed preferences for organic and cloned milk: combining choice experiment and scanner data. *American Journal of Agricultural Economics, 92*(4), 1229-124

Bryan, E., Deressa, T. and Gbetibouo G.A. and Ringler C. 2009. Adaptation to climate *and Policy*, 12, 413-426.

Chhetri, N., Chaudhary, P., Puspa B.E., Tiwari C. and Yadawd, B. 2012. Institutional and technological innovation: Understanding agricultural adaptation strategies. *Journal of Agricultural Science, 6*(11), 99-128.

Burden, F.A. 2012. Practical feeding and conditioning scoring for donkeys. *Equine Vet. Educ, 24,* 589-596.

Burden, F.A., Gallagher, J., Thiemann, A.K. and Trawford, A.F. 2009. Necropsy survey of gastric ulcers in a population of aged donkeys: Prevalence, lesion description and risk factors. *Animal, 3,* 287-293.

Burditt, L., Buchanan, D. and Fitch, J. 2000. Breeds of livestock. Department of Animal Science, Oklahoma State University. http://www.ansi.okstate.edujbreed. 28 November 2001.

Camillo, F., Rota, A., Biagini, L., Tesi, M., Fanalli, D. and Panzani, D. 2018. The current situation and trend of the donkey industry in Europe. *Journal of Equine Veterinary Science, 65*, 44-49

Carlberg, J.G., Froehlich, E. and Ward, C.E. 2007. Willingness-to-pay for branded fresh. Beef products in Canada. Report submitted to Canfax research services administrator of the improving alignment of the supply chain component of the national beef industry development fund, March 2007.

Carpio, C. and Isengildina-Massa, O. 2009. Consumer Willingness to Pay for Locally Grown Products:.*The Case of South Carolina Agribusiness,* 25, 412-426

Chakona, G. and Shackleton, C. 2019. Food Taboos and Cultural Beliefs Influence Food Choice and Dietary Preferences among Pregnant Women in the Eastern Cape, South Africa. *Nutrients, 11*, 2668.

Chiwome, A., Mushonga B., Mbeserua, V. and Samkange, A. 2019 Perceptions and Welfare of Donkeys in Southern Namibia.

Cittadini, A., Domínguez, R., Pateiro, M., Sarriés, M.V. and Lorenzo, J.M. 2021. Fatty Acid Composition and Volatile Profile of longissimus thoracis et lumborum Muscle from Burguete and Jaca Navarra Foals Fattened with Different Finishing Diets. *Foods, 10*, 2914.

City Business News. Killing of Ghana's donkeys. 2020. Deputy Agric Minister says "they're becoming less significant. Available online: https://citibusinessnews.com/2020/03/killing-of-ghanas-donkeysdeputyagricminister-says-theyre-becoming-less-significant/ (accessed on 17 December 2023).

Cole, H.H. 1966. Introduction to livestock production: Including dairy and poultry. 2nd edition. Freeman and Company, San Francisco.

Cowling, N. 2023. Household disposable income per capita in South Africa 2004-2022.

Crespi, D. 2007. Why data integrity is important to you. www.emulex.com/artifacts/4a5fff0f-f35f-4786-917c.../DI.pdf Date of access: 02 August 2023.

Cupps, P.T. 2001. *Animal husbandry*. Encarta Encyclopedia. http://www.encarta.msn.com. 01 August 2001.

DAD-IS, Domestic Animal Diversity Information System. Available online: http://www.fao.org/dad-is/browse-by-countryand-species/en/(accessed on 14 January 2024)

DAFF. 2015. Abstract of Agricultural Statistics, Directorate, Agricultural Information, NDA, Pretoria.

Dai, F, E.D Costa, M., Minero, F., Burden. and Judge, A. 2017. *Dairy Donkeys: Good Animal* Decent standard of living in South Africa. (2022). Towards a decent life for all. The findings on possession of the social perceived necessities.ISBN No:.97806397-6560-0.

Deng, L., Shi, S., Li, J., Tang, C., Han, Y. and Xie, P. 2021. A Survey of smallholder farmers regarding demographics, health care, and management factors of donkeys in north-eastern China. *Frontiers in Veterinary Science, 8*, 343.

Deressa, T.T., Hassan, R.M., Ringler, C., Alemu, T. and Yesuf, M. 2009. Determinants of farmers' choice of adaptation methods to climate change in the Nile Basin of Ethiopia. *Global Environmental Change*, *19*, 248-255.

Deressa, T.T., Hassan, R.M. and Ringler, C. 2010. Perception of and adaptation to climate change by farmers in the Nile basin of Ethiopia. *Journal of Agricultural Science,* 149: 23-31.

Deressa, T.T., Hassan, R.M. and Ringler, C. 2011. Perception of and adaptation to climate change by farmers in the Nile basin of Ethiopia, *Journal of Agricultural Science*, 149, 23-31.

Development of Donkeys. Genes, 13, 1945. https://doi.org/10.3390/genes13111945

Dolisca, F., Carter, D.R., McDaniel J.M., Shannon D.A. and Jolly, C.M., 2006. Factors influencing farmers 'participation in forestry management programs: A case study from Haiti. *Forest Ecology and Management,* 236.

Donkeys, People and Development. 2009. A resource book in the Animal Traction Network for Eastern and Southern Africa (ATNESA). Wageningen: ACP-EU Technical Centre for Agriculture and Rural Cooperation, pp. 33–44.

Dosal, E. 2013. The importance of data integrity http://www.brightgauge.com/importanceof-data-integrity/ Date of access 04 December 2023.

El Hatmi, H., Jrad, Z., Khorchani, T., Dary, A. and Girardet, J.M. 2014. Fast protein liquid chromatography of camel alpha-lactalbumin fraction with radical scavenging activity, *Emirate Journal of Food and Agriculture,* 4, 309-316.

Epstein, H. 1971. The origin of the domestic animals of Africa. Africana Publishing Corporation, New York, USA.

Etana, D., Snelder, D.J.R.M., van Wesenbeeck, C.F.A. and de Cock Buning, T. 2020. Dynamics of smallholder farmers' livelihood adaptation decision- making in central Ethiopia. *Sustainability, 12*(11), 4526. doi:10.3390/su12114526

Etwire, P.M., Dogbe, W., Wiredu, A.N., Martey, E., Etwire, E., Owusul, R.K. and Wahaga, E. 2013. Factors influencing farmer's participation in agricultural projects: the case of the agricultural value chain mentorship project in the northern region of Ghana. Legon Uccra: CSIR-Savanna Agricultural Research Institute.

FAO. 2008. Forestry Outlook Study for Africa: Sub-regional Report — Southern Africa. African Development Bank, European Commission and the Food and Agriculture Organization of the United Nations, (FAO), Rome. www.fao.org/docrep/fao/005/y8672e/y8672e00.pdf.

FAO. 2010. Donkeys for Development: A Resource Book of the Animal Traction Network for Eastern and Southern Africa (ATNESA). Food and Agriculture Organization of the United Nations.

FAO: Rome, Italy.http://www.kendat.org/our-causes-3/animal-welfare-2/. (Accessed 14 October 2023).https://phys.org/news/2017-03-china-demand-medicinefuelsafrican.html

Federica, S., Roberta, C., Chiara, M., Francesca, M., Iolanda, A., Rosario, L., Barbara, A., Carlo, D., Carlo, B. and Lorella, G. 2019. A multi-approach study of the performance of dairy donkey during lactation: Preliminary results. Ital. *J. Anim. Sci, 18,* 1135-1141.

Fernando, P. and Starkey, P. 2004. Donkeys and development: socio-ecomic aspects of donkey use in Africa. In. Starkey P. and Fielding D. (eds), Donkeys people and development. A resource book of the Animal traction network for Eastern and Southern Africa (ATNESA). ACP-EU Technical Centre for Agricultural and rural Corperation (CTA). Wageningen, the Netherlands. Pp31-44.

Fielding, D. and Krause, P. 1998. Physiology, nutrition and feeding. In Donkeys; Fielding, D., Krause, P., Eds.; MacMillan Education Ltd.: London, UK, pp. 14–31

Fisher, M. 2004. Household Welfare and Forest Dependence in Southern Malawi. *Environment and Development Economics, 9*(2),135-154.

Food And Agriculture Organisation Of The United Nations (FAO), 2010. Draught animal power: An overview. Available from: http://www.fao.org/fileadmin/user_upload/ags/publications/draugth_ap_overview.pd

Food and Agriculture Organization of the United Nations (FAO). 2019. Statistics Division FAOStat. Available online: http://www.fao.org/faostat/en/#data/QA

Food and Agriculture Organization of the United Nations (FAO). http://www.fao.org/faostat/en/#data/ QCL Statistics Division FAOSTAT Available online: accessed on 11 October 2023.

Food, Agriculture and National Resources Policy Network (FANPARN). 2003.

Garden Veterinary Services Limited. 2017. A survey of donkey trade and slaughter practices in Kenya, the case of Narok County. For the Brook London. Accessed 05 January 2024. Available: http//gardenvet.co.ke/Projects/Final_Report_A_survey_of_donkey_trade_and_slaughter_practices_in_Kenya-%20The_Case_of_Narok_County.pdf.

Gbetibouo, G.A. 2009. Understanding Farmers' Perceptions and Adaptations to Climate Change and Variability: The Case of the Limpopo Basin, South Africa. IFPRI Discussion Paper No. 00849. Washington, DC

Geiger M., Hockenhull J., Buller H., Tefera Engida G., Mulugeta, G. and Burden, F. 2020. Understanding the Attitudes of Communities to the Social, Economic, and Cultural Importance of Working Donkeys in Rural, Peri-urban, and Urban Areas of Ethiopia. *Frontiers in Veterinary Science, 7*(60), 1-13.

Gichure, M., Onono, J., Wahome, R. and Gathura, P. 2019. Benefits and associated challenges of working donkeys in smallholder farming systems in Kenya. *International Journal of Life Sciences Research, 7*(4), 76-84.

Gichure, M.N. 2012. Prevalence and risk factors of African horse sickness in the donkey population of Kiambu West district, Kenya. Unpublished Msc thesis, University of Nairobi.

Gina T.G. and Tadesse B.A. 2015. The role of working animals toward livelihoods and food security in selected districts of Fafan Zone, Somali Region, Ethiopia. *Advances in Life Science and Technology, 33,* 88–94.

GoK (Government of Kenya). 2012. Meat Control Act Cap 356 Laws of Kenya. Nairobi, ecotypes of donkey (Equus asinus) in South Darfur State, Sudan. *Journal of Science and Technology, 17*(2), 74-84

Goulder, J. 2016. The utilization of working animals (and women) in Ancient Mesopotamia and Modern Africa. *Anthropology of the Middle East, 11*(1), 66-84.

Greene, W.H. 2003. Econometric analysis. 5th edition. Prentice Hall, New Jersey.

Gujarati, D.N. and Porter, D.C. 2009. Basic Econometrics. 5th Edition. An Introduction: Basic Ideas and Concepts Reading: Gujarati, pp. 34-54.

Haab T.C. and McConnell K.E. 2002. The econometrics of non-market valuation Valuing environmental and natural resources. Edward Elgar Publishing, Inc, UK.

Haghjou, M., Hayati, B., Pishbahar, E., Mohammadrezaei, R. and Dashti G. 2013. Factors Affecting Consumers' Potential Willingness to Pay for Organic Food Products. Case Study of Tabriz in Iran. *Journal of Agricultural Sciences and Technology, 15,* 191-202.

Hamdi, H., Znaïdi, I.A., Kraiem, K. and Majdoub-Mathlouthi, L. 2021. Effects of pasture types on tissue composition and sensorial meat quality of lambs raised under the organic livestock system. *Options Mediterr, 125*, 461–465.

Hannani, H., Bouzebda, Z., Bouzebda, A.F., Hannan, A. and Khemis, M.D.E.H. 2020. Morphometric characteristics of the extreme Eastern Algeria dometics donkey (*Aquus asinus*). *Folia Vet, 64*, 66-76.

Harago, T., Megersa, M., Niguse, A. and Fayera, T. 2015. Assessment on working donkey welfare issue in Wolaita Soddo Zuria District, Southern Ethiopia. *Global Veterinaria,* 14(6), 867-875. doi:10.5829/idosi.gv. 2015.14.06.9516

Harun, R, Muresan, I.C, Arion, F.H, Dumitrs, D.E. and Lile, R. 2015. Analysis of Factors that Influence the Willingness to Pay for Irrigation Water in the Kurdistan Regional Government, Iraq. *Sustainability, 7*, 9574-9586.

Hassan, Z.M., Manyelo, T.G., Nemukondeni, N., Sebola, A.N., Selaledi, L. and Mabelebele, M. 2022. The Possibility of Including Donkey Meat and Milk in the Food Chain: A Southern African Scenario. *Animals, 12,* 1073. https://doi.org/10.3390/ani12091073

Herago, T., Megersa, M. and Niguse, A. 2015. Assessment on Working Donkey Welfare Issue in Wolaita Soddo Zuria District, Southern Ethiopia. *Glob Vet, 14*(6), 867–875.

Hiko, A., Gebremariam, K. and Muktar, Y. 2016. Socio-economic Roles and Welfare

Aspects of Donkey (*Equus asinus*) in Selected Sites of Tigray Regional State, Ethiopia. American-Eurasian J. Agric. & Environ*. Sci., 16*(10), 1629-1634

HLPE. 2017. Nutrition and food systems. In A Report by the High-Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security.

IFAD. 2016. Rural Poverty Report 2001: The Challenge of Ending Rural Poverty. International Fund for Agricultural Development, Rome.

Ivankovi´c, A., Šubara, G., Bittante, G., Šuran, E., Amalfitano, N., Aladrovi´c, J., Kelava Ugarkovi´c, N., Pad¯en, L., Pec´ina, M. and Konjac˘ic´, M. 2023. Potential of Endangered Local Donkey Breeds in Meat and Milk Production. *Animals, 13*, 2146. https://doi.org/10.3390/ ani13132146

Jeleta G.K, Birku, R.E. and Alemayehu, E.D. 2020. Households' Willingness to Pay for Livestock Insurance in Karrayyu Pastoralist Community: An Attempt for Risk Reduction. *Ethiopian Journal of Science and Sustainable Development, 7*(1)

Jellason, N.P., Conway, S.J. and Baines, R.N. 2019. Exploring smallholders' cultural beliefs and their implication for adaptation to climate change in North-Western Nigeria. *The Social Science Journal, 60*.

Jerop, R. 2012. Consumer willingness to pay for dairy goat milk in Siaya County, Kenya. *Livestock Research for Rural Development, 25.*

Joubert, B. 1995. A historical perspective on animal power use in South Africa. In *Animal traction in South Africa: Empowering rural communities* (pp.125-138). Gauteng: Halfway House.

Joubert, B. 2016. Using animals to plough the fields. *Farmer's weekly*. Feb,23.

Kebede, F. 2013. Ecology and community-based conservation of Grevy's zebra (Equus grevyi) and African wild ass (Equus africanus) in the Afar Region. University of Addis Ababa

Keitshweditse, B. 2019. Households' Willingness to Pay for Donkey Milk: Evidence from Mahikeng Local Municipality. Master's Thesis, Northwest University, Potchefstroom, South Africa.

KENDAT, 2018. Animal welfare: Heshimu Punda Program. Retrieved From: Kenya.

Khaleel, A.G., Lawal, L.A., Nasir, M., Hassan, A.M., Abdu, M.I., Salisu, N. and Kamarudini, A.S. 2020. Morphometric characterization of donkeys (*Aquus asinus*) in D/Kudu Kono state for selective breeding and genetic conservation. *J. Agribiotechnol*., 11, 12-21.

Khan, M.S., Ghias, M. and Shah, U. 2013. Donkey traction, use and welfare needs at Daman region of Dera Ismail Khan, Pakistan. *Sci Res Essays, 8*(21):

Khumalo, S. 2017. China's demand for medicine fuels African donkey slaughter. donkeys: a case study from Eastern Uganda," in Proceedings of the International Animal Traction Network for Eastern and Southern Africa ATNESA'97), Debre Zeit, Ethiopia.

Kimura, B., Marshall, F., Periera, A.B. and Mulligan, C. 2013. *Donkey domestication. African Archaeological Review,* 30, 83-95.

Kom, Z., Nethengwe, N.S., Mpandeli, N.S. and Chikoore, H., 2020. Determinants of smallscale farmers' choice and adaptive strategies in response to climatic shocks in Vhembe District, South Africa. *GeoJournal*, 1-24.

Kong, F., Xiong, K. and Zhang, N. 2014. Determinants of Farmers' Willingness to Pay and Its Level for Ecological Compensation of Poyang Lake Wetland, A HouseholdLevel Survey in China. *Sustainability, 6,* 6714-6728.

Kontoleon, A., Macroy, R. and Swanson, T. 2002. 'Individual Preference Based Values and Enviromental Decision-making; Should Valuation have its Day in Court?' *Journal of Research in Law and Economics 20,* 179-216.

Kosťuková, M., Černohorská, H., Bihuncová, I., Oravcová, I., Sobotková, E. and Jiskrová, I., 2015. Characteristics of morphological parameters of donkeys in Czech Republic. *Acta Univ. Agric. Silivict. Mendelinae Brunesis,* 63, 419–424.

Kugler, W., Grunenfelder, H.P. and Broxham, E. 2008. *Donkey breeds in Europe*. St. Gallen, Switzerland: Save Foundation.

Kyeswa, C. 1996. A cross-sectional study of gastrointestinal nematodiasis, gross skin conditions, and ectoparasites of donkeys in Mwingi district Kenya. University of Nairobi.

Lemma, M., Doyle, R., Alemayehu, G., Mekonnen, M., Kumbe, A. and Wieland, B. 2022. Using Community Conversations to explore animal welfare perceptions and practices of rural households in Ethiopia. *Front. Vet. Sci,* 9,980192. doi: 10.3389/fvets.2022.980192

Leste´-Lasserre C. 2019. 'Donkeys face worldwide existential threat,' Science (December), pp. 1294–\1295. https://doi.org/10.1126/science.366.6471.1294 PMID: 31831646

Li, X., Amadou, I., Zhou, G.Y., Qian, L.Y., Zhang, J.L. and Wang, D.L. 2020. Flavor components comparison between the neck meat of donkey, swine, bovine, and sheep. *Food Sci Anim Resour, 40*(4), 527-540.

Lorenzo, J.M., Sarri´es, M.V., Tateo, A., Polidori, P., Franco, D. and Lanza, M. 2014. Carcass characteristics, meat quality and nutritional value of horsemeat: A review. *Meat Science, 96*(4), 1478-1488.

Lumumba, T.K., Maichomo, M.W., Olum, M.O., Okech, T., Nyoike, N. and Magero, J. 2019. The status of donkey slaughter in Kenya and its implication on community livelihoods. Paper presented at the 3rd Africa Animal Welfare Conference (AAWC) Complex in Addis Ababa, Ethiopia on 2nd -4th September. Accessed 17 January 2024. Available Https://www.aawconference.org/index.php/resources/3rdafricaanimal-welfare-conference-presentations.

Lutz, S.M., Blaylock, J.R. and Smallwood, D.M. 1993. Household characteristics Affect Food Choices. *Food Rev*, 16, 12-18.

Ma, Y., Koondhar, M.A. and Wang, H. 2020. Perceived Value Influencing the Household Waste Sorting Behaviors in Rural China. *Environmental Research and Public Health,* 17.

Mabe, F.N., Sienso, G. and Donkoh, S. 2014. Determinant of choice of climate change adaptation strategies in Northern Ghana, 6(4).

Madure, M. 2014. Socio-economic importance, health and welfare aspects of donkeys (Equus asinus) used for carting in a peri-urban area of South Africa. Faculty of Science and Agriculture, University of Fort Hare.

Maggs H.C., Ainslie A. and Bennett R.M. 2021. Donkey Ownership Provides a Range of Income Benefits to the Livelihoods of Rural Households in Northern Ghana. *Animals, 11*(11), 3154. https://doi.org/10.3390/ani11113154 PMID: 34827884

Maggs, H.C., Ainslie, A. and Bennett R.M. 2023. The value of donkeys to livelihood provision in northern Ghana. *PLoS ONE 18*(2), e0274337. https://doi.org/10.1371/journal.pone.0274337 *Management Practices for Donkey Milk Production.* Milan: University of Milan Department of Veterinary Medicine and Animal Welfare. Accessed on August 02, 2023 from http://donkeynetwork.org.uk/article/355/dairy-donkeys-good-animal managementpractices- for-donkey-milk-production

Mahmood, N.H., Yahya, R.O. and Aziz, S.J. 2022. Apply Binary Logistic Regression

Mariani, P.L. 2008. Donkey milk nutraceutical characteristics: a biochemical evaluation of nutritious and clinical properties. Unpublished Doctorate Thesis, University of Camerino. Italy.

Martey, E., Etwire, P.M. and Koomson, I. 2022. Parental time poverty, child work and school attendance in Ghana. *Child Indicators Research,* 1-27.

Martini, M., Altomonte, I., Licitra, R. and Salari. F. 2018b. Nutritional and nutraceutical quality of donkey milk. Journal of Equine Veterinary Science 65, 33–37. *Journal of Equine Veterinary Science, 65,* 33-37.

Martini, M., Salari. F., Altomonte. I., Ragona. G., Piazza. A., Gori. R., Casati, D. and Brajon, G, 2018a. Effects of pasteurization and storage conditions on donkey milk nutritional and hygienic characteristics. *Journal of Dairy Research, 85*, 445-448.

Masuku, M.M. 2013. The effect of infrastructure and institutional services on food security in Ntambanana rural areas. Master's Thesis, University of Zululand, South Africa. Available online: (Accessed 22-01-2024).

Maswana, M., Mugwabana. T.J. and Tyasi, T.L. 2022. Morphological differentiation among donkey breeds: A review. School of Agricultural and Environmental Sciences, Department of Agricultural Economics and Animal Production, University of Limpopo. Pakistan J. zool., pp 1-6.

McCarthy, G. 1989. Chapter 4. Donkey Nutrition. Section IIb. The principles and 7 practice of feed rationing for donkeys. In The Professional Handbook of the Donkey, 2nd ed.; Donkey Sanctuary: Sidmouth, UK, pp. 54–63.

Melak, A., Belayhun. T., Kefyalew. E., Hailu. A., Mustefa. A. and Assefa, A. 2020. Farmers' willingness to pay for Sinar donkey conservation in selected districts of Metekel and Assosa zones, northwest Ethiopia: a contingent valuation study. *Biodiversitas Journal of Biological Diversity,* 21(7), 3373-3379. doi:10.13057/biodiv/d210762.

Mitchell., P. 2017. Why the Donkey Did Not Go South: Disease as a Constraint on the Spread of Equus asinus into Southern Africa. School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand, Johannesburg PO Wits 2050, South Africa. *Afr Archaeol Rev, 34*,21-41

Model to Recognize the Risk Factors of Diabetes through Measuring Glycated Hemoglobin Levels. Department of Business Administration, Cihan University Sulaimaniya, Kurdistan Region, Iraq.

Molini, U., Franzo, G., Nel. H., Khaiseb. S., Ntahonshikira. C., Chiwome. B., Baines. I., Madzingira, O., Monaco. F., Savini. G. and D'Alterio. N. 2021. West Nile Virus Seroprevalence in a Selected Donkey Population of Namibia. *Front. Vet. Sci*, 8,681354. doi: 10.3389/fvets.2021.681354

Mthi. S. and Nyangiwe, N. 2018. Farmers' perception on sheep production constraints in the communal grazing areas of the Eastern Cape Province, South Africa. *International Journal of Livestock Production, 9*(12), 334-339. doi:10.5897/IJLP2018.0500

Mudamburi, B., Chigariro, J. and Namalambo, E.S. 2003. Donkey population and management for utility in relationship to environmental degradation and traffic accidents in north central Namibia. Windhoek, Namibia

Muhanguzi, D.M., Mugenyi, A., Bigirwa, G., Kamusiime, M., Akurut, G.G., Tweyongyere, R., Ocwo, S., Amanyire, W., Oketch, G.S., Kitibwa, A. and Hattendort, J. 2017. African animal trypanosomiasis as a constraint to livestock health and production in Karamoja region: a detailed qualitative and quantitative assessment. *BioMed Central Veterinary Research,* 13,355.

Mukiria, P., Mdachi, R., Thuita, J., Mutuku, J., Wanjala, K. and Omolo, J. 2010. Semi longitudinal study of trypanosomiasis and its vectors in donkeys. Proceedings of the 12th KARI Biennial Scientific Conference. Accessed 17 January 2024. Available https://research.thedonkeysactuary.org.uk/paper/469

Mulligan, C. J. 2011. Ancient DNA from Nubian and Somali wild ass provides nsights into donkey ancestry and domestication. *Proceedings of the Royal Society B,* 278, 50-57.

Mulwa, N., Mulinge, E., Githigia, S., Karanja, D., Ogolla, K. and Zeyhle, E. 2020. Prevalence and Intensity of Gastrointestinal Parasites in Donkeys in Selected Abattoirs in Kenya. *Hindawi Scientifica.* Article ID 5672140. Accessed 17 January 2024. Available https://www.hindawi/com/journals/scientifica/2020/5672140/

Mutua, J. 2004. Some challenges to the use of donkeys in Kenya. In. Starkey P. and Fielding D. (eds), Donkeys people and development. A resource book of the Animal traction network for Eastern and Southern Africa (ATNESA). ACP-EU technical centre for Agricultural and rural Corperation (CTA). Wageningen, the Netherlands.

Mwasame, D.B. 2020. Analysis of the socio-economic contribution of donkey ownership and use to household livehoods in Kiambu County, Kenya. Department of Agriculture economics, Faculty of Agriculture, University of Nairobi.

Nabikolo, D., Bashaasha, B., Mangheni, M.N. and Majaliwa, J.G.M. 2012. Determinants of climate change adaptation among male and female headed farm households in Eastern Uganda. *African Crop Science Journal, 20*(s2), 203-212

National Bureau of Statistics of China. Available online. 2019. http://data.stats.gov.cn/english/easyquery.htm?cn=C01

Nhemachena, C. 2008. Agriculture and future climate dynamics in Africa: Impacts and adaptation options. PhD Thesis. Department of Agricultural Economics, Extension and Rural Development, University of Pretoria.

Nhemachena, C. and Hassan, R. 2008. Micro-level analysis of farmers' adaptation to climate change in Southern Africa. IFPRI Discussion Paper No. 00714. International Food Policy Research Institute. Washington DC.

Nkoana, M.A., Cholo, M.S., Hlongwane, J.J. and Belete, A. 2019. Determinants of households' willingness to pay for water and electricity in Moletjie under Aganang municipality, Limpopo province, South Africa. *Journal of Agribusiness and Rural Development, 1*(51), 43-50.

Noko, K. 2023. Small-scale maize farmers' perceptions and adaptation towards climatechange in Makhuduthamaga local municipality, Sekhukhune district, Limpopo Province. Master's Thesis, University of Limpopo, South Africa. Available online: (Accessed 12 December 2023).

Olum, S., Okello-Uma, I., Tumuhimbise, G.A., Taylor, D. and Ongeng, D. 2017. The Relationship between Cultural Norms and Food Security in the Karamoja SubRegion of Uganda. J. Food. *Nutr. Res, 5*, 427-435.

Oluwatayo, I.B. 2011. Climate change and adaptation strategies of small-scale arable crop Farmers in rural Nigeria, *International Journal of Agriculture and Food Science*, 1, 12-27.

Orkoh, E., Blaauw, P.F. and Claassen, C., 2020. Relative Effects of Income and Consumption Poverty on Time Poverty in Ghana. *Social Indicators Research*, 147(2), 465-499.

Oxford: Oxford University Press. Orton, J.D. 2015. The introduction of pastoralism to southernmost Africa: Thoughts on new contributions to an ongoing debate. *Azania: Archaeological Research in Africa, 50*, 250-258.

Pearson, R.A. and Vall, E. 1998. Performance and management of draught animals in agriculture in sub-Saharan Africa: a review. *Tropical Animal Health and Production. 30*(5), 309-24.

Pearson, R.A, Negomasha, E. and Krecek, R. 1999. The challenges in using donkeys for work in Africa. In Meeting the challenges of animal traction. A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA), Harare, Zimbabwe. Intermediate Technology Publications, London. Pp 326.

Pearson, R.A. and Ouassat, M. 1996. Estimation of the live weight and body condition of working donkeys in Morocco. *The Veterinary Record, 138*(10), 229-233.

Perry, B. 2017. We must tie equine welfare to international development. *Vet record. 181*, 600-601.

Polidori, P. and Vincenzetti, S. 2017. Farm management and feeding strategies for donkey milk production. In. Agricultural Research Updates. Volume 14, ISBN:978153610-344-1

Polidori, P., Cammertoni, N., Santini, G., Klimanova, Y., Zhang, J.-J. and Vincenzetti, S. 2021. Effects of Donkeys Rearing System on Performance Indices, Carcass, and Meat Quality. *Foods 10,* 3119. https:// doi.org/10.3390/foods10123119

Polidori, P., Cavallucci, C., Beghelli, D. and Vincenzetti, S. 2009. Physical and chemical characteristics of donkey meat from Martina Franca breed. *Meat Science, 82*(4), 469–471.

Polidori, P., Vincenzetti, S., Cavallucci, C. and Beghelli, D. 2008. Quality of donkey meat and carcass characteristics. *Meat Science, 80*(4), 1222-1224.

Polidori, P., Beghelli, D., Mariani, P. and Vincenzetti, S. 2009. Donkey milk production: State of the art. Ital. *J. Anim. Sci, 8,* 677-683.

Qiong, O.U. 2017. A Brief Introduction to Perception. CSCanada. *Studies in Literature and Language, 15*(4), 18-28

Quisumbing. R.A. 2015. What dimensions of women's empowerment in agriculture matter for nutrition in Ghana. International Food Policy Research Institute (IFPRI), Poverty, Health and Nutrition Division (PHND), 2033 K St N.W., Washington, DC, USA

Radam, A.M.R., Yacob, T., Siew Bee, J. and Selamat. A D 2010. Consumers" perceptions, attitudes and willingness to pay towards food products with *No Added Msg* labeling. *International Journal of Marketing Studies* 2(1), 65-77.

Ram, J.J., Padalkar, R., Anuraja, B., Hallikeri R.C., Deshmanya J.B., Neelkanthayya G. and Sagar, V.V. 2004. Nutritional Requirement of Adult Donkeys (Equus asinus) during Work and Rest. *Tropical Animal Health and Production, 36*, 407-412.

Rankoana S.A. 2022. A description of small-scale farmers' indigenous household livelihood strategies in Dikgale community in Limpopo province. University of Limpopo, South Africa. *Eurasian Journal of Social Sciences, 10*(3)*,* 197-203 DOI: 10.15604.

Ravichandran, T., Perumal, R.K., Vijayalakshmy, K., Raw, Z., Cooke, F., Baltenweck, I. and Rahman, H. 2023. Means of Livelihood, Clean Environment to Women Empowerment: The Multi-Faceted Role of Donkeys. *Animals, 13*

Raw, Z., Rodrigues, J.B., Santurtun, E., Cooke, F. and Clancy, C. 2021. Donkeys in transition: Changing use in a changing world. Brazil. J. Vet. *Res. Anim. Sci., 58*, e174325.

Roitner-Schobesberger, B., Darnhofer, I., Somsook, S. and Vogl, C.R. 2008. Consumer perceptions of organic of foods in Bangkok, Thailand, food policy.

Rossel, S.,Marshall, F. B., Peters, J., Pilgram, T., Adams, M.D. and O'Connor, D. 2008. Domestication of the donkey: Timing, processes, and indicators. Proceedings of the *National Academy of Sciences (USA), 105*, 511–519.

Runganga, R. and Mumbengegwi, C. 2020. A Double-hurdle Model Estimation of Smallholder Commercial Farmers' willingness to Adopt Crop Insurance in Zimbabwe: A Caseof Mazowe district. *International Journal of Research and Scientific Innovation (IJRSI),* 7(9), 339-348.

Sadr, K. 2013. The archaeology of herding in southernmost Africa. In P. J. Mitchell & P. J. Lane (Eds.), The Oxford handbook of African archaeology (pp. 645–656).

Sargentini, C., Tocci, R., Martini, A. and Bozzi, R., 2018. Morphological characterization of Amiata donkey through multivariate analyses. *Bras. Zootec*., 47: e20170310.

Senturk, I. 2009. Willingness to pay for genetically modified foods in Turkey: an ordered probit analysis. *Empirical Economic Letters,* 8, 431-438.

Shongwe, P. 2014. Factors influencing the choice of climate change adaptation strategies by households. A case of Mpolonjeni Area Development Programme (ADP) in Swaziland. *Journal of Agricultural Studies*, 8(4).

Shuiep, E.S. 2016. The Socio-Economic Value of Rearing Different Ecotypes of Donkeys (Aquus asinus) in South Darfur State (Sudan). *Sudan Journal of Science and Technology*, 17(2), 74-84.

Smith, D.G. and Pearson, R.A. 2005. A review of the factors affecting the survival of donkeys in the semi-arid regions of sub-saharan Africa. Tropical animal health and production. Supplementary 1 Pp 1-19.

Somanje, A.N., Mohan, G. and Saito, O. 2021. Evaluating farmers' perception toward the effectiveness of agricultural extension services in Ghana and Zambia. *Agriculture & Food Security,* 10(53).

Stanisic, L., Aleksić, J.M., Dimitrijevic, V., Kovačević,b B., Stevanovic, J. and Stanimirovic, Z. 2020. Banat donkey, a neglected donkey breed from the central Balkans (Serbia). *Peer J*., 8: e8598.

Starkey, P. and Starkey, M. 2004. Regional and world trends in donkey populations.

Starkey, P., Jaiyesimi-Njobe, F. and Hanekom, D. 1995. Animal traction in South Africa: Overview of key issues. In *Animal traction in South Africa: Empowering rural communities* (pp.17-30). Gauteng: Halfway House.

Stutley, C.J. and Mahul, O. 2010. Government support agricultural insurance challenges and options for developing countries. The International bank for reconstruction and development/The world Bank 1818 H Washington DC 20433Sual

Su, S., Macdonald E.A., Beseng M., Thomaz F. and Macdonald D.W. 2022. The link between wildlife trade and the global donkey skin product network. Conservation Science and Practice.

Tadich-Gallo, T.A., De-Aluja, A. and Cagigas, R. 2016. Children's recognition of working donkeys' needs in Tuliman, Mexico: Preliminary observations*. Vet Mex OA, 3*(4).

Tazeze, A., Jemma, H. and Mengistu K. 2012. Climate change adaptation strategies of smallholder farmers: The case of Babilie District, East Harerghe zone of Oromia regional state of Ethiopia. *Journal of Economics and Sustainable Development.* 3(14).

Teweldmehidin, M. and Conroy, A. 2010. The Economic Importance of Draft Oxen on Small farms in Namibia's Eastern Caprivi region. *African journal of Agricultural Research*. 5(9), 928-934.

The Donkey Sanctuary UK & World Horse Welfare (DSUK & WHW). 2017. *Sustainable Development Goals: How the Welfare of Working Equids delivers for Development.* Accessed August 23, 2023 from: https://www.thedonkeysanctuary.org.uk/sites/uk/files/2023-06/sustainabledevelopment- goals.pdf

The Donkey Sanctuary UK. 2017. Under the Skin: The Emerging Trade in Donkeys Skins and its Implications for Donkey Welfare and Livelihoods. Accessed August 23, 2023 from: https://www.thedonkeysanctuary.org.uk/sites/uk/files/201711/under_the_skin_report.pdf

The Donkey Sanctuary UK. n.d. 2018. *Donkey Care Handbook: Fifth Edition.* Accessed on August 23, 2023 from https://www.thedonkeysanctuary.org.uk/sites/uk/files/2018-06/donkey-carehandbook-5th-edition.pdf.

Tidona, F., Sekse, C., Criscione, A., Jacobsen, M., Bordonaro, S., Marletta, D. and Vegarud, G.E. 2011. Antimicrobial Effect of Donkeys' Milk Digested In Vitro with Human Gastrointestinal Enzymes. *Int. Dairy J, 21,* 158-165.

Tuaruka, L. and Agbolosu A.A. 2019. Assessing donkey production and management in Bunkpurugu/Yunyoo District in the Northern Region of Ghana. *Journal of Animal Husbandry and Dairy Science, 3*(2), 1-5.

Umar, A. 2010. Economic Evaluation of investment in Animal traction a Case Study of Katsina State, Nigeria. In Y Kishida (ed), Agricultural Mechanization in Asia, Africa and Latin America, Farm Machinery Industrial Research Corporation: Japan.

Van Loo, E., Caputo, V., Nayga, R., Meullenet, J. and Ricke, S. 2011. Consumers' willingness to pay for organic chicken breast: Evidence from choice experiment. Food Quality and Preference, *22*(7), 603-613.

Van Soest, P. 1994. Nutritional Ecology of the Ruminant, 2nd ed.; Van Soest, P.J., Ed.; Comstock Publishing: Ithaca, NY, USA, pp. 57–76.

Vincenzetti, S., Foghini, L., Pucciarelli, S., Polzonetti, V., Cammertoni, N., Beghelli, D. and Polidori, P. 2014. Hypoallergenic Properties of Donkey's Milk: A Preliminary Study. *Vet. Ital, 50*, 99–107.

Vlaeva, R., Barzev, G., Georgieva, S. and Ivanova, I. 2017. Dynamics in the Development of Donkey Population in Bulgaria. *Trakia Journal of Sciences,* 1, 56-59.

Vlaeva, R., Barzev, G., Georgieva, S. and Ivanova, I., 2017. Dynamics in the development of donkey population in Bulgaria. *Trakia J. Sci.*, *1*, 56-59.

Voona, J.P., Nguib, K.S. and Agrawal, A. 2011. Determinants of Willingness to Purchase Organic Food: An Exploratory Study Using Structural Equation Modeling. *International Food and Agribusiness Management Review, 65*(6), 195-200.

Wang, Y., Hua, X., Shi, X. and Wang, C. 2022. Origin, Evolution, and Research of External Injuries in Working Equines in Ethiopia. *International Journal of Applied Research in Veterinary Medicine, 4*, 1-7. Available https://www.jarvm.com/articles/Vol4Iss1Vol4Iss1BiffaV4N1pp1-7.pdf. Accessed 17 January 2024

Wassie, A.M., Getachew, B.T., Kassa, A.H., Megersa, G.A. and Aseged. T.A. 2023. Donkey production systems and breeding practices in selected districts of south Omo Zone, Southern Ethiopia. *The Rangeland Journal,* 45(3), 97-108. doi:10.1071/RJ23018

Watson, T.L., Kubasiewicz, L.M., Chamberlain. N., Nye, C., Raw, Z. and Burden, F.A. 2020. Cultural “Blind Spots,” Social Influence and the Welfare of Working Donkeys in Brick Kilns in Northern India. *Front. Vet. Sci, 7*, 214.

Wold, A.G., Tegegne, A. and Yami, A. 2004. Research needs of donkey utilisation in Ethiopia. In Donkeys, People and Development. A Resource Book in the Animal Traction Network for Eastern and Southern Africa; Starkey, P., Fielding, D., Eds.; ACP-EU Technical Centre for Agricultural and Rural Cooperation: Wageningen, The Netherlands; p. 79.

Xu, Y., Liu. X., Fu, J., Wang, H., Wang, J. and Huang, C. 2020. Enhancing genetic gain through genomic selection: from livestock to plants. *Plant Communications,* 1(1), 100005. doi: 10.1016/j.xplc.2019. 100005

Yegbemey, R.N., Yabi, J.A., Heubach, K., Bauer, S. and Nuppenau, E.A. 2014. Willingness to be informed and to pay for agricultural extension services in times of climate change: The case of maize farming in Northern Benin, West Africa. *Clim. Dev, 61*, 135–143.

Yirga, C.T. 2007. The dynamics of soil degradation and incentives for optimal management in Central Highlands of Ethiopia. Ph.D. Thesis. Department of Agricultural

Economics, Extension, and Rural Development, University of Pretoria, South Africa.

Zantsi, S. and Bester, B. 2019. Revisiting the benefits of animal traction to subsistence smallholder farmers: a case study of Ndabakazi villages in Butterworth, Eastern Cape Province of South Africa. S. Afr. J. Agric. Ext, 47(3), 1-13.

Zewdu E, Agonafir A, Tessema T.S, Tilahun G, Medhin G, Vitale M, Di Marco V, Cox E,Vercruysse J., and Dorny P. (2013). Seroepidemiological study of caprine toxoplasmosis in East and West Shewa Zones, Oromia Regional State, Central Ethiopia. Research in Veterinary Science. Volume 94, Issue 1, February 2013, Pages 43-48

7. APPENDICES Appendix A: Participant Consent form

University of Limpopo

CONSENT TO PARTICIPATE IN RESEARCH

TITLE OF RESEARCH PROJECT: RURAL HOUSEHOLD PERCEPTION AND WILLINGNESS TO PAY FOR DONKEY FARMING: A CASE STUDY OF BLOUBERG LOCAL MUNICIPALITY, CAPRICORN DISTRICT, LIMPOPO PROVINCE.

Dear Participant,

You are requested to participate in the above-mentioned research study conducted by Tshetshemi Joel Malepeng (Department of Agricultural Economics and Animal Production, University of Limpopo). You were selected as a participant in this study for perceptions and willingness to pay for donkey farming within Blouberg Local Municipality.

1. PURPOSE OF THE STUDY

This research project aims to analyse rural household perceptions and willingness to pay for donkey farming, determine the level of perceptions of rural households towards donkey farming contributions, and determine the socio-economic factors influencing willingness to pay for donkey farming contributions towards household welfare in Blouberg Local Municipality.

2. PROCEDURES

As the investigator, you will be interviewed by me, translating to participants in the sepedi language commonly used in the study area and you will volunteer to participate in this study. I would kindly ask you to Agree to be interviewed. The study consists of socio-economic characteristics and factors affecting perceptions and willingness to pay for donkey farming.

3. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

This research will help in determining the level of perceptions and factors influencing willingness to pay for donkey framing's contribution towards household welfare and establish possible solutions to contribute to the enhancement of an individual willingness to pay for donkey farming.

4. CONFIDENTIALITY

Information obtained from the participants during the study will remain confidential and will be disclosed only with your permission. Confidentiality of all the research data will be maintained by the investigator and the identity of the respondents will not be revealed in the research report. The data will be stored on computer only the supervisor will access and will be kept for five years.

5. PARTICIPATION AND WITHDRAWAL

You can choose whether to participate in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and remain in the study. The investigators may withdraw you from this research if circumstances arise that warrant doing so.

6. IDENTIFICATION OF INVESTIGATORS

In a situation where you have any questions or concerns about the research, please feel free to contact the project leader:

Project leader: Dr TJ NESENGANI
E-mail: thinandavha.nesengani@ul.ac.za
Contacts: +27 60 967 4072

7. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights, or remedies because of your participation in

this research study. If you have questions regarding your rights as a research subject, contact: Mr Abdul Maluleke [Abdul.Maluleke@ul.ac.za]; 015 268 2306 at the University of Limpopo Research office.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was described to me by …… (Enumerator) I was allowed to ask questions, which were answered to my satisfaction. I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

_____

Name of Subject/Participant

_____ _____

Signature of Subject/Participant Date:

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to _____ [*name of the subject/participant.* He/she was encouraged and given ample time to ask me any questions.

Signature of Investigator :_____Date: _____

Appendix B: Request for permission letter

P O BOX 309

MANYAMA

0753

TO: OLDLONGSINE HEADMAN

P O BOX 213

SENWABARWANA

0790

RE: APPLICATION TO CONDUCT RESEARCH STUDY

I am Malepeng Tshetshemi Joel, a master's student from the University of Limpopo in the School of Agriculture and Environment Sciences (SAES). I hereby request your good tribal authority permission to conduct a research study in your village. The title of the study is Rural Household Perception and willingness to pay for donkey farming. I promise not to disturb or disrupt day to day operations of the village when given the opportunity to conduct a research study.

I hope my request will be taken into consideration by your good tribal office.

Regards

Malepeng T.J

Appendix C: Ethical clearance

University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 3935, Fax: (015) 268 2306, Email: tukiso.sewapa@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE

ETHICS CLEARANCE CERTIFICATE

MEETING: **31 OCTOBER 2023**

PROJECT NUMBER: **TREC/1595/2023: PG**

PROJECT:

Title:	Rural household perceptions and willingness to pay for donkey farming: A case study of Blouberg Municipality, Capricorn District, Limpopo Province.
Researcher:	TJ Malepeng
Supervisor:	Dr TJ Nesengani
Co-Supervisor/s:	Dr MA Nkoana
School:	Agricultural and Environmental Sciences
Degree:	Masters in Agricultural Management

PROF D MAPOSA
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: **REC-0310111-031**

Note:

i) **This Ethics Clearance Certificate will be valid for one (1) year, as from the abovementioned date. Application for annual renewal (or annual review) need to be received by TREC one month before lapse of this period.**

ii) **Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee, together with the Application for Amendment form.**

iii) **PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.**

Finding solutions for Africa

Appendix D: Questionnaire

University of Limpopo, Department of Agricultural Economics and Animal Production
School of Agricultural and Environmental Sciences
Faculty of Science and Agriculture
South Africa
Mobile: (+27) 799831001
Tshetshemi Joel Malepeng Email: leparajoel.malepen@gmail.com

Questionnaire number…….

Name of the enumerator…….

Name of the Municipality……. Name of

village……

Date of interview…….

The respondents will be asked to participate voluntarily and without being coerced, and the information gathered will be treated in confidence. Additionally, neither the environment nor the responders will be harmed by this research effort.

Research topic: Rural household perceptions and willingness to pay for donkey farming: A case study of Blouberg Local Municipality, Capricorn District, Limpopo Province.

Aim of the study: To analyse rural household perceptions and willingness to pay for donkey farming.

Please mark with an X to indicate consent for the survey.

I agree to complete the questionnaire and do so completely voluntarily. I understand that my responses will be kept confidential. _____Signature_____

SECTION A: RURAL HOUSEHOLD CHARACTERISTICS

NB: Household members refer to members who live, cook, and eat from the same food stock together with other household members for at least the last six months.

What is the name of the household head?

.....

1. HOUSEHOLD KEY SOCIO-ECONOMIC CHARACTERISTICS

Relation with the household head	**Marital status**	**Gender 1= male 2=female**	**Age**	**Highest level of formal education**	**Employment status**

Key: Use the codes mentioned in the table below to answer the table above.

Relation with the head of the household	**Marital status**	**Highest level of formal education**	**Employment status**
1. Father 2. Mother 3. Daughter 4. Son 5. Daughter in law 6. Son in law	1. Married 2. Single 3. Divorced 4. Widowed 5. Living together	1. Never attended school 2. Primary level 3. Secondary level but did not complete matric 4. Matriculated	1. Unemployed 2. Permanent employment 3. Temporarily employment 4. Contract employment

7. Other: specify		5. Tertiary level	

2. How many adult members are there in the household? .....
3. What is the household size? .....
4. What are the household's major sources of income? Please rank these according to their importance, where one (1) represents the most important.

Household income sources	**Please tick**	**Rank**
On-farm income		
Unearned income-generating activities		
Employment		
Off-farm income		
Other: specify		

5. Estimated total farm income per year …… (R)

6. Other income sources per month in the previous year and please tick.

Farm income (R)		**Remittances (Gifts) (R)**		**Child social grants (R)**		**Employment (wages and salaries) (R)**		**Pensions (R)**		**Disability grant**		**Other specify. …… ……**	
<500		<500		<300		<1000		<1000		<700		<500	
500-1000		500-700		300-500		1000-1500		1000-2000		700-1200		500-800	
1001-1500		701-900		501-800		1501-2000		2001-3000		1201-1700		801-1100	

1501-2000		901-1200		801-1100		2001-2500		3001-4500		1701-2200		1001-1400	
2501-3000		1201-1500		1101-1400		2501-4000		4501-5500		2201-2700		1401-1700	
>3000		>1500		>1400		>4000		>5500		>2700		>1700	

2. SECTION B. Level of perception of rural households towards donkey farming's contribution

1. Are you aware of the benefits that you can derive from donkey farming products?

1. Yes	0. No

2. How would you rate the importance of the following socio-economic benefits of donkey farming products?

	1 Not very important	2 Not Important	3 Undecided	4 Important	5 Extremely Important
Income generation					
Consumption					
Safety Net					

N:B A safety net refers to a mechanism that provides a level of support during times of difficulty or hardship.

3. Rate the perception of donkey compared to tractors using the items given below from 1: Strongly disagree to 5: Strongly agree.

Item	1. Strongly disagree.	2. Disagree	2. Neither agree nor disagree	4. Agree	5. Strongly agree.
Ploughing good					

High pollution to the environment					
Protect the soil tillage					
Save costs					
Arrives fast to destinations.					
Carrying lots goods at once					

4. Rate the perception of donkey compared to motor vehicles using the items given below from 1: Strongly disagree to 5: Strongly agree

Item	1. Strongly disagree	2. Disagree	5. Neither agree nor disagree	4. Agree	5. Strongly agree
Ploughing good					
High pollution to environment					
Protect the soil tillage					
Save costs					
Arrives fast to destinations					
Carrying lots goods at once					

Carry enough of sands					
Transport building materials at once					

5. Rate the perception of donkey farming compared to mule farming using the items given below from 1: Strongly disagree to 5: Strongly agree

Item	1. Strongly disagree	2. Disagree	3. Neither agree nor disagree	4. Agree	5. Strongly agree
Easy to bred					
Its toughness					
Disease resistance					
Meat quality					
Milk quality					
Feed supplementing					
High Management					

6. Rate the perception of donkey farming compared to horse farming using the items given below from 1: Strongly disagree to 5: Strongly agree

Item	1. Strongly disagree	2. Disagree	3. Neither agree nor disagree	4. Agree	5. Strongly agree
Easy to bred					
Its toughness					

Disease resistance					
Meat quality					
Milk quality					
Feed supplementing					
High Management					

7. Rate the perception of donkey farming compared to large stock farming using the items given below from 1: Strongly disagree to 5: Strongly agree

Item	1. Strongly disagree	2. Disagree	3. Neither agree nor disagree	4. Agree	5. Strongly agree
Easy to bred					
Its toughness					
Disease resistance					
Meat quality					
Milk quality					
Feed supplementing					
High Management					

SECTION C: Factors influencing willingness to pay for donkey farming's contribution towards household welfare.

1. How important do you think is donkey farming in your agricultural practice?

Not very important =1	Not important = 2	Uncertain =3	Important = 4	Very important=5

2. How much will you pay for a donkey?

Type of donkeys	Amount
Jack	
Jackass	
Foal	

3. Do you think donkey farming is important to rural households?

1.Agree	2.Disagree

4. Are donkey farming beneficial to the community?

1. Agree	2. Disagree

5. Do you think using donkey farming is old-fashioned?

1. Agree	2. Disagree

6. Will you practice donkey farming'?

1. Agree	2. Disagree

7. Are donkey farming performing effectively and efficiently?

1. Agree	2. Disagree

8. Are you willing to pay for donkey farming?

1. Yes	2. No

SECTION D: Factors influencing donkey farming's contribution towards household welfare.

1. Do you follow proper management of donkey farming?

1. Yes	2.No

1.1 How often do you vaccinate your donkeys against diseases?

1. Monthly	2. Quarterly	3.Mid term	4. Annually	Do not vaccinate

1.2 How often do you dip your donkey farming against parasites?

1. Monthly	2. Quarterly	3.Mid term	4. Annually	Do not dip

1.3 How often do your donkeys receive veterinary services?

1. Monthly	2. Quarterly	3.Mid term	4. Annually	Do not receive veterinary services

1.4 How frequently do Agricultural Extension officers get in touch with you or interact with you?

To a great extent	
To some extent	
To a little extent	
To a very little extent	
Never communicate at all	

1.5 Do you have animal identification for donkey farming?

1. Yes	2.No

2. Do you have any qualifications in agricultural farming?

1. Yes	2.No

1.1 If yes, specify the type of qualification…….

1.2 From which institution ……

1.3 How did you acquire the qualification…….

2. Do you make a profit from rendering donkey farming?

1. Yes	2.No

3.1 If yes, how much money do you make?

1. Monthly	2. Quarterly	3. Mid-term	4. Annually	5. Daily

3.2 Are you satisfied with the remuneration received from rendering the service?

1. Yes	2.No

Appendix E: Language Certificate

Registered with the South African Translators' Institute (SATI)

Reference number 1000686

03 June 2024

RURAL HOUSEHOLD PERCEPTIONS AND WILLINGNESS TO PAY FOR DONKEY FARMING: A CASE STUDY OF BLOUBERG MUNICIPALITY, CAPRICORN DISTRICT, LIMPOPO PROVINCE

This confirms that I edited substantively the above document, including a Reference list. The document was returned to the author with various tracked changes to correct errors and clarify meaning. It was the author's responsibility to attend to these changes.

Yours faithfully

Dr. K. Zano

Ph.D. in English

kufazano@gmail.com/kufazano@yahoo.com

+27631434276