

**EXPLORING CONSUMER PREFERENCES ON BLENDED DONKEY MILK
YOGURT IN ZIMBABWE**

**A dissertation submitted in partial fulfilment of the requirements for the Master of
Science Degree in Food Security and Sustainable Agricultural (PRODUCTION)**

Bindura University of Science Education



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DECLARATION

I hereby declare that the research project entitled “**Exploring Consumer Preferences On Blended Donkey Milk Yogurt In Zimbabwe**” submitted to Bindura University of Science Education, Department of Agricultural Economics, Education and Extension is a record of an original work done by me under the guidance and supervision of **Dr Renias Chivheya** and this work is submitted in partial fulfilment of the requirements for the award of a Master of Science Degree in Food Security and Sustainable Agriculture. The results embodied in this thesis have not been submitted to any University or Institute for the award of any degree of diploma.

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A rectangular box containing a handwritten signature in blue ink, which appears to read 'Erick Mutizhe'.

Date: 08 October 2024

DEDICATION

This study is dedicated to my wife (Nancy), my mother (Nikiwe), children (Anotidaishe, Tinodiwanashe, Kudiwanashe and the only daughter, Matidaishe Mutizhe.

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The study was testimony to the abundant grace that the Almighty God granted me.

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ABSTRACT

This study sought to explore the consumer preferences towards the novel blended donkey milk yoghurt in Zimbabwe. Convenience sampling (Snowball) was done to identify participants from 110 donkey owning households in 3 wards in Beitbridge District of Zimbabwe. The participants responded to a pre-tested researcher administered questionnaire. Knowledge, attitude and practices were evaluated employing the KAP framework. Furthermore, Spearman rank correlation was used to evaluate associations between knowledge-attitudes (K-A), knowledge-practices (K-P) and attitudes-practices (A-P) of consumers on donkey milk products. Blended donkey milk yoghurts were made using documented standard protocols and 54 consenting volunteers were purposively selected to participate in sensory evaluation of ginger, honey and baobab donkey milk yoghurt blends. Chi-square tests were done to determine the associations between the consumer characteristics and the consumer donkey milk blend preferences. Strong positive correlations between K-A, KP and A-P with correlation coefficients 0.793, 0.715 and 0.884 respectively with $p < 0.01$ were observed. The findings indicate that a greater knowledge of donkey milk products contribute to positive attitudes towards consumption. Factors that affected consumer preferences for the blended donkey milk yoghurt were analysed using multilinear logistic regression. Education, age, price, health consciousness, male gender and product availability were important predictors for choosing ginger. Taste was an important predictor for baobab yoghurt blend preference whereas income levels affected choice of honey blend. Sensory evaluation revealed that the most preferred yoghurt was the ginger blend. Gender had statistically significant association with liking of ginger ($\chi^2 = 8.276$; $p < 0.05$); baobab ($\chi^2 = 7.721$; $p < 0.05$) and honey ($\chi^2 = 9.382$; $p < 0.05$) blended donkey milk yoghurts. Age had a statistically significant association with consumer preferring the ginger ($\chi^2 = 8.276$; $p < 0.05$); baobab ($\chi^2 = 7.721$; $p < 0.05$) and honey ($\chi^2 = 9.382$; $p < 0.05$) blended donkey. There was however no statistically significant association between income, family size and yoghurt eating frequencies. There is need to consider taste preferences, age and gender dynamics in marketing yoghurt blends. It is recommended that market segmentation, price sensitivity, awareness raising and ensuring constant availability of donkey milk products on the market be prioritized to counter some forces against the successful introduction and growth of blended donkey milk yoghurt in the marketplace.

Keywords: Donkey; Yoghurt blend; Preference; Multinomial, Chi-Square,

LIST OF ACRONYMS AND ABBREVIATIONS

DLVS : Department of Livestock and Veterinary Services (DLVS, 2

GDP : Gross Domestic Product (GDP)

TranZ DVC: Transforming Zimbabwe's Dairy Value Chain for the Future Action ()

SDG : Sustainable Development Goals

SPSS : Statistical Package for Social Sciences

UNFPA : United Nations Population Fund

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CHAPTER 1

INTRODUCTION

1.1 Background of the study

The livelihoods of approximately 70% of the population in Zimbabwe is supported by the agricultural sector with 17% of the Gross Domestic Product (GDP) derived from it (FAO, 2021). Income from milk and milk by-products has been reported to contribute 0.3% of the total GDP according to Transforming Zimbabwe's Dairy Value Chain for the Future Action (TranZ DVC) (2019). Milk from dairy species other than cattle represents 22% of milk production in Africa (FAO, 2021). In Zimbabwe, the milk source is from cattle production systems namely smallholder, medium scale and large-scale commercial farmers (Chirinda et al., 2021). Donkeys are not contributing to the milk supply as they, historically, been kept only for draught power provision especially in the agriculture sector (Demirgünescedil, 2015). However, donkey milk has been recognised as a potential ingredient for the development of innovative dairy products such as yoghurts. Compared to cow's milk, donkey milk is known to be richer in proteins, vitamins, and minerals, making it a nutritious option for health-conscious consumers (Martini et al., 2021)

Owing to climate change, the agrarian challenges that are experienced around the world, as a result, alternative food sources for proteins need to be exploited using animals that can withstand harsh environmental conditions to produce quality proteins (Hassan et al., 2022). According to Mariutti et al. (2021) the push towards alternative foods is inherent in the pursuit of sustainable development goals (SDGs) of the 2030 Agenda namely zero hunger (SDG 2); good health and well-being (SDG 3); responsible consumption and production (SDG 12); and climate action (SDG 13). This is pivotal in shielding against food insecurity. Donkeys (*Equus asinus* species) are such animals as they have been known to survive on low husbandry and inferior quality forage to produce milk (ibid). While cattle are susceptible to many diseases such Theileriosis which has ravaged their population in Zimbabwe, donkeys tend to resist most of these diseases (Hassan et al., 2022). They can be potential milk sources for yoghurt production.

Previous studies revealed that donkey milk has unique nutritional and medicinal qualities that make it superior to the traditional cow milk (Prasad, 2020). It is rich in vitamins, minerals, and

essential fatty acids, and is known for its health benefits such as improving digestion, enhancing immune function, and reducing inflammation and does not cause allergic reactions unlike cow milk and has potential to treat diseases such as whooping cough (Madhusudan et al., 2017; Prasad, 2020; Martin et al, 2018).

In Africa, the consumption of donkey milk and related products have not been fully adopted due to a lack of knowledge as well as cultural beliefs (Hassan et al., 2022). The motivations of consumers and the thinking styles have been shown to shape their judgements and cultural influence moderates them (Shavitt and Barnes, 2020). However, in Europe and Asia, the demand for donkey milk has increased in recent years as new information on the health benefits is becoming more available (Hassan et al., 2022). There is however some controversy regarding exploitation of donkeys for their products and this emanates from two conflicting views namely utilitarian and preservationist (Mutizhe and Mwenje, 2018). The former advocates for exploitation of donkey products as a way of unlocking economic value of donkeys while the latter construes it as a potential threat to animal welfare and would rather keep donkeys only for draught power. The conservationist views influenced the closure of a donkey abattoir that sought to export donkey skins from Zimbabwe to China in 2018 as animal welfare entities had reservations regarding the welfare of donkeys considering that they are not production animals. Furthermore, it was considered that there was going to be decimation of donkey numbers thereby disenfranchising communities of their livelihoods anchored on donkey draught power (Mutizhe and Mwenje, 2018).

Previous studies have been done on non-traditional milk sources namely from camel and water buffalo and concluded that product knowledge, nutritional benefits, attitudes and social contacts positively affect purchasing intention of consumers (Chakona & Shackleton, 2019). A Botswana company, Takuwa Natural Products, was reported as wanting to establish a donkey milk value addition base in Zimbabwe generating debate amongst consumers (Ndlovu, 2023). According to Grunert (2014) the success of a new product will depend on whether consumers prefer it as part of their diet. Yogurt is one of the health products that can be produced using milk. It is a cultured product and has been shown to be nutritionally rich in protein, calcium, vitamin D, riboflavin, vitamin B6 and vitamin B12 (Cazacu et al.,2014). Different types of yoghurt are made using healthy amount of active good bacteria known as probiotics needed by the digestive tract to aid digestion, ease diarrhoea, boost immunity, fight infection and protect against cancer (Prasad, 2020).

Studies conducted on sheep milk-based yogurt show that interest in nutritional and health-related yogurt features increases the probability of accepting the yogurt (De Devitiis et al., 2023). Factors such as price, product quality, availability and socio-demographic factors such as income and education levels have been shown to impact preferences of dairy products (Friedela et al., 2022; Cazacua et al., 2014). In this study yoghurt was produced from donkey milk and three separate blends made using ginger, honey, and baobab. The addition of natural ingredients like baobab, ginger, and honey to the donkey milk yoghurt potentially enhances the nutritional value and sensory appeal addressing the evolving preferences of health-conscious consumers. Baobab is a native fruit of the African continent and contains high antioxidant levels, dietary fibre, and essential minerals (Kamatou et al., 2011.) Ginger, on the other hand, is recognized for its anti-inflammatory and digestive properties, which could contribute to the overall health benefits of the yoghurt (Li et al., 2019). Honey, a natural sweetener with antimicrobial and probiotic characteristics, can also be explored as a potential ingredient to improve the taste and nutritional profile of the blended donkey milk yoghurt. (Sarkar and Chandra, 2019). The addition of natural ingredients like baobab, ginger, and honey can further enhance the nutritional value and sensory appeal of the yoghurt, potentially addressing the evolving preferences of health-conscious consumers. Studies have explored the development and consumer acceptance of blended dairy products, such as milk-barley or milk-oats combinations (Shevade et al., 2021). These studies highlight the potential benefits, as well as the technical and sensory challenges, associated with blending dairy ingredients. However, there is limited information on consumer acceptance of novel or niche dairy products, such as blended donkey milk yoghurt, in the Zimbabwean context.

Considering that donkey milk yoghurt is novel in Zimbabwe, no known study yet has explored the consumer preferences on the blended with ginger, baobab or honey. Thus, the objective of the study seeks explore the area to get an empirical understanding of the consumer preferences. This is useful in ensuring success when the products are introduced to the market.

1.2 Problem statement

Traditionally, cow milk-based products have been dominating the dairy product market in Zimbabwe. Although it is documented that raw cow milk production in Zimbabwe had increased from by 14.4% from 79,6 million litres in 2021 to 91,6 million litres in 2022 there is threat from existing diseases such as theileriosis and emerging diseases owing to climate

change (Coleman, 2023). The evolving consumer conscience towards health eating as well as climate change's threat to food security have propped up some growing interest in exploring alternative milk sources. Donkey milk has been recognized as a potential ingredient for the development of innovative dairy products such as yoghurts. Donkeys are generally resilient to diseases. Furthermore, donkey milk has health benefits and special properties. Donkey milk has been found to have a resemblance to human milk and contains high levels of protein, vitamins and minerals (Cazacu et al., 2014). Donkey milk can be processed into fermented products such as yoghurt. Yoghurt consumption is considered healthy given that yoghurt is made incorporating probiotics that are critical for the digestive system. Ginger, baobab and honey are in their own individual capacities known for their medicinal strengths and are often used to treat various ailments. Thus, donkey milk yoghurt blended with either of ginger, baobab or honey can be considered fortified with nutritional and medicinal components. Previous studies document non-traditional milk sources for human consumption derived from species such as camels, water buffalos and sheep and not donkeys (Galeboea, 2018; Mohan et al., 2018, Cazacu et al., 2014). The introduction of blended donkey milk yoghurt presents a new and novel product to the Zimbabwean market. As such, no empirical understanding of consumer preferences has been known to have been made with regards to blended donkey milk yoghurt in Zimbabwe. This study aims to explore the factors influencing consumer preferences, their knowledge, attitudes, and practices towards blended donkey milk yogurt as well their preferences among the three yoghurt blends in Zimbabwe to proffer valuable insights in the target consumers' preferences, perceptions and willingness to purchase.

1.3 Objectives

1.3.1 Main objective

The broad objective of the study was to explore consumer preferences on different blended donkey milk yogurts in Zimbabwe

1.3.2 Specific objectives

The specific objectives of the study were to:

1. Evaluate consumer knowledge, attitudes and practices towards donkey milk products in Zimbabwe.
2. Analyse factors influencing consumer preferences for different blended donkey milk yogurt formulations.

3. To determine the consumer preferences for developed blended donkey milk yoghurt products.

1.4 Research questions

- a) What is the knowledge, attitudes and practices of Zimbabwean consumers regarding donkey milk products?
- b) What are the factors that influence consumer preferences for donkey milk products?
- c) What is the consumer preferred donkey milk yogurt among ginger, baobab and honey blends?

1.5 Justification

Donkey milk is an untapped resource in Zimbabwe yet the drive towards alternative foods is inherent in the pursuit of some of the sustainable development goals (SDGs) of the 2030 Agenda namely zero hunger (SDG 2); good health and well-being (SDG 3); responsible consumption and production (SDG 12); and climate action (SDG 13). This is pivotal in shielding against food insecurity. In addition to that, exploring consumer preferences for blended donkey milk yogurt can contribute to the development of sustainable agricultural practices thereby presenting economic opportunities for local farmers and contribute to the diversification of agriculture and improvement of livelihoods. Furthermore, understanding consumer preferences will help in the development of a donkey milk yogurt that can meet the needs and expectations of the target market. It will enable producers to create a blended donkey milk yogurt that appeals to consumers and has a higher chance of success on the market.

Exploring consumer preferences will also shed light on the opportunities to amplify the level of awareness and knowledge about blended donkey milk yogurt among consumers in Zimbabwe. This information can help in designing educational campaigns and marketing strategies to increase awareness and educate consumers about the benefits of the product.

1.6 Delimitations and limitations of study

1.6.1 Delimitations

The donkey owners targeted for this study were limited to Beitbridge wards 6, 8 and 9. To understand animal welfare perspectives. The focus was on blended donkey milk yogurt and not yoghurts from other dairy sources. The study targeted consumers of all ages, genders, and

socioeconomic backgrounds whom consent was obtained and were open to trying new donkey milk derived yoghurts.

1.6.2 Limitations of the study

The study was limited to a specific sample size, which may not represent the entire population of consumers in Zimbabwe. The research findings may have been influenced by the specific geographic and cultural context of Beitbridge and may not be generalizable to other regions of Zimbabwe. The study relied on self-reported data from consumers, which may be subject to recall bias or social desirability bias.

1.7 Outline of Thesis

The remainder of the thesis is as follows:

Chapter two is literature review of studies done by previous scholars on knowledge, attitudes, and practices on dairy products. Similarly, factors affecting consumer preferences for a brand will be interrogated. The theory underpinning the study as well as the conceptual framework proposed.

Chapter three presents description of the study area and methodology of the study. The sampling procedure, data collection procedure, data analysis and ethical considerations is also covered. Data analysis was presented for the specific objectives in chapter four, five and six.

Chapter four focuses on evaluation of consumer knowledge, attitudes and practices towards donkey milk products in Zimbabwe. Except for one question which sought to check the frequency of yoghurt in general, the respondents had to answer YES or NO for each variable. KAP analytical framework and Spearman rank correlation was used to evaluate associations between knowledge-practices (K-P), knowledge-attitudes (K-A), attitudes-practices (A-P) in preferences for yogurt.

Chapter five will analyse factors influencing consumer preferences for different blended donkey milk yogurt formulations. Multinomial logistic regression model features here. Chapter six presents the findings on determination of the consumer preferences for developed blended donkey milk yoghurt products through sensory tasting whereby the consumer choice was made. Chapter seven combines the results, conclusions and recommendations of chapters four, five and six. The chapter highlight the major findings under each objective.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Donkey milk has gained increasing attention in recent years due to its unique nutritional profile and potential health benefits. Compared to cow's milk, donkey milk is richer in vitamins, minerals, and antimicrobial properties, making it a promising ingredient for novel dairy products (Salimei and Fantuz, 2012; Cazacua et al, 2014). Blending donkey milk and ginger, honey or baobab to make yoghurt can create a nutritionally enhanced dairy. Understanding consumer preferences of such blended dairy products paves way for their successful introduction and commercialization, particularly in developing markets like Zimbabwe. This chapter gives a comprehensive review of literature on consumer preferences towards donkey milk products. Reviews on knowledge, attitudes and practices regarding the products will be made. Factors that influence consumer preferences will be explored. The processes followed in developing yoghurt will be highlighted. The chapter also, presents a conceptual framework generated from the objectives.

2.1.1 The exploration of donkey milk for yoghurt making

The livelihoods of approximately 70% of the population in Zimbabwe is supported by the agricultural sector with 17% of the Gross Domestic Product derived from the sector (FAO, 2021). Income from milk and milk by-products has been reported to contribute 0,3% of the total GDP according to Transforming Zimbabwe's Dairy Value Chain for the Future Action (TranZ DVC) (2019). Milk from dairy species other than cattle represents 22% of milk production in Africa (FAO, 2021). These species include water buffaloes, camels and small ruminants (Cazacua et al.,2014). In Zimbabwe, the milk supply is largely from cattle production systems namely smallholder, medium scale and large-scale commercial farmers (Chirinda et al., 2021). Donkeys are not contributing to the milk supply (Mutizhe and Mwenje, 2018). In most communities, the historical use of donkeys has always been that of draught power provision especially in the agriculture sector (Demirgünescedil, 2015). Previous studies have been done on non-traditional milk sources namely from camel and water buffalo and concluded that product knowledge, nutritional benefits, attitudes and social contacts positively affect purchasing intention of consumers (Chakona & Shackleton, 2019).

Alternative food sources for proteins be exploited using animals that can withstand harsh environmental conditions produce quality proteins (Hassan et al., 2022). According to Mariutti et al. (2021), the drive towards alternative foods is inherent in the pursuit of sustainable development goals (SDGs) of the 2030 Agenda namely zero hunger (SDG 2); good health and well-being (SDG 3); responsible consumption and production (SDG 12); and climate action (SDG 13). This is pivotal in shielding against food insecurity.

Donkeys (*Equus asinus* species) are such animals as they have been known to survive on low husbandry and inferior quality forage (Hassan et al., 2022). While cattle are susceptible to many diseases such Theileriosis which has ravaged their population in Zimbabwe, donkeys tend to resist most of these diseases and thus becomes a potential source of milk. Previous studies revealed that donkey milk has unique nutritional and medicinal qualities that make it superior to the traditional cow milk (Prasad, 2020). It is rich in vitamins, minerals, and essential fatty acids, and is known for its health benefits such as improving digestion, enhancing immune function, and reducing inflammation and does not cause allergic reactions unlike cow milk and has potential to treat diseases such as whooping cough (Madhusudan et al., 2017; Prasad, 2020; Martin et al, 2018). Table 2.1 below shows comparisons in terms of composition among different species. It is evident that donkey milk almost resembles human milk.

Table 2.1: Composition of milk of mammals (g/dl)

	Breast	Cow	Buffalo	Goat	Sheep	Camel	Mare	Donkey
Fat	3.6	3.9	6.6	3.8	7.3	4.9	2.1	2.0
Protein	1.2	3.3	0.6	3.9	5.7	3.5	1.7	1.5
Lactose	6.4	4.3	4.7	4.7	4.6	5.0	6.2	6.3
Minerals	0.2	0.6	0.7	0.8	0.8	0.8	0.5	0.4
Water	88.6	87.9	87.4	86.8	81.6	85.8	89.5	89.8
pH	7.1	6.5	6.7	6.5	6.5	6.5	6.7	7.1
SG	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
Calories	63	66	81	69	107	78	50	49

Table adopted from Osman (2011)

Yogurt is one of the health products that can be produced using milk. It is a cultured product and has been shown to be nutritionally rich in protein, calcium, vitamin D, riboflavin, vitamin B6 and vitamin B12 (Cazacu et al.,2014).

Previous studies conducted on sheep milk-based yogurt show that interest in nutritional and health-related yogurt features increases the probability of accepting the yogurt (De Devitiis et al., 2023). According to Grunert (2014) the success of a new product will depend on whether consumers prefer it as part of their diet. In this study yoghurt was produced from donkey milk and three separate blends made using ginger, honey, and baobab. The blending with these herbs was intended to add more potency to the health benefits that can accrue from consumption of the products El-Sayed and Youssef (2019) posit that fortifying dairy products with herbs adds antioxidative, anti-inflammatory, antidiabetic, antihypertensive and antimicrobial qualities to the nutritional and medicinal values apart from improving the appearance and attractiveness.

Donkeys (*Equus asinus*) are a domesticated animal species belonging to the Equidae family and are commonly used as working animals since ancient time (Milevski and Horwitz, 2019). A growing interest in donkey milk has recently been detected especially in Europe where the milk has become an alternative food in instances where bovine milk proteins allergy and in the prevention of metabolic pathologies require to be avoided (Martini et al, 2018). Hippocrates (fourth century BCE) and Pliny the Elder (first century CE) considered donkey milk as a remedy for various diseases, including liver disease, ulcerations, and asthma (Cazacua et al., 2014). While the traditional cow milk produces a wider range of products such as butter, ice cream, cheese, yogurt. some studies have revealed that cow milk contain protein allergens that may cause problems especially in infants thereby making donkey milk more superior (Njoya et al., 2018).

Although consumption of donkey milk and its derivative products is not common in most parts of the world, there is a growing trend in the consumption of other non-traditional products such as camel milk, sheep milk and water buffalo milk (Cazacua et al., 2014; Profeta et al., 2022; De Devitiis et al., 2023). For example, camel milk has become a regular part of the daily diet primarily due to its claimed health benefits in the developed world (Profet et al., 2022). The application of flavors has been explored to conceal the perceived salty taste of camel milk (Eissa et al., 2011). This attests to the fact that there can be endless possibilities of enhancing a product. Therefore, the blending of donkey milk yoghurt can also heighten its acceptability.

Existing global donkey milk markets show that it is a lucrative venture into processed donkey milk products as their prices are higher than those of conventional dairy milk (Ndlovu, 2023). This can be attributable to scarcity and associated demand and supply dynamics, The general appreciation of the health benefits associated with its consumption make the milk highly regarded. Value addition of donkey milk can have a positive impact on the households that keep them (Mohammed et. al., 2022). Presently, in Zimbabwe, importance of donkeys is attached to their draught power provision (Ndhlovu, 2013). Consequently, donkey milk products are not common in the human food chain in Zimbabwe. However, in Botswana milk is commonly by people and while donkey meat is sold legally in butcheries. Recent reports indicate Botswana is producing soaps and lotions from donkey milk and the market will extend to Zimbabwe (Ndlovu, 2023).

The exploitation of donkeys has been previously put under spotlight owing to conflicting viewpoints namely the utilitarian and preservationist (Tatemoto et al., 2021). Utilitarian viewpoint is a proponent for exploitation of natural resources and considers it as a way of unlocking economic value while preservationist prefer keeping the natural resources (Loreau,2014).The preservationist views lobbied for the closure of a donkey abattoir that to slaughter for the export of donkey skins from Zimbabwe to China in 2018 (Mutizhe and Mwenje, 2018) claiming that there was going to be decimation of donkey numbers thereby disenfranchising communities of their livelihoods anchored on donkey draught power while aggravating donkey welfare (Mutizhe and Mwenje, 2018). Thus, the success and sustainability of the donkey milk supply chain for yoghurt production may be compounded by these conflicting schools of thought.

2.1.2 Benefits of eating yoghurt.

Yoghurt is a semi-solid fermented product which is popular globally and is obtained through lactic acid fermentation of milk by lactic acid bacteria known as *Lactobacillus bulgaricus* and *Streptococcus thermophilus* (Madhu et al., 2012). Yoghurt is a source of proteins and minerals. Furthermore, owing to the partial or total hydrolysis of fat, lactose and proteins, yoghurt has desirable digestibility making it recommendable for people with lactose intolerance or milk protein allergy (Njoya et al., 2018; Papademas et al., 2022; Martini et al., 2021).

Apart from these, yoghurt has been shown to reduce the risk of diseases and conditions such as Type 2 diabetes (Li et al.,2020). It lowers blood cholesterol level and helps in the assimilation

of protein and calcium in the body (Li et al., 2020; Njoya et al., 2018; Madhusudan et al., 2017). High frequency of eating yoghurt has been associated with higher levels of important bacteria such as *Streptococcus thermophilus* and *Bifidobacterium animalis* sub species *lactis* when compared to those who did not eat yoghurt (Le Roy et al, 2022). As a result, yogurt consumption has been claimed to be associated with an increased diversity of bacteria in the gut attributable to the incorporation of probiotics during yogurt making (Martini et al., 2021). A study that employed Healthy Eating Index revealed that people who ate yogurt at least once a week were more likely to follow a healthier diet than those who never ate yoghurt (Li et al., 2020).

2.1.3 Consumer knowledge, attitudes and practices towards donkey milk products

Despite donkey milk products gaining popularity in recent years due to their perceived health benefits and unique properties not many countries have the products on the market (Meena et al, 2024). Many possible explanations can be given including unavailability of products, lack of knowledge, bad attitudes or influencing practices and cultural norms in which communities are entrenched (Kattestumar and Babu, 2019). Consumer attitudes towards dairy products in general have been shown to be influenced by knowledge about a product, as well as the product availability and taste (Vargas-Bello-Pérez, 2022; Cazacu et al, 2014). The level of knowledge that consumers have about a product, their taste likes and dislikes is shape how they react when they are exposed to a new product (Amudha et al., 2016). Studies done on sheep and goat dairy products in Mexico, revealed that many consumers did not consume them because they were unfamiliar with the products (Vargas-Bello-Pérez et al., 2022). From these studies, it can be inferred that product labelling showing important attributes of a product and even awareness may be required to increase knowledge. When a product is unavailable on the market, it can be a reason for non-consumption (Miller and Lu., 2019). In as much as donkey milk is commonly consumed in countries like Botswana, donkey milk products are not popular in Zimbabwe (Ndlovu, 2023; Mutizhe and Mwenje, 2018). This can potentially generate some negative attitudes towards them as there are no testimonials to support the claims that they are superior in nutritional and health benefits. Van Loo et al (2014) assert that a positive association exists between knowledge, attitudes, and the frequency of purchasing and consuming organic yogurt. Wang et al. (2024) also posit that there is a relationship between knowledge of diet and food preferences This implies that knowledge and attitudes are important variables.

Bechtold and Abdulai (2014) revealed that preference variability depends on consumers' attitudes toward functional products. Attitudes may also be associated with the affordability of a product (Lanfranchi et al., 2017). When a product has a higher price, it becomes unaffordable to many such that a negative attitude may ensue as the product is categorised as one that is for the rich (Muunda et al., 2023). It is imperative to consider the source of milk for yoghurt production. Attitude can be linked to the apathy associated with seeking veterinary treatments for donkeys. Thus, the health of donkeys remains questionable to the extent that consumers may fail to accept donkey milk. Attitude and intention relationships determine the preferences made and is likely to be weaker where individuals possess attitudinal ambivalence (Gorton and Barjolle, 2014). For instance, a consumer may have both positive and negative attitudes to ginger liking the medicinal properties but disliking the sour taste

Practices have been shown to impact on consumer behavior. A group of people in a community can be socialised into not consuming certain foods and this may emanate from cultural and religious norms. In certain communities, there is taboo associated with consumption of donkey milk (Mutizhe and Mwenje, 2018).

2.1.4 Factors influencing consumer preferences for different blended donkey milk yogurts.

Consumption of unpopular dairy products has been evaluated in some studies. Factors such as age, gender, education, geographical location, employment status, healthy consciousness, taste of the product were associated with the consumption patterns of dairy products (Vargas-Bello-Pérez et al., 2022). Although most of the studies were done on milk from small ruminants like sheep and goats, it can be tempting to surmise that consumption of donkey milk yoghurt can also be influenced by these factors. However, assertions by Chang (2022) who argue that food choice is a complex process, and consumers may have different consumption patterns and preferences makes it critical to tread with caution. Karthick and Nithya (2021) further augment this by concluding that consumer behaviour is dynamic. Product qualities, individual health consciousness, product price and availability are the most influencing factors that have been demonstrated to influence the preferences for milk products (Bahety et al., 2024; Kumar and Babu, 2014). Various studies have categorized the factors that influence food preferences differently owing to the complex nature of food choice (Chen & Antonelli, 2020; Bauer & Reisch, 2021). Parasuraman et al. (2021) revealed that the quality, nutrient content, socio-demographic characteristics (education and income level) play a role in influencing behaviour towards and preferences of dairy products. The factors will now be explored.

2.1.4.1 Product related factors

The product related factors encompass chemical and physical attributes, sensory attributes such as taste, aroma, texture and visual appearance (Cazacu et al, 2014). According to Gullo et al. (2019) yoghurt, consumers often choose various yogurt flavors to satisfy diverse needs and it is imperative for food producers and processors to know consumer preferences. Some previous studies conducted on sheep milk-based yogurt show that interest in nutritional and health-related yogurt features increases the probability of accepting the yogurt (De Devitiis et al., 2023). Virmani (2016) also concedes that product factors, particularly quality and availability influence the preferences. The effect of availability on preferences has been studied by Pechey et al (2022) who concluded that increasing the availability of food options increased preferences for a particular option. Availability may refer to having the donkey milk yoghurt products locally accessible to consumers. Based on these studies, it can be construed that food preferences are inherently influenced by various factors.

Considering the increasing levels of health consciousness, consumers are becoming more demanding in terms of food safety and expect products to be made from natural and safe ingredients. Studies have explored the development and consumer acceptance of blended dairy products, such as milk-barley or milk-oats combinations (Shevade et al., 2021). These studies highlight the potential benefits, as well as the technical and sensory challenges, associated with blending dairy ingredients. However, there is limited information on consumer acceptance of novel or niche dairy products, such as blended donkey milk yoghurt, in the Zimbabwean context. Blended donkey milk yoghurt may potentially be marketable as the individual blends (ginger, honey and baobab) have superior medicinal and nutritional properties. They will, however, appeal to a cross section of consumers who may be inclined towards healthy eating and their perceptions influencing food preferences (Vargas-Bello-Pérez et al., 2022; Bartkiene et al., 2019). The properties of each of baobab, honey and ginger blending ingredients will now be discussed.

Baobab

This is a common plant used in traditional medicine (Kamatou et al., 2011). Almost all parts of the tree are used in Africa although with variation among countries. Fruit pulp is used as an immune stimulant often added in sauces, porridges and beverages (Ibrahima et al., 2013; Namratha and Sahithi, 2015). Owing to its ascorbic acid, calcium, potassium and dietary fibre content, the interest in baobab has been increasing over the years in many communities. The high vitamin C content of 280–300 mg/100 g is almost six times that of oranges (51 mg/100 g)

(Kamatou et al., 2011). The blending of baobab pulp with yoghurt can therefore have additional nutritional benefits to those already contained in the donkey milk yoghurt itself.

Honey

The societal interest in healthy diets prompts the urge to develop functional dairy products that not only provide health benefits, but also enhancing experiences. Honey has been documented to have nutritional and medicinal value. The addition of honey to yoghurt increases the nutritional value of the yoghurt given the incorporation of probiotics which assist in digestion and keep the gut healthy (Sarkar and Chandra, 2019). Apart from improving the body, texture and flavor of yoghurt honey improves the viability of bifidobacteria which is a probiotic (Ammar, 2015). In this study case of donkey yoghurt, the honey blend has qualities are thought to bolster preferences.

Ginger

Ginger (*Zingiber officinale* Roscoe) is a herbaceous plant widely used as flavoring and herbal medicine for centuries (Anh et al., 2022). It is widely known and used as a spice and flavoring agent in various cuisines around the world owing to its taste, aroma and flavor. It can be used to relieve common health problems such as nausea, pain and vomiting (Li et al., 2019). Many studies corroborate these assertions indicating that ginger has antibacterial and anti-fungal properties (Gugnani and Ezenwanze, 1985; Akoachere et al., 2002; Atai et al., 2009; Kaushik and Goyal, 2011). Ginger also has antioxidant and anti-inflammation properties (Nile and Park, 2015). Furthermore, it has anticancer properties (Crichton et al., 2019). The blending of yoghurt with ginger has been documented to render the yoghurt more functional (Njoya et al., 2018).

2.1.4.2. Consumer related factors

Consumer-related factors have been studied and include age, gender and educational level. These factors take the form of socio-demographic nature and in studies done on preferences of sheep-milk based yoghurt it was shown shows that gender, education and income level had an influence on acceptance (De Devitiis et al., 2023). Bhanu et al. (2017) reveal that age, gender, family size and education increased the probability of choosing milk (Ahmadi et al., 2019). Significant differences in food preferences due to gender have also been documented by Feraco et al. (2024). Increase in age and education level have been shown to increase the probability of preferring a dairy product (Ahmadi et al., 2019; Gopal and Natarajan, 2023). While most studies agree that age is an important factor, Koduru and Krishna (2023) argue that age had

gender had minimal effect on preferences and willingness to purchase yoghurt. It can however be argued that the differences noted by these scholars may be attributable to geographical, societal and product differences. In fact, according to Jain (2017), what consumers perceive about a product is dependent on demographic regions. Thus, it can still be concluded that older people and the educated tend to appreciate the health benefits associated with and hence the importance of eating yoghurt. In terms of family size, Kaliji et al (2019) argue that high family size is associated with bigger family sizes, and this decreases the probability of choosing yoghurt as a preferred dairy product. Intricately linked to family sizes is product price. Product prices are an important element in consumer buying behavior that can impact on the nutritional quality of a household as it influences relative affordability of alternative food (Griffith et al., 2015; Drewnowski & Monsivais, 2020). Schneider (2018) and Cornelsen (2015) demonstrate that low-income households are more sensitive to prices and purchase low-income dairy products. Sociodemographic factors are therefore critical in influencing preferences.

2.1.4.3 Environmental factors

Environmental factors also include social attributes. Chakona and Shackleton (2019) posit that most learnt underlying taboos and practices shared among communities are generally transmitted in social groups across generations. This is augmented by Shavitt and Barnes (2020) who state that culture has a deep seating influence and can shape the judgements and decisions of consumers. Culture has been defined as values, common traditions and habits that are present in a population group and influence consumer choice (Lindsey, 2024). Where there is a high culture of uncertainty, products do not always get the best response from the consumers. This is because of risk adverse behaviour by the consumer. The role of culture in consumer decision making differs with contexts. It is not uncommon to have a culture in which consumption of beef is taboo while in others it is not. In the case of products derived from donkey milk, this is also a possibility.

Shared values and traditions in the community have been extensively studied and shown to influence the consumer decisions in consuming a product (Henrich, 2015). This has also been supported by Shavitt and Barnes (2020) who posit that consumer motivations and thinking styles shape their judgments and decisions and are fundamentally influenced by culture. It can be concluded that certain taboos associated with food neophobia emanate from the culture and this is where attitudes and practices may arise from.

Schiffman and Kanuk (2010) further identifies social factors influencing consumer's attitudes and behaviour namely group of reference, family, and social role. Reference groups impact directly on a person's attitude and practices (Cardon et al.,2017). Thus, it is perceived that consumers consult opinions from their social group first owing to the strong shared norms and values. These socio-cultural factors need to be thoroughly explored especially when a new product is being introduced to the market. In as much as there are documented benefits associated with their consumption donkey milk and its associated products are considered as taboo in some communities in Zimbabwe (Mutizhe and Mwenje, 2018).

Botswana is one of the few African countries that has been known to market and consume meat and milk from donkeys (Ndlovu, 2024). Plans to market donkey milk products such as lotions, soap and milk in Zimbabwe by a Botswana company are on the cards (ibid). This is notwithstanding the fact that donkey milk products are generally not consumed especially by the Zimbabwean community (Mutizhe and Mwenje, 2018). It is generally considered as taboo and there is controversy surrounding the marketing of such products in Zimbabwe. It is important to appreciate the dynamics associated with location in the discourse of dairy consumption as studied by Gezginc and Akbay (2015) and Phuong, Cuong & Mergenthaler (2014). Beitbridge is a community located at the Boundary of Zimbabwe and South Africa and Botswana. There is movement between and mixing of people among these countries and this may moderate the culturally held notions around consumption of donkey milk. The implication is that the Beitbridge community may have higher chances of tolerating donkey products than other communities in Zimbabwe. Culture may be concluded as a factor that may cause food neophobia and unjustifiable exclusion of important and nutritionally sound foods (Cazacua et al., 2014). Tackling these sources of negative perceptions on food norms must be done to circumvent food insecurity.

2.2 Conceptual/theoretical framework

The conceptual framework was built underpinned by Discrete Choice Model and Food Choice Processing Model. Consumers make rational decisions to maximise their overall satisfaction (Friedela et al.,2022). Consumers are considered to have well defined preferences for different food items based on factors such as taste, nutritional value, economic and socio-cultural factors. Thus, they weigh the costs and benefits and select the combination that provides the highest utility. The utility maximization formed the basis of majority of application in Discrete Choice Modelling stemming from Daniel McFadden (1974). The Discrete Choice models specify the

probability that an individual chooses an option among a set of alternatives (Louviere et al.,2010). For example, when presented with different blends of yoghurt, one’s choice is driven by some influencing factors. The model analyses the decisions made by individuals when presented with a set of mutually exclusive alternative. Fundamentally the decision is based on which alternative provides them with the highest utility. Mathematically presented, the probability of selecting alternative j is based on whether the differences in systematic utilities between the alternatives is greater than the difference between the unsystematic utilities as shown in the equation below.

$$\text{Prob}_j = \text{Prob}(V_{ij} - V_{ik} \geq \epsilon_{ik} - \epsilon_{ij}); j \neq k,$$

The greater the systematic utility (V) of alternative j relative to alternative k the more likely it is that a person will select alternative j (Friedela et al.,2022).

To explain the factors determining preferences, The food choice process model (FCP) developed by Furst et al. (1996) can be invoked. It comprises three components namely life course, influences and personal systems as shown in Figure 3.1 below.

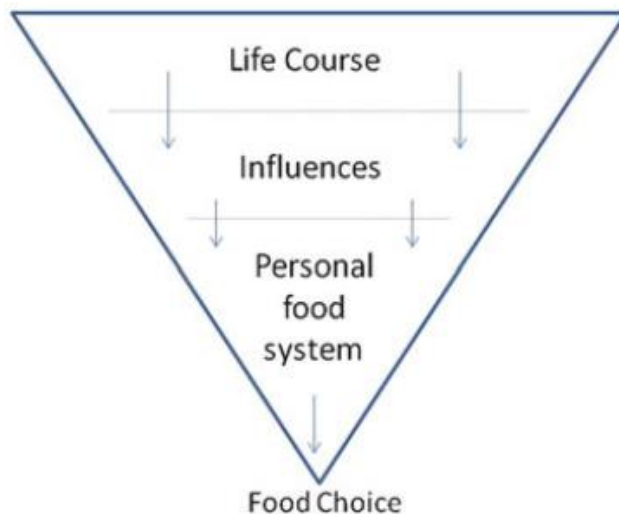


Figure 2.1: Food choice process model (Source: adapted from Sobal et al. 2006, p. 3)

The life course refers to past and current eating experiences (Gorton and Barjolle,2014). Furst et al. (1996) contend that trajectories associated with an individual’s beliefs, feelings and actions through their lifespan shape the patterns of food intake that exist today and form in particular historical and situational contexts. The family is thought to be the most significant

situational and historical context in shaping eating habits even after one moves out of their parents' house. In the context of donkey milk yogurts, a person's knowledge of and attitude towards them may emanate from past and current eating experiences. Considering that the consumption of donkey milk products may be associated with mixed feelings in Zimbabwe, adoption of these products may be accepted differently among communities in Zimbabwe.

The second component influences and encompasses social frameworks, resources and ideals (Gorton and Barjolle, 2014). Ideals are the symbolic connotations attached to food by people who consider food as proper or not. Resources include money which is important in determining affordability. The social framework deals with interpersonal relationships, and these can influence food choice considering that sometimes individual preferences may conflict with family choices. The personal food system is the third component of the model and relates to mental processes whereby people translate influences on their food choices into how and what they eat in a particular specific context (Gorton and Barjolle, 2014). It includes sensory perceptions, monetary considerations, convenience, health/nutrition, and quality. For instance, one may choose to purchase baobab blended yoghurt over honey and ginger even if it is more expensive simply because their children prefer it. The nutritional properties of yoghurt and the general propensity towards healthy eating may influence preferences.

Various studies have categorized the factors that influence food preferences differently owing to the complex nature of food choice (Chen & Antonelli, 2020; Bauer & Reisch, 2021). Categorisation by Chen and Antonelli (2020) is made into namely food related factors; individual differences; and society related factors. They assert that food related factors can be intrinsic and extrinsic (aroma and packaging). Individual differences include biological (taste), physical, psychological, cognitive (attitudes, beliefs and knowledge) and social factors (family and peers). The third category is society related and involves culture, price and income.

Bauer and Reisch (2019) proposes a more summarised factors arguing that food decisions are affected by individual (psychological, physical, neurological), social, and environmental factors. For purposes of this study, the conceptual framework considers such variations. It can be concluded that preferences are influenced by a myriad of factors and any innovation around food must factor in these when introducing new food products such as donkey milk yoghurt as the consumers seek to derive maximum utility from the products.

Based on the Discrete Choice model and the Food Choice Process model described above, the conceptual framework for exploring consumer preferences on blended donkey milk yogurt in Zimbabwe has been proposed and summarised in Figure 3.2 below.

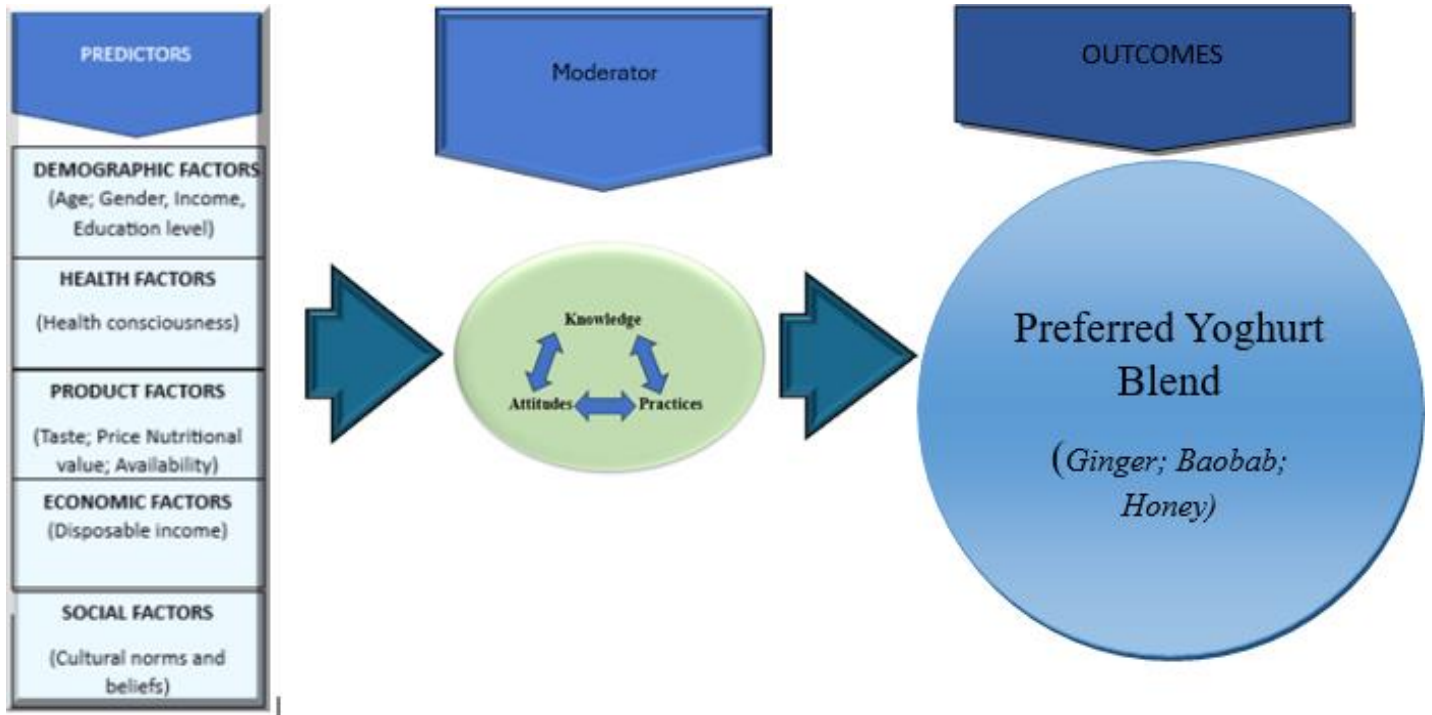


Figure 2.2: Conceptual Framework (Own framework, 2024)

Preference is influenced by many factors (Schiffman and Kanuk, 2010). This model observes demographic factors (age, gender, family, education, income), health factors (health consciousness), product factors (taste, price, nutritional value, availability), economic factors (disposable income), social factors (cultural norms and beliefs) are considered predictors of preferences (Lindsey, 2024; Shavitt & Barnes, 2020; Gorton & Barjolle, 2014) Considering that inherent knowledge about a product, attitude of a consumer and practices they engage in which invariably emanate from the environment they stay in, the predictors are moderated in order to affect preferences as an outcome. For instance, a consumer may have enough disposable income but owing to negative attitude towards donkey products, they may not purchase the product. Similarly, owing to practices they are entrenched in they shun the product.

2.3 Summary of literature Review

Literature was reviewed on knowledge, attitudes and practices towards the donkey milk products. Factors that influence consumer preferences for donkey milk products were explored. The standard processes followed in developing yoghurt was highlighted. A conceptual framework generated from the objectives was modelled. The qualities of donkey milk yoghurt as well as that of ginger, baobab and honey were also reviewed. The literature reviewed acknowledge the importance of socio-demographic factors such as income education level, cultural factors, product factors such as taste, economic factors such as price in moderating preferences.

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CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter gives an overview of the research methods, which delineates whether the research is quantitative or qualitative. The chapter furthermore explicitly defines the study area, present the research design, as well as the target population and the study unit. It is also made up of sampling methods in terms of the sampling technique, sampling procedures and sample size. Data analysis methods and its framework. The chapter is capped off by presenting the ethical considerations and finally, research methodology summary

3.2 Description of study site/s

3.2.1 Study site

This study was conducted in Beitbridge district where the questionnaire was distributed.

3.2.1.1 Description of study area



Figure 3.1: Map of Matabeleland South Province and districts *Beitbridge District*

Source: www.en.wikipedia.org/wiki/Beitbridge-district

Beitbridge district located in Matabeleland South Province of Zimbabwe at the border with South Africa with a population of 144 000 people (ZimStat, 2022) and is a semi-arid region under Agro-Ecological Region 5 (Chikodzi et al., 2013). On the Southwestern part, Beitbridge shares a boundary with Botswana. The region's average annual temperature 23.0°C, and over the year the monthly average temperatures vary by 10.7°C. The rainfall averages 333 mm/year and the variation in the precipitation between the driest and wettest months is 69 mm/year. It has 15 wards and covers an estimated land area of 567.681 square kilometres. The study was carried out in 3 purposively selected Wards namely Wards 6, 8 and 9 located in the southern part of the Beitbridge District. The three wards were selected considering their proximity to South Africa and Botswana hence the potential of cultural mixing arising from people crossing borders thereby bringing diversity to perspectives and food experiences. According to Department of Livestock and Veterinary Services (2019) there are over 35000 donkeys in the district. It has a huge donkey population with cultural setting tolerable to donkey milk consumption although it is for treatment of coughs in humans mainly. It is therefore a potential supplier of donkey milk for yogurt processing.

3.3 Research design

The study used a mixed-methods approach, combining quantitative and qualitative data collection and analysis to explore the consumer preferences on blended donkey milk yoghurt.

3.4 Target population

The target population was 4078 households in 3 wards in Beitbridge District namely Ward 6 (n=1953), Ward 8(n=934) and Ward 9 (n=1191). Beitbridge District was purposively sampled owing to its proximity to both Botswana and South Africa as well as the high donkey population of 35000 according to the census obtained from the Department of Livestock and Veterinary Services (DLVS, 2020). Beitbridge community has kept donkeys for many years and donkeys are valued and given consideration that is at par with cattle. As such Beitbridge presented high chances of people having experienced the use of donkey milk thereby more likely to have willingness to try donkey milk yoghurt. Furthermore, the movement of people across to Botswana and South Africa where donkey products are known to be commonly consumed was assumed to increase likelihood of positive reception to donkey milk yoghurt, a condition that would not be found in other places of Zimbabwe.

3.5 Sampling Procedures and Sample Size

3.5.1 Sampling Procedure

Purposive sampling was done to choose Wards that are closer to the neighbouring Botswana and South Africa, and these were Wards 6, 8 and 9. Considering that only households that had at least a donkey were suitable for the study, Convenience (Snowball) sampling was done to identify and sample households that had at least a donkey to participate in the researcher administered questionnaire. Given that not everyone who agreed to participate responding to the questionnaire was keen to taste the donkey milk yoghurt for various reasons purposive sampling of volunteers to participate in donkey milk yoghurt tasting was done.

3.5.2 Sample size

For the questionnaire administration in Beitbridge, the sample size of 138 donkey owning households was arrived at as follows.

Sample size calculation formula: $n = Z^2[p(1-p)]/L^2$ (Pfeiffer ,2010)

Where n= the sample size

Z= 1.96, the standard normal deviation at the desired interval, 95%

p= 0.9 (90%) the assumed proportion of households who own a donkey

L= 0.05 (5% precision)

Sample size = $1.96^2 [0.9(1-0.9)/0.05^2]$

= 138.24

=138

The total number of households per ward was adapted from ZIMSTAT (2022). However, this number included the Households which did not own donkeys. Thus, there was need to adjust this population by multiplying the figure by 0.9 to get the assumed proportion of the households who owned at least a donkey. It is this value which became the target population of donkey owners in each Ward. The sample size of 138 randomly selected Household Heads who own at least a donkey was then computed from this value to arrive at the proportional sizes of Ward 6 (n=66), Ward 8 (n=32), Ward 9(n=40), as shown in Table 31 below. Only one person representing the Household Heads (HH) was chosen per household.

Table 3.1: Table showing population and sample sizes of donkey owners in selected wards in Beitbridge.

DISTRICT	PLACE	TOTAL No. of Households (A)	TARGET HOUSEHOLDS (A* 0.9)	SAMPLE SIZE
BEITBRIDGE	Ward 6	2170	1953	66
BEITBRIDGE	Ward 8	1038	934	32
BEITBRIDGE	Ward 9	1218	1191	40
TOTAL		4426	4078	138

Source: ZimStat (2022) and own calculations

3.6 Data collection procedure

All data for the first three objectives were collected using a standardised researcher administered questionnaire. The questionnaire contained questions relating to consumer knowledge, awareness and attitudes towards donkey milk products; factors influencing consumer preferences for different blended donkey milk yogurt formulations; and the consumer preferred donkey milk yoghurt blend. The consumer preferred yoghurt blend was done by asking respondents to voluntarily taste the three yoghurt blends (ginger, baobab and honey). To ensure that every respondent understood the questions, the questionnaire was translated into ChiVenda, the prevalent languages in Beitbridge. The questionnaire had the last section specially included for those willing to taste the donkey milk yoghurts. The questionnaire for data collection was pre-tested before it used to check for appropriateness of questions.

3.6.1 Validity and reliability of survey instrument (questionnaire)

3.6.1.1 Reliability

Reliability is a concept describing how replicable a study is. A study is considered reliable if it can be repeated and the same results are found. Although majority of scales used in this study are adapted from previous studies, their reliability and validity in the new research environment cannot be taken for granted. The reliability of measures will be assessed using the Cronbach alpha (a) test in the SPSS programme. The Cronbach Alpha reliability coefficients indicate high levels of reliability of the instrument with all the values above the acceptable minimum

of 0.70 (Cronbach, 1951; Nunnally, 1978). The reliabilities for the individual constructs were all above 0.7.

3.6.1.2. Validity

Validity of a research refers to how well the results among the study participants represent true findings among similar individuals outside the study. Bryman (2021) adds that validity refers to the extent to which the indicator (or set of indicators) devised to measure a concept really measures that concept. This study conducted a pilot test to ensure the validity of the questionnaire. Pilot testing looks to examine the validity of each question. Five respondents (peers) were randomly selected 5 questionnaires were pretested to identify questionnaire problems. The pre-testing was essentially used to identify flaws in the questionnaire and determine the time required by a respondent to complete the questionnaire.

During pre-testing it was observed that there were typo errors had been made where ‘Ginger ‘was typed as Honey. Some omissions were also detected for example there was no question asking if the household had access to electricity and or refrigeration. Data was analysed using SPSS Version 20 during pretesting and no information was found missing or found to be irrelevant and removed. After pre-testing the instrument, the researcher collected the data.

3.6.2 Pre-testing

Five respondents (peers) were randomly selected 5 questionnaires were pretested to identify questionnaire problems. The pre-testing was used to identify flaws in the questionnaire and determine the time required by a respondent to complete the questionnaire. During pre-testing it was observed that there were read where typo errors had been made where ‘Ginger ‘was typed as Honey. Some omissions were also detected for example there was no question asking if the household had access to electricity and or refrigeration. Data was analysed using SPSS Version 20 during pretesting and no information was found missing or found to be irrelevant and removed. After pre-testing the instrument, the researcher collected the data.

3.6.3 Determination of knowledge, attitudes and practices of Zimbabwean consumers regarding donkey milk products.

To achieve this objective, a researcher administered pre-tested structured questionnaire was used as the main primary tool for data collection. The questionnaire was structured in such a way that it included the key knowledge and attitudes variables assumed by scholars on products

were included. Researcher administered questionnaires were used in order achieve high response rates from the targeted 138 respondents while ensuring that all questions were and soliciting more information where necessary. A total of 16 questions were included in the questionnaire categorized as follows: 7 questions on knowledge determination, 5 questions to characterize attitudes and 4 questions for profiling consumption practices. Except for one question which sought to check the frequency of yoghurt in general, the respondents had to answer **YES** or **NO** for each variable. YES indicated a positive acknowledgement while NO indicate the opposite. The assigned points are shown in the Table 3.2 below.

Table 3.2: Knowledge, attitudes and practices towards donkey milk products

KNOWLEDGE, ATTITUDES, AND PRACTICES		
TOWARDS DONKEY MILK PRODUCTS	YES	NO
SCORE	2	1
# KNOWLEDGE VARIABLES		
Know any donkey milk derived products?		
Know if donkey milk products to have nutritional properties?		
Know if eating yoghurt help in maintaining gut healthy?		
Know that honey have healing properties?		
Know that ginger have medicinal properties?		
Know that baobab have medicinal properties?		
Know that blending donkey milk yoghurt with herbs make it more nutritionally rich?		
Do you have a positive impression about donkey milk products?		
AVERAGE		
# PRACTICE VARIABLES		
Are you a donkey owner?		
Have you consumed any donkey milk products before?		
Are donkey milk products commonly consumed in your community?		
AVERAGE		
# ATTITUDE VARIABLES		

Do you recommend donkey milk products recommended to friends and family?		
Would you be interested in consuming donkey milk yoghurt?		
Are you more likely to purchase donkey milk products next time you go shopping?		
AVERAGE		

3.6.4 Analysis of factors influencing consumer preferences for different blended donkey milk yogurts

A researcher administered pre-tested structured questionnaire was used as the main primary tool for data collection. A sample of 138 donkey owning households were selected using convenient (snowball) sampling technique. A personally administered pre-tested questionnaire was used as the data collection tool to solicit factors influencing consumer preferences for the three blended donkey milk yoghurts. The questionnaire was administered to capture demographic, economic, social, health, product and health factors. A total of 9 questions were included in the questionnaire addressing this objective. These were measured using a 5-point Likert scale ranging from “strongly disagree” to “strongly agree”. Respondents rated the extent to which they strongly agreed or disagreed whether the different factors influenced their decision to purchase the various blended donkey milk yogurt formulations. Each of the factors were rated against each of the 3 yoghurt blends using the numerical scores as below

Strongly Disagree = 1; Disagree = 2; Neutral = 3; Agree = 4; and Strongly Agree = 5

The assigned points are shown in the Table 3.3 below.

Table 3.3 Factors influencing consumer preferences for different blended donkey milk yoghurt formulations

Dependent Variable – 3 various blended donkey milk yoghurts (Ginger; Baobab & Honey)						Expected outcome (+/-)
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
SCORE	1	2	3	4	5	
I prefer this blend only if it is priced well						+
I prefer this blend only because if it is available						+
I prefer this blend because of its good taste attributes						+
I prefer this blend because of nutritional value						+
I prefer this blend because ginger has healing properties						+
I prefer this blend because I am health conscious						+
I will prefer this blend only if friends and family prefer it						+
I will never prefer this blended donkey yoghurt						-

due to taboo on
donkey products

3.6.5 Determination of the consumer preferences for developed blended donkey milk yoghurt products through sensory tasting.

To achieve this objective, the researcher had to make the three blended donkey milk yoghurt first and then ask volunteering respondents to taste and indicate their preferences. Product development for the 3 different herbal blended donkey milk yoghurt followed the processes outlined below.

Fresh donkey milk (Microbial and Physicochemical composition given in Table 3.4) collected from lactating donkeys at Beitbridge was used. The yoghurt was made according to the modified method of Lee and Lucey (2010). The milk mixed with a stabilizer (cornstarch) was pasteurized by heating at 85-90°C for five minutes in a boiling water bath during which 6.5% (w/v) of sugar was added. The milk was then rapidly cooled to inoculation temperature (42 °C) followed by addition of 2.5% (w/v) yoghurt starter culture (Lyofast Y 259A) comprising *Streptococcus thermophilus* and *Lactobacillus delbrueckii* spp *bulgaricus* in a 1:1 ratio and incubation at 42 °C for 3 hours when the yoghurt was set. The set yoghurt was directly cooled in refrigerator (4 – 6°C for 12h) before manual stirring. After stirring, respective blends were added namely ginger powder, honey and baobab pulp to make 3 different blends of yoghurt Baobab(B), Honey (H) and Ginger (G). Potassium sorbate was added as a preservative. All the yoghurt samples were kept in the refrigerator (4 – 6°C) for physicochemical analysis. They were packaged in branded containers and administered to participants who volunteered in affective tasting.

Table 3.4: Microbial and Physicochemical composition of fresh donkey milk used

	B/F	Protein	Lactose	T/S	SNF	TBC	Coli	E	Y & M	pH	SCC
	%	%	%	%	%	X10/ml	X10/ml	Coli	X10/ml		
Raw Donkey Milk	0.27	1.83	5.32	7.20	1.88	13	<1	-ve	<1	5.05	6

Source: (AgLabs, 2024)

A personally administered pre-tested structured questionnaire was used as the main primary tool for data collection from 38 volunteers. The questionnaire was structured such that it included the satisfaction level with the 3 different blended donkey milk yogurt formulations tested. This was measured using a 5-point Likert scale ranging from “very dissatisfied” to “very satisfied”. Respondents rated the level to which they were satisfied or dissatisfied with the various blended donkey milk yogurt formulations. Each of the factors were rated against each of the 3 yoghurt blends using the numerical scores whereby:

Very dissatisfied = 1; Dissatisfied = 2; Unsure = 3; Satisfied = 4; and Very Satisfied = 5

Furthermore, inferential statistics tests such as correlation and regression were conducted from the ratings provided to investigate the strength of the associations. The assigned points are shown in the Table 3.5 below.

Table 3.5: Rating the level of satisfaction of the various donkey milk yoghurt blends

Independent variables - Factors influencing consumer preferences for different blended donkey milk yogurt formulations							
		Very Dissatisfied 1	Dissatisfied 2	Unsure 3	Satisfied 4	Very Satisfied 5	Expected outcome (+/-)
Dependent variables	Ginger						+
	Baobab						+
	Honey						+

3.7 Organization and implementation of the fieldwork

The researcher, an assistant and a Veterinary Extension Officer (VEO) working in the area constituted the study team for data collection. As the study sought to survey only those household that owned at least a donkey, snowball sampling procedure was deemed appropriate to have knowledge of where the next respondent would be found. Beitbridge being a chiVenda dominated community, the VEO inclusion was to assist in translation from English to chiVenda language so that the respondents could understand the questionnaire. Before participating in the study, participants were informed about the purpose of the research and were made to understand the nature and purpose of the research for them to consent to participate without

coercion. The tasting of donkey milk yoghurt was only done by participants who indicated willingness to do.

3.8 Data analysis methods

This section describes the analytic tools used by the research project on the respective objectives. The researcher made use of measures of descriptive and inferential statistics. The researcher used different data tables to represent the responses of the participants to the research questions and their sub-themes. The data tables show the percentages of the respondents who strongly disagreed, disagreed, neutral, agreed and strongly agreed with the given statements. The data was then analysed, and the analysis were reflected on the tables as percentages. The next sections describe the analysis method employed for each objective.

3.8.1 Evaluating consumer knowledge, attitudes and practices towards donkey milk products in Zimbabwe

The data was collected using a questionnaire and entered Microsoft Excel 2013 after which it was coded, entered, cleaned and run in Statistical Package for Social Sciences (SPSS Version 20) software. The following specific objective was set in pursuit of the overall objective:

- To evaluate consumer knowledge, attitudes and practices towards donkey milk products in Zimbabwe

The KAP framework analysis was used to evaluate the Knowledge, Attitudes and Practices of consumers towards donkey milk products. KAP is a quantitative method that provides access to quantitative and qualitative information. The collection of information on what is known (Knowledge), what is thought (Attitudes) and what is done (Practices) about a topic of in a particular population attitude (i.e. what is thought), and practices (i.e. what is done) about general and/or specific topics of a particular population is better achieved through KAP tools. To evaluate knowledge, aspects such as nutritional and medicinal value of ginger, honey and baobab were assessed. To reflect attitudes participants were asked whether they would recommend donkey milk products to friends and family, whether they would be interested in purchasing, consuming donkey milk yoghurt as well as their impression about donkey milk products as shown in Table 3.2 above.

Practices were evaluated using questions such as How often do you consume yoghurt in general? Have you consumed any donkey milk products before? Are donkey milk products commonly consumed in your community? KAP surveys are useful in identifying knowledge

gaps, cultural beliefs, or behavioural patterns that may facilitate understanding and action towards donkey milk products such as blended yoghurt.

Furthermore, Spearman rank correlation was used to evaluate the associations between knowledge-attitudes (K-A), knowledge- practices (K-P), attitudes-practices (A-P) towards preferences on donkey milk products.

3.8.2 Factors influencing consumer preferences for different blended donkey milk yogurt formulations.

The data that was collected using questionnaire was coded, entered, cleaned and run in SPSS version 20. The process was done to accomplish the following specific objective:

- To analyse factors influencing consumer preferences for different blended donkey milk yogurt formulations.

3.8.2.1 Analytic presentation

The section analysed the influence of factors influencing consumer decision on preference on blended donkey milk yoghurt using multinomial logistic regression. When exploring choice process where the choice set consists of more than two alternatives, multinomial logistic regression is appropriate (Kohansal and Firoozzare, 2013). It describes the behaviour of consumers in the face of goods highly distinguished by individual attitudes (Schupp et al., 1998; Luzar et al., 1998). Multinomial logistic regression is used to model nominal outcome variables as a linear combination of the predictor variables (Helveston,2022). In this study, the outcome variables are donkey yoghurt preference among Ginger, Baobab and Honey blends. The predictor variables are factors namely Socio-demographic (age; sex; income; family size; education), Economic (price; availability), Product (taste), Consumer (health consciousness; cultural norms).

3.8.2.2 Mathematical representation of the Multinomial Logistic Regression Model

Kohansal and Firoozzare (2013) asserts that the logit model originated from Luce (1959) underpinned by the random utility maximisation theory. The utility, U_{ij} derived by the i th individual from the j th alternative can be written as:

$$U_{ij} = V_{ij} + \varepsilon_{ij} = \beta_j' X_i + \varepsilon_{ij} \quad (1)$$

Where, V_{ij} is average utility, ε_{ij} , is the random part, X_i is the matrix of the characteristics of the individual i , and, β_j is the parameter vector for each alternative (Kohansal & Firoozzare, 2013).

The developed random utility theory predicts that the probability, P_{ij} that an individual i selects alternative j equals the probability that U_{ij} is larger than the utilities U_{ik} of all other alternatives in the individual's choice set, C .

$$\begin{aligned} P_{ij} &= P(U_{ij} \geq U_{ik} \quad \forall k \in C \quad k \neq j) \\ P_{ij} &= P(V_{ij} + \varepsilon_{ij} \geq V_{ik} + \varepsilon_{ik} \quad \forall k \in C \quad k \neq j) \end{aligned} \quad (2)$$

It is further assumed that the random components of the utility, ε_{ij} , are independent and identically distributed with a Gumbel distribution (Kohansal and Firoozzare, 2013; Helveston, 2022). Equation (3) expresses the probability of an individual i choosing an alternative j as:

$$P_{ij} = \frac{e^{\beta_j' X_i}}{\sum_{k \in C} e^{\beta_k' X_i}} \quad \forall j \in C \quad (3)$$

In the context of this study, the logit analysis determines the likelihoods of a consumer preferring different yoghurt blends (Baobab, Honey and Ginger) given their socio-demographic characteristics (age, gender, education, income, health consciousness), customs and beliefs, product knowledge, taste and price. Multinomial logit model is defined as follows:

$$\begin{aligned} \log\left(\frac{P_{ij}}{P_{i1}}\right) &= x_i \beta_j \quad \text{for } j = 1, \dots, J, \\ i &= 1, \dots, N \end{aligned} \quad (4)$$

Where P_{ij} is $\text{Prob}(Y=j|x)$, which is obtained as follows:

$$P_{ij} = \frac{\exp(x_i \beta_j)}{\sum_{j=1}^J \exp(x_i \beta_j)} \quad (5)$$

The method of maximum likelihood can estimate Equation (5) as follows:

$$\begin{aligned} P_i(Y=1) &= \frac{1}{1 + \sum_{j=1}^J \exp\{x_i \beta_j\}} \\ P_i(Y=j) &= \frac{\exp\{x_i \beta_j\}}{1 + \sum_{j=1}^J \exp\{x_i \beta_j\}} \\ \text{where } j &= 1, 2, \dots, J-1, \quad i = 1, 2, \dots, N \\ P_i(Y=J) &= \frac{\exp\{x_i \beta_J\}}{1 + \sum_{j=1}^J \exp\{x_i \beta_j\}} \end{aligned} \quad (6)$$

In the model, the assumption is made that response counts at each level of covariate combination are multinomial and multinomial counts at different covariate combinations are independent. Marginal probabilities of choice (marginal effects) can be calculated from Equation (7) below:

$$\frac{\partial P_{ij}}{\partial x_i} = P_{ij} \left[\beta_j - \sum_{k=1}^J P_{ik} \beta_{k0} \right] \quad \text{for } j = 1, 2, \dots, J. \quad (7)$$

Using Equation (7), we can find changes in probabilities for preferred yoghurt blend due to a slight change in one of the consumers' characteristics, while holding all other explanatory variables fixed (Luzar et al., 1998; Kohansal and Firoozzare, 2013).

$$\ln \left(\frac{P(y=j|X)}{P(y=ginger|X)} \right) = \beta_0 + \beta_1 \text{taste} + \beta_2 \text{education} + \beta_3 \text{income} + \beta_4 \text{family size} + \beta_5 \text{age} + \beta_6 \text{price} + \beta_7 \text{male} + \beta_8 \text{availability} + \beta_9 \text{cultural norm} + \beta_{10} \text{Health} \quad (8)$$

SPSS version 20 was used to estimate the multinomial logit model in the study.

3.8.3 Determination of preferred donkey milk yoghurt blend through consumer sensory testing

The blended yoghurt produced was given to volunteers for affective tasting. The level of satisfaction with each yoghurt blend were evaluated. χ^2 test was done to demonstrate any associations between demographic characteristics and blended donkey milk yoghurt.

3.9 Ethical considerations

The respondents were made fully aware of the aim of this study and participated after consenting. The participants were informed that the yoghurt had been made from donkey milk. The collected data was anonymous and there will not be identifying values that can link the information to the participant. Voluntary participation was upheld by ensuring that participants were allowed to exit the survey at any time.

3.10 Summary

The chapter has examined the research methodology by first describing the Beitbridge District as a study area and wards sampled. Research design, sampling procedures, data collection and data analysis for each of the three objectives were part of the chapter. The next chapter will present and discuss the results of the findings of objective one. The chapter concentrates on the responses of the respondents to the questions in the questionnaires. Descriptive statistics, tables and charts were used to aid the analysis of the data.

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CHAPTER 4

EVALUATION OF CONSUMER KNOWLEDGE, ATTITUDES AND PRACTICES (KAP) TOWARDS DONKEY MILK PRODUCTS IN ZIMBABWE

ABSTRACT

This study was aimed at evaluating consumer knowledge, attitudes and practices towards donkey milk products in Zimbabwe. Conveniently sampled (Snowball sampling) donkey owning households (n=110) were asked to participate in a researcher administered survey in 3 selected Wards in Beitbridge District of Zimbabwe. Knowledge, attitude and practices were evaluated employing the KAP framework. Furthermore, Spearman rank correlation was used to evaluate the possible association between knowledge-attitudes (K-A), knowledge-practices (K-P) and attitudes-practices (A-P) of consumers on donkey milk products. The study revealed higher levels of knowledge but poor attitudes and practices. Strong positive correlations between K-A, KP and A-P with correlation coefficients were 0.793, 0.715 and 0.884 respectively, $p < 0.01$) were observed. The findings indicate that a greater knowledge of donkey milk products could lead to a more positive attitude towards consumption. The study however reflects a dissonance in that while knowledge is high, participants are hesitant to recommend the consumption of the product to friends and family suggesting that confounding cultural factors were at play. Promoting collaborations with local healthcare providers, nutritionists, or traditional medicine practitioners can lend credibility to the benefits of donkey milk products. Organising cultural events or field days or festivals to exhibit the traditional uses and preparation methods of donkey milk yoghurt can influence positive attitudes and practices.

Keywords: Knowledge, Attitude: Practices; Spearman; Association

4.1 Introduction

Despite donkey milk products gaining popularity in recent years due to their perceived health benefits and unique properties not many countries have the products on the market (Meena et al, 2024). Possible explanations can be the unavailability of products, lack of knowledge, bad attitudes or influencing practices and cultural norms in which communities are entrenched (Kumar, and Babu, 2019). Consumer attitudes towards dairy products have been shown to be influenced by knowledge about a product, as well as the product availability and taste (Vargas-Bello-Pérez, 2022; Cazacu et al, 2014). The level of knowledge that consumers have about a product, their taste likes and dislikes is shape how they react when they are exposed to a new product (Amudha et al., 2016). Studies done on sheep and goat dairy products in Mexico, revealed that many consumers did not consume them because they were unfamiliar with the products (Vargas-Bello-Pérez et al., 2022). From these studies, it can be inferred that product labelling showing important attributes of a product and even awareness may be required to increase knowledge. When a product is unavailable on the market, it can be a reason for non-consumption (Miller and Lu., 2019). In as much as donkey milk is commonly consumed in countries like Botswana, donkey milk products are not popular in Zimbabwe (Ndlovu, 2023; Mutizhe and Mwenje, 2018). This can potentially generate some negative attitudes towards them as there are no testimonials to support the claims that they are superior in nutritional and health benefits.

Bechtold and Abdulai (2014) revealed that preference variability depends on consumers' attitudes toward functional products. Attitudes may also be associated with the affordability of a product (Lanfranchi et al., 2017). When a product has a higher price, it becomes unaffordable to many such that a negative attitude may ensue as the product is categorised as one that is for the rich (Muunda et al., 2023). It is imperative to consider the source of milk for yoghurt production. Attitude can be linked to the apathy associated with seeking veterinary treatments for donkeys. Thus, the health of donkeys remains questionable to the extent that consumers may fail to accept donkey milk. Attitude and intention relationships determine the preferences made and is likely to be weaker where individuals possess attitudinal ambivalence (Gorton and Barjolle, 2014). For instance, a consumer may have both positive and negative attitudes to ginger liking the medicinal properties but disliking the sour taste.

Practices have been shown to impact on consumer behaviour. A group of people in a community can be socialised into not consuming certain foods and this may emanate from

cultural and religious norms. In certain communities, there is taboo associated with consumption of donkey milk (Mutizhe and Mwenje, 2018). There is, however, little known regarding the knowledge, attitudes and practices of consumers to donkey milk products.

4.2 Material and Methods

Details regarding the study area and the methodology encompassing sampling procedures, questionnaire design, methods of data collection and data analysis are described in Chapter three. This chapter only gives a summary

4.2.1 Description of study area

The study was conducted in Beitbridge District in 3 wards, Details of the study area are given in Chapter 3

4.2.2 Research Design

The study used a mixed-methods approach, combining quantitative and qualitative data collection and analysis to evaluate knowledge, attitudes and practice consumer preferences on blended donkey milk yoghurt.

4.2.3 Sampling procedure

Non-probability sampling was done using convenience (Snowball) sampling procedure. Only owners of at least a donkey were identified for questionnaire administration. Details regarding the sampling procedure are given in Section 3.5 of Chapter 3.

4.2.4 Data collection procedure

A pretested researcher administered questionnaire was used for data collection from January to March 2024. More details regarding the data collection procedure are given in Section 3.6 of Chapter 3.

4.2.5 Data analysis procedure

The data that was collected using questionnaire, which was coded, entered, cleaned and run in Statistical Package for Social Sciences (SPSS Version 20) software and Microsoft Excel 2013 program for analysis. Descriptive statistics was applied to analyse the background of the sampled households. The data was used to complete Table 4.1. The KAP analytic framework

was used to evaluate consumer knowledge, attitudes and practices towards donkey milk products in Zimbabwe.

Furthermore, Spearman rank correlation was used to evaluate possible associations between knowledge-practices (K-P), knowledge-attitudes (K-A), attitudes-practices (A-P) in determining knowledge, attitudes and practices towards donkey milk products in Zimbabwe.

More details on the data analysis method and analytic presentation regarding women's perceptions is given in Section 3.8.2; 3.8.2.1 and 3.8.2.2 of Chapter 3

4.2.6 Challenges encountered during data collection

The community was a largely chi Venda speaking, and translation of the questionnaire needed someone who was both comfortable in English and Chi Venda. That meant the researcher could not function without such a person. That caused delays in data gathering as the person engaged also had other commitments on some of the days. In the end instead of 138 households targeted, the researcher only managed to access 110 respondents.

4.3 Results and Discussion

4.3.1 Knowledge, Attitudes and Practices analysis results for the perception on donkey milk products

Table 4.3 below shows the study results of the KAP analysis for the perception on donkey milk products in Beitbridge District. The table indicates variables that reflect knowledge, attitudes and practices.

Table 4.1 Knowledge, Attitudes and Practice analysis for the perception on donkey milk products

Variables	No		Yes	
	n=110	%	n=110	%
Knowledge variables				
Do you consider donkey milk products to have nutritional properties?	53	48.2	57	51.8
Does eating yoghurt help in maintaining gut healthy?	56	50.9	54	49.1
Does honey have healing properties?	52	47.3	58	52.7
Does ginger have medicinal properties?	54	49.1	56	50.9
Does baobab have medicinal properties?	50	45.5	60	54.5
Does blending donkey milk yoghurt with herbs make it more nutritionally rich?	53	48.2	57	51.8
AVERAGE	53	48.2	57	51.8
Attitude variables				
Would you recommend donkey milk products recommended to friends and family?	63	57.3	47	42.7
If you had the opportunity to access donkey milk yoghurt, would you be interested in consuming it	61	55.5	49	44.5
Are you more likely to purchase donkey milk products next time you go shopping?	62	56.4	48	43.6
Overall, do you have a positive impression about donkey milk products?	56	50.9	54	49.1
AVERAGE	60.5	54.4	50.2	45.6
Practice Variables				
Are donkey milk products commonly consumed in community	99	90	11	10
Have you consumed any donkey milk products before	16	14.5	94	85.5
AVERAGE	57.5	52.3	52.5	47.8

4.3.1.1 Knowledge variables

The findings reflect that 51.8% of the donkey owners had knowledge about the nutritional qualities of donkey milk products and blends while 48.2% revealed lack of knowledge. The

level of knowledge being higher, it implies that there is general appreciation of dietary issues within the population as conceded by Wang et al. (2024) who posit that there is a relationship between knowledge of diet and food preferences. Thus, equipped with such knowledge, it may be expected that attitudes may be favourable towards preference of the blended donkey milk yogurt. The majority of respondents (54.5%) had knowledge that baobab pulp had medicinal properties while 45.5% had no knowledge on this.

Based on the findings, it was evident that most donkey owners possessed a good understanding of the nutritional benefits associated with donkey milk products. Gorton and Barjolle (2014) posits that a person's knowledge of and attitude towards them may emanate from past and current eating experiences. Osman (2011) document that donkey milk can be used to treat whooping cough. Since donkey milk is commonly believed to possess curing effect on whooping cough cases, this knowledge is in tandem with the practices. Additionally, they were aware of the medicinal properties of honey and ginger. This is supported by El-Sayed and Youssef (2019) who posit that fortifying dairy products with herbs adds antioxidative, anti-inflammatory, antidiabetic, antihypertensive and antimicrobial qualities to the nutritional and medicinal values apart from improving the appearance and attractiveness.

Surprisingly, the perception of eating yoghurt helping in maintaining gut health was negative for 50.9% of respondents. This contrasts with known facts that probiotics in yoghurt aid in digestion (Prasad, 2020; Martini et al., 2021). Considering the socio-demographic composition of the respondents, this knowledge may be too technical hence the lack of appreciation that yoghurt consumption improves gut health.

4.3.1.2 Attitudes variables

Some 54.4%, expressed negative attitudes towards donkey milk products with and 45.6% having indicated positive attitudes. Furthermore, 57.3% were not willing to recommend donkey milk products to friends and family. Most respondents (55.5%) expressed a lack of interest in consuming donkey milk yoghurt while 56.4% would not buy the products in future and 56% confessed they had a negative perception of donkey milk products. They expressed concerns about the hygiene, health risks, cultural taboos, and religious beliefs associated with consuming donkey milk yoghurt. Generally, the results reflect a general unlikeliness towards donkey yoghurt products. The negative attitude may be arising from the unavailability of such products and subsequent lack of experience according to Vargas-Bello-Pérez (2022) and Cazacu et al (2014). Blended donkey milk yoghurt product being novel innovation in Zimbabwe acceptance

cannot be expected to be uniform but to follow some diffusion of innovation pathway with some adopting the product earlier than others.

4.3.1.3 Practices variables

General yoghurt eating practices were assessed by the study. However, the pattern is related to convectional cow milk-based yoghurt and frequency of consumption shown Figure 4.1 below.

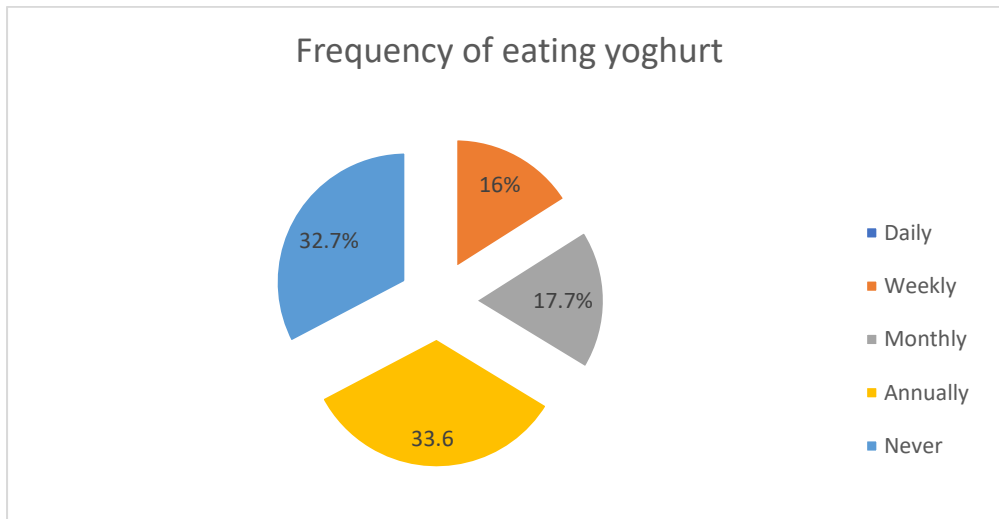


Figure 4.1: Frequency of yoghurt consumption

The data presented in Table 4.2 indicates that most respondents (33.6%) consumed yoghurt at least once a year and 32.7% claimed they ever consume yogurt at all. None consumed yoghurt daily. The reasons stated for not consuming yoghurt were related to unaffordability and general lack of interest. While there is fragmentation in terms of yoghurt consumption, it is evident from the study that the participants in this research were well-acquainted with yoghurt products and frequently indulged in them whenever the chance presented itself. In fact, the variations in yoghurt consumption have been explained by Gezginc and Akbay (2015) who assert that socioeconomic and demographic characteristics such as household size, education, age and gender significantly affect yoghurt consumption. The study location being a rural one, the results are consistent with the settings.

It is worth noting that a majority (85.5%) of the participants had consumed donkey milk products at some stage in their lives although in as much as 90% stated that it was not common practice in the community to just consume it except for treating whooping cough. It is possible that this discrepancy arose from the fact that some consumers may have consumed donkey milk in Botswana where it is common but back at home.

4.3.2 Correlations between Knowledge, Attitudes, and Practices on donkey milk yoghurt products.

Knowledge, Attitude and Practices were tested for association using Spearman’s correlations and the results are presented in the Table 4.4 below.

Table 4.4 Knowledge-Attitude, Knowledge- Practices and Practice-Attitude correlation on donkey milk products

Variables		Knowledge	Practices	Attitudes
Knowledge	Coefficient	-----	0.715**	0.793**
	Significant	-----	0.000	0.000
Practices	Coefficient	-----	-----	0.884**
	Significant	-----	-----	0.000
Attitudes	Coefficient	-----	-----	-----

Source: Field Survey (2024) ** Correlation is significant at $p < 0.01$ level (2-tailed)

4.3.2.1 Analysis of correlations between Knowledge-Attitudes, Knowledge-Practices and Practices-Attitudes.

Spearman rank correlation was used to evaluate the possible association between knowledge-attitudes (K-A), knowledge-practices (K-P) and attitudes-practices (A-P) of consumers on donkey milk products. Strong positive correlations between K-A, KP and A-P with correlation coefficients were 0.793, 0.715 and 0.884 respectively, $p < 0.01$) as shown in Table 4.4 above. The findings indicate that a greater understanding (knowledge) of donkey milk products could lead to a more positive attitude towards consumption. The study however reflects a dissonance in that while knowledge was high, participants were generally hesitant to recommend the consumption of the product to friends and family. This may be attributable to the lack of confidence in the knowledge they have. Moreover, cultural norms commonly shared within a community may override the knowledge that individuals have on a subject (Cazacua et al., 2014). For instance, a community may consider it taboo to consume donkey milk but in as much as it may be appreciated that the products are good for health, cultural norms limit

openness to that. Another explanation to the deviation noted is that Beitbridge being a community that is located at the boundaries Zimbabwe share with South Africa and Botswana, it is also possible that knowledge of donkey products was obtained after visiting these neighbouring countries where donkey milk is consumed. However, when back in Zimbabwe owing to entrenched beliefs or other reasons consumption is not practiced.

The study reveals that there is low attitudes and low practices. This impacts on perceptions of donkey milk yoghurt consumption in the Beitbridge district. The findings align well with arguments by Vargas-Bello-Pérez (2022) and Cazacua et al (2014) who argue that consumer attitudes towards dairy products in general are influenced by knowledge and practices. Amudha et al. (2016) also posits that the level of knowledge that consumers have about a product, their taste likes and dislikes shapes how they react when they are exposed to a new product.

4.4 Conclusion

The fact that respondents appreciated that blending yoghurt makes it nutritionally rich may make the donkey milk yoghurt very acceptable. However, preferences may vary depending on other cognitive aspects such as tastes. Appreciating that knowledge is influenced by many factors including location and other socio-demographic characteristics, the result may fail to offer a generalisable picture of the situation in Zimbabwe in as far as knowledge is concerned. Practices variables revealed low average rating meaning that the practices did not favour consumption of donkey milk products. Although the participants had indicated a higher rating in having consumed donkey milk products before, the response for donkey milk being commonly consumed was very low. This may mean that there are strong cultural barriers to donkey milk products consumption which make people only consume these products when they visit other places.

Strong positive correlations were revealed between K-P, K-A, and A-P respectively between variables implying addressing knowledge may invariably improve attitudes towards the products, while addressing attitudes may improve practices. Similarly, when knowledge is addressed, practices can be improved.

4.5 Recommendations

On Knowledge.

- Conduct outreaches, workshops or public talks to inform the public about and to generate interest in the unique nutritional characteristics of blended donkey milk yoghurt
- Promoting collaborations with local healthcare providers, nutritionists, or traditional medicine practitioners to lend credibility to the benefits of donkey milk products.
- Organize cultural events or field days to exhibit the different yoghurts made from donkey milk and giving attendees to taste

On Attitudes:

- Companies may start producing the yoghurts in Zimbabwe so that availability can influence good attitude.
- Using social media platforms to amplify testimonials and inspire others to try donkey milk products.
- Encouraging the Department of Veterinary Services to roll out a programme on donkey herd health inspections to ensure donkey milk is trusted to be coming from animals that are healthy.
- Packaging and labelling of donkey milk yoghurt should be done well to invoke liking in consumers.

On practices:

- Set up events where community members can sample donkey milk yogurt and then encourage participants including community leaders to provide feedback and share their impressions of the yoghurt. Such positive testimonials may improve attitudes and suffocate ill-conceived practices that shun donkey milk yoghurt consumption.

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CHAPTER 5

ANALYSIS OF FACTORS INFLUENCING CONSUMER PREFERENCES FOR DIFFERENT BLENDED DONKEY MILK YOGURT FORMULATIONS.

ABSTRACT

Blended donkey milk yoghurts are a novel product in Zimbabwe. While the yogurt has nutritional properties that are unique, after blending it with ginger, baobab or honey, the consumer preferences cannot be taken for granted. This study therefore sought to analyse the factors that affected consumer preferences for the different blended donkey milk yoghurt. A researcher administered pretested questionnaire was administered in 3 Wards in Beitbridge, Matabeleland South Province of Zimbabwe to 110 donkey owners conveniently sampled (snowball sampling). Quantitative data collected from respondents was coded and thereafter analyzed using SPSS version 20. Descriptive and inferential statistical analysis to analyse data. Descriptive statistics employed the use of frequencies and percentages, and for inferential statistics, multilinear logistic regression was used. Economic factors in the form of price and availability, social factors in the form of taboos in culture, product factors such as taste, and nutritional value of a blend were shown to be important. Regression revealed that education, age, price, health consciousness, male gender and product availability were important predictors which increased likelihood of choosing ginger. Taste was an important predictor for baobab yoghurt blend preference while income levels affected honey blend. It is recommended that market segmentation, price sensitivity, awareness raising and ensuring constant availability of donkey milk products on the market be prioritized to counter some forces against the successful introduction and market share growth of blended donkey milk yoghurt in the marketplace.

Keywords: Novel, Donkey milk yoghurt, Blends, Factors, Market segmentation

5.1 Introduction

For novel products such as donkey milk yoghurt, there needs to be evaluation of factors that may make consumers prefer one blend to another. The three blends are baobab, honey and ginger. There are a few factors that can influence a consumer's choice between baobab, honey and ginger blended yoghurt namely socio-demographic characteristics, health benefits, taste influences and novelty (Cazacua et al., 2014; products (Vargas-Bello-Pérez et al., 2022; De Devitiis et al., 2023). Parasuraman et al. (2021) revealed that socio-demographic characteristics (education and income level) play a role in influencing behaviour towards and preferences of dairy products. Cazacua et al. (2014) demonstrate that low-income households are more sensitive to prices and purchase low-income dairy products. Product price and availability influence the preferences for milk products (Bahety et al., 2024; Kumar and Babu, 2014).

Interest in nutritional and health-related yogurt features has been found to increase the probability of accepting the yogurt (De Devitiis et al., 2023). Virmani (2016) also concedes that product factors, particularly quality and availability influence the preferences. Based on these studies, it can be construed that food preferences are inherently influenced by various factors. In terms of health, baobab is a nutrient-dense fruit that is high in vitamin C, fiber, and antioxidants. Baobab blended yoghurt may be seen as a healthier option. Ginger is known for its anti-inflammatory properties and may offer additional health benefits. Ginger blended yoghurt could appeal to consumers seeking these benefits. Honey is often perceived as a healthier sweetener compared to added sugars or artificial sweeteners. For consumers with dietary restrictions or preferences, such as those following a low-sugar or natural diet, the honey blended yogurt may be a more appealing option compared to flavors with added sugars or artificial sweeteners.

The product related factors encompassing chemical and physical attributes, sensory attributes such as taste, aroma, texture and visual appearance influence preferences (Cazacu et al, 2014). Yoghurt, consumers often choose various yogurt flavors to satisfy diverse needs and it is imperative for food producers and processors to know consumer preferences (Gullo et al., 2019). Baobab has a slightly tart and tangy flavor, while ginger has a spicy, slightly sweet taste. Consumers may prefer one flavor profile over the other. Some consumers may find the combination of baobab and yoghurt more appealing, while others may enjoy the blend of ginger and yoghurt or honey in yoghurt blend more appealing. Baobab pulp in yoghurt can therefore

have additional nutritional benefits to those already contained in the donkey milk yoghurt itself. Honey has been documented to have nutritional and medicinal value such that its addition to yoghurt increases the nutritional value of the yoghurt given the incorporation. Apart from improving the body, texture and flavor of yoghurt honey improves the viability of bifidobacteria which is a probiotic (Ammar, 2015). In this study case of donkey yoghurt, the honey blend has qualities are thought to bolster preferences. Ginger (*Zingiber officinale* Roscoe) is a herbaceous plant widely used as flavoring and herbal medicine for centuries (Anh et al., 2022). It is widely known and used as a spice and flavoring agent in various cuisines around the world owing to its taste, aroma and flavor. It can be used to relieve common health problems such as nausea, pain and vomiting (Li et al., 2019). Many studies corroborate these assertions indicating that ginger has antibacterial and anti-fungal, antioxidant and anti-inflammatory and anti-cancer properties (Crichton et al.,2019). The blending of yoghurt with ginger has been documented to render the yoghurt more functional (Njoya et al., 2018).

Cultural norms also have an influence (Chakona and Shackleton, 2019). This is augmented by Shavitt and Barnes (2020) who state that culture has a deep seating influence shaping the judgements and decisions of consumers. Culture has been defined as values, common traditions and habits that are present in a population group and influence consumer choice (Bahety et al.,2014). Where there is a high culture of uncertainty, products do not always get the best response from the consumers. This is because of risk adverse behaviour by the consumer. The role of culture in consumer decision making differs with contexts (Shavitt and Barnes, 2020). Understanding these factors that impact consumer preferences is fundamental in not only knowing how to improve liking for a novel product like donkey milk yoghurt, but also to get a glimpse of why consumers behave in a certain manner towards a food. The objective of the study was to analyse factors influencing consumer preferences for different blended donkey milk yogurt formulations.

5.2 Material and Methods

The study was done in Beitbridge district in Matabeleland Province in Zimbabwe. Sampling procedure, data collection and analysis have been highlighted in Chapter three. In this chapter, a summary is provided.

5.2.1 Description of study area

The study was conducted in Beitbridge District in Matebeland South Province of Zimbabwe. Chapter three highlighted the description of the study area.

5.2.2 Research Design

The study employed survey-based research design in exploring consumer preferences towards blended donkey milk yoghurt in which a researcher administered pre-tested questionnaire was used to collect data as described in Chapter 3.

5.2.3 Sampling procedure

Convenience (Snowball) sampling was done to identify and sample households that had at least a donkey to participate in the researcher administered questionnaire. Details regarding the sampling procedure are given in Section 3.5 of Chapter 3.

5.2.4 Data collection procedure

A personally administered pre-tested questionnaire was used for data collection. More details concerning data collection procedure are given in Chapter 3 under Section 3.6.

5.2.5 Data analysis procedure and description of variables used in the analysis.

Data was collected using the pre-tested questionnaire and was coded and run in SPSS (version 20) software for analysis. Descriptive statistics was applied and subsequently Multilinear Logistic Model used for analysis. More details on the data analysis method and analytic presentation is given in Chapter 3 Section 3.8.2 while a Mathematical representation of the Multinomial Logistic Regression Model was highlighted in section 3.8.2.2 of Chapter 3.

5.2.6 Challenges encountered during data collect

The community was mostly chiVenda speaking, and translation of the questionnaire needed someone who was both comfortable in English and Chi Venda. That meant the researcher could not function without such a person. That caused delays in data gathering as the person engaged also had other commitments on some of the days. In the end instead of 138 households targeted, the researcher only managed to access 110.

5.3 Results and Discussion

5.3.1. Participants background information.

Table 5.1: Results of respondents background information

Respondents	Sample size (n) = 110			
<i>Variables</i>				
Ward	Ward 6	Ward 8	Ward 9	
	46.4%	22.7%	30.9%	
Gender	Male	Female		
	49.1%	50.9%		
Age	18-30	31-40	41-50	51 & above
	28.2%	31.8%	20.9%	19.1%
Education	None	Primary	Secondary	Tertiary
	10.9%	35.5%	49.1%	4.5%
Main income source	Employment	Cropping	Livestock sales	Remittances
	23.6%	14.5%	51.8%	10.0%
Annual income	Below \$500	\$501-\$1000	Above \$1000	
	7.3%	29.1%	63.6%	
Family size	Less than 3	4 to 6 people	Above 6 people	
	39.1%	21.8%	38.2%	

Table 5.1 below shows background information of the participants. The study targeted 110 households 3 Wards in Beitbridge district to produce valid and reliable information on the in exploring consumer preferences on blended donkey milk yoghurt in Beitbridge.

Table 5.1 above indicate that the respondents were selected from the three specific wards examined in this study. A slightly higher percentage of female respondents (50.9 %) compared to males (49.1%) is reflected. This the gender disparity is consistent with the national gender ratios which depicts more females (52%) than males (48%) according to UNFPA (2022). The age distribution of the respondents shows that the largest group falls within the 31 to 40 years age range accounting for 31.8% of the total. This modal age range 31 to 40 age would ordinarily be the working age group pursuing professional careers in urban areas but considering Beitbridge is a livestock farming community (Matsa and Dzawanda, 2019), this age group

forms the majority of farmers making a living from this lucrative venture accounting for 51.8% of their total income as shown in table 5.1 above.

In addition, the findings of the study reveal that the majority of respondents (49.1%) had completed secondary level education. This was followed by those with primary level education (35.5%), while 10.9% of the respondents had no formal education. A smaller percentage (4.5%) had achieved tertiary education. The findings suggest that individuals in the district have received formal education indicating higher literacy levels.

Formal employment as a source of income was for 23.6% of the respondents, and cropping at 14.5%, with the least being remittances at 10%. In addition, a significant majority of the participants indicated an annual income exceeding \$1000 (63.5%). This suggests that livestock farming proved to be a profitable and sustainable venture. Based on the findings, a significant number of participants have recognised the potential of livestock farming and the sale of its by-products. This suggests that they may be open to considering a business opportunity like blended donkey milk yoghurt in Zimbabwe. The respondents had a range of family sizes, with a majority (39.1%) having less than 3 people. Another significant portion (38.2%) had more than 6 people in their families, while 21.8% fell in the range of 4 to 6 people.

5.3.2 Influence of factors influencing consumer decision on preference on blended donkey milk yoghurt

The section analysed the influence of factors influencing consumer decision on preference on blended donkey milk yoghurt. Multilinear logistical regression was used to analyse data.

Table 5.2 Multilinear Logistic Regression results

Variables	$\ln \left(\frac{P_1}{P_2} \right)$ Honey vs Ginger		$\ln \left(\frac{P_3}{P_2} \right)$ Baobab vs Ginger	
	Coef.	P> z	Coef.	P> z
taste	-0.0897	0.8191	11.5918	0.0461***
education	-0.2692	0.0013***	2.6754	0.0571*
Income	0.2333	0.0001***	-0.0062	0.8492
familysize	-0.2965	0.3322	1.9481	0.1661
age	-0.3591	0.0012***	0.1476	0.0022***
price	-1.3477	0.0042***	-0.0317	0.0081***
male	-2.6750	0.0017***	-0.0269	0.0032***
availability	-1.5219	0.0041***	-0.0853	0.3981
culturalnorm	-0.8758	0.0572	0.0174	0.0243***
conscience	-0.4150	0.3691	-0.2359	0.0031***
Number of observations 110				
LR $\chi^2(34)$ = 471.64				
Pseudo R ² = 0.6232				

Significance $p < 0.05$ ***

The model has a high goodness-of-fit. Pseudo R-squared of 0.6232 indicates that the model explains a substantial portion (62.3%) of the variation in the dependent variables.

5.3.2.1 Demographic factors

Education has a negative coefficient that is statistically significant at the 5% level ($p=0.001$), indicating that higher education levels are associated with a lower ratio of honey to ginger prices. This implies that as education level attained increases, the consumers prefer ginger to honey. This may be attributable to a greater understanding of the unique nature of ginger which participants may consider as having more nutritional value or medicinal potency than honey. Education has a positive coefficient that is marginally significant at the 5% level ($p=0.005$), suggesting that higher education levels may be associated with a higher preference of baobab

to ginger blended yoghurt. According to Bartkiene et al (2019) education significantly influence perceptions regarding healthy eating and therefore food choices and in this case it may be suggested that preferences for ginger and baobab are borne out of the greater understanding of their health and nutritional properties.

Age has a negative coefficient that is statistically significant at the 5% significance level, implying that older individuals tend to have a lower ratio of honey to ginger preference. As people get older, they may begin to consider ginger as more appealing owing to age associated ailments such as cancers. Ginger has anti-cancer, antioxidant and anti-inflammation properties (Nile and Park, 2015; Crichton et al.,2019). The blending of yoghurt with ginger has been documented to render the yoghurt more functional (Njoya et al., 2018).

Being **male** has a negative coefficient that is statistically significant at the 5% level ($p=0.001$), suggesting that males tend to have a lower ratio of honey to ginger than females. This observation is consistent with what is known about males and ginger consumption. Ginger is commonly used for erectile dysfunction and as a circulatory stimulant in older men because it can amplify blood flow to and from organs and tissues. Between baobab and ginger, being male has a negative coefficient that is statistically significant at the 5% level ($p=0.003$) suggesting that males tend to have a lower ratio of baobab to ginger prices. The results show that males prefer ginger to either honey or baobab. The results are consistent with assertions by Feraco et al (2024) who documented significant differences in food preferences due to gender demonstrating specific desires based on gender. It is interesting to note that scholars such as Koduru and Krishna (2023) argue that gender had minimal effect on preferences and willingness to purchase yoghurt. In the case of this study, we sustain the argument that gender has an effect on preferences and argue that food preference is contextual with location playing an important role.

5.3.2.2 Economic factors

Price has a negative coefficient that is statistically significant at the 5% level, indicating that higher prices are associated with a lower ratio of honey to ginger preference. The implication is that as price of yoghurt blends increase, consumers would rather choose ginger than honey. Previous studies by Griffith et al.(2015) and Drewnowski & Monsivais (2020) conclude that price can impact on the nutritional quality of a household as it influences relative affordability of alternative food. Schneider (2018) and Cornelsen (2015) demonstrate that low-income

households a more sensitive to prices and purchase low-income dairy products. Sociodemographic factors are therefore critical in influencing preferences. The fact that ginger remains preferred even at higher price does not necessarily imply that it is only for those of high income. It may also suggest that consumers are willing to sacrifice even the little they have to buy ginger flavor owing to the claimed medicinal properties. However, considering that honey also has sought after nutritional properties (Ammar, 2015), the preference for ginger in this case could possibly be that consumers derive more utility from ginger when prices are higher, *ceteris paribus*. Between baobab and ginger, price has a negative coefficient that is statistically significant at the 5% level ($p=0.008$), implying that higher prices are associated with a lower ratio of baobab to ginger prices. It can be concluded that the yoghurt blends that people are willing to purchase at higher price among the three blends is ginger. This could be due to the perceived medicinal properties that ginger has and a premium can be paid for one to consume ginger blended product.

Income has a positive coefficient that is statistically significant at the 0.5% level ($p=0.0001$), suggesting that higher incomes are associated with a higher ratio of honey yoghurt blend to ginger preference. The implication is that for a more flamboyant community, honey yoghurt blend sells better than ginger. Since the addition of honey to yoghurt increases the nutritional value of the yoghurt given the incorporation of probiotics which assist in digestion and keep the gut healthy (Sarkar and Chandra, 2019; Ammar, 2015), the appreciation for honey may be made based on gut health.

Availability has a negative coefficient that is statistically significant ($p=0.004$), implying that better availability is associated with a lower ratio of honey to ginger. This implies that when both honey and ginger are available consumers go for ginger. The effect of availability on preferences has been studied by Pechey et al (2022) who concluded that that increasing the availability of food options increased preferences for a particular option. Availability may refer to having the donkey milk yoghurt products locally accessible to consumers.

5.3.2.3 Product factors

Taste and baobab preference has a positive coefficient that is statistically at 5% significance level indicating that a stronger preference for taste is associated with a higher ratio of baobab to ginger. The implication is that baobab blend is the preferred blend based on its taste and donkey milk yoghurt consumers seeking taste as a primary expectation would not choose honey

nor ginger. The high vitamin C content of 280–300 mg/100 g is almost six times that of oranges (51 mg/100 g) (Kamatou et al., 2011). This might be contributing to the baobab yoghurt taste likeness by consumers. However, taste had no significance in the choice of ginger and honey. A consumer taking honey or ginger is therefore assumed to be looking for other product qualities such as medicinal effects rather than taste as argued by Sarkar and Chandra (2019) and Li et al., (2019).

5.3.2.4 Social factors

Cultural norm has a negative coefficient that is statistically significant given $p < 0.05$. This implies that stronger cultural norms may be associated with a lower ratio of baobab to ginger ratio. This indicates that the prevailing culture favours ginger. This may be attributable to ginger being part of most meals in the community and in agreement with observations by Okwachi et al. (2017) who posit that food choices are determined by cultural factors traditions, taboos and beliefs. Lindsey (2024) also asserts that in cultural domains, food preferences, consumption habits and distinct culinary traditions are influenced by cultural heritage. Ginger's deeper integration into the traditional culinary practices and beliefs of the community may arise from the appreciation of its antioxidant and anti-inflammation properties (Nile and Park, 2015). The community has propensity to incorporate food stuff that have ginger incorporated in them for health reasons.

5.3.2.5 Health factors

Health conscience has a negative coefficient that is statistically significant given that $p < 0.05$ indicating a stronger sense of conscience associated with a lower ratio of baobab to ginger preference. This implies that consumers seeking healthy eating prefer that their yoghurt be ginger blended. This finding agrees with assertions by Bartkiene et al (2019) that perceptions of healthy eating influences consumers' eating habits and food preferences. However, both ginger and baobab have unique documented health benefits. Ginger has anti-inflammatory, digestive, and potential immune-boosting properties ((Li et al., 2019; Nile and Park, 2015) and baobab has high levels of vitamin C and (Kamatou et al., 2011). This may suggest that preference for ginger may not be solely based on the quest to fulfil health needs but on familiarity, culinary versatility or general personal preferences of ginger over baobab. According to Bartkiene et al (2019) health is just but one among the numerous factors affecting preferences.

5.4 Conclusion

The chapter has looked at an array of factors influencing preferences of consumers for blended donkey milk yoghurt. The products are novel. The predictors being taste, education level, income size, family size, age, price, gender, availability, cultural norms, and health consciousness were tested for their effect on the outcome (yoghurt blend preference). The blended yoghurt preferences could be predicted significantly by price, taste, education level, income size, gender, availability, cultural norms and health consciousness.

The findings suggest that consumer preferences for the different food products are influenced by a combination of socioeconomic characteristics, personal values, and product-specific attributes. Honey is more strongly associated with higher-income while ginger and baobab is relatively more valued by educated consumers. Ginger yoghurt blend shows popularity across diverse factors. Older people, the educated, those who are not limited by price, the healthy consciousness people and availability were proven to be predictors of ginger donkey milk yoghurt preference.

It is imperative to understand these nuanced preference patterns for yoghurt producers, marketers, and food policymakers to craft strategies that better meet the diverse needs and expectations of various consumer segments. This can involve product positioning, marketing communication, pricing, and distribution decisions to optimize the appeal and accessibility of these food products.

5.6 Recommendations

Based on the study results obtained from regression analysis, the following recommendations are proposed.

Demographic factors

- **Education can be increased by** implementing educational campaigns to raise awareness about the nutritional and health value of donkey milk yoghurt blends emphasizing on the individual attributes of each blended product. Signboards and banners can be pitched up in community areas to generate awareness among the people. For ginger and baobab target tertiary institutions and taste seeking consumers.
- **Age** having been shown to have influence on preferences, product marketing should consider targeting specific age groups with the older segment being encouraged to consume the blended donkey yoghurts for managing conditions associated with age such as cancers, diabetes, hypertension. The ginger, baobab and honey have inherent properties that can help in these situations.
- **Male gender** having shown a skewedness towards ginger preference, it is imperative to target males in marketing the ginger yoghurt blend by making it available on the market and positioning it around places where men meet such as various men's fora, Men's Clinics as well as stadia where they frequent for watching sporting matches. Emphasise its health benefits.

Economic factors

- **Price** sensitivity having been shown for Honey and Baobab yoghurt blends, a reasonable pricing strategy to attract price-conscious consumers can be assumed. A premium pricing approach may however be justified for ginger given the higher willingness to pay among the target segments such as the health-conscious cross section of consumers.
- High **income** favour honey yoghurt blends implying that it can be targeted to more flamboyant communities. Considerations can be made to market it at hotels, airports and tourist destinations.

Product factors

- **Taste** having been shown to increase likelihood of choosing baobab, it can appeal more to children's taste preferences and parents would consider it to satisfy the needs of their

children. Targeting schools and children play areas may unlock a better opportunity for baobab

- **Availability.** Ensuring adequate and consistent availability of donkey milk yoghurt across different regions and distribution channels in Zimbabwe to meet consumer demand should be guaranteed. Yoghurt being a perishable, the distribution channel should earmark electrified shops that have refrigerators

Social factors

- **Cultural norms** having been shown to influence preferences, it is recommended that exhaustive market research be instituted in various communities around Zimbabwe to tailor make products according to their preferences and avoid generalisations.

Health factors

- **Health consciousness** has been demonstrated to have an effect on preference on ginger, the product may target consumers seeking healthy eating or who seek to address health problems leveraging on the properties of the blended yoghurts.

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CHAPTER 6

DETERMINE THE CONSUMER PREFERENCES FOR DEVELOPED BLENDED DONKEY MILK YOGHURT PRODUCTS THROUGH SENSORY TASTING.

ABSTRACT

The study sought to determine the consumer preferences for developed blended donkey milk yoghurt products through sensory tasting. In order to achieve this, product development was first done using documented protocols for making yoghurt. Purposely selected 54 consenting volunteers were identified in Beitbridge to participate in sensory evaluation of ginger, honey and baobab donkey milk yoghurt blends. Using a standardised researcher administered questionnaire, data on demographics and blend preferences was collected. Descriptive statistics were used to describe the demographic composition of the participants. Chi-square tests were done to determine the associations between the consumer characteristics and their preferred donkey milk yoghurt blend. Gender was shown to have statistically significant association with liking of ginger ($\chi^2 = 8.276$; $p < 0.05$); baobab ($\chi^2 = 7.721$; $p < 0.05$) and honey ($\chi^2 = 9.382$; $p < 0.05$) blended donkey milk yoghurts. Age also had a statistically significant association with consumer them preferring the ginger ($\chi^2 = 8.276$; $p < 0.05$); baobab ($\chi^2 = 7.721$; $p < 0.05$) and honey ($\chi^2 = 9.382$; $p < 0.05$) blended donkey. There was however no statistically significant association between income, family size and yoghurt eating frequencies. There is need to tailor make yoghurt marketing according to the taste likes of consumers considering critical demographic aspects such as age and gender. Prospective yoghurt production processes should have low costs in order to produce donkey milk yoghurt which is cheaper and affordable.

Keywords: Preferences, Sensory, Evaluation, Age, Gender

6.1 Introduction

Food judgments, such as ratings of food preference, liking, pleasantness, and choice, are influenced not only by the sensory qualities of the food itself, but also by the emotional state (Kaneko et al., 2022). Additionally, existing associations between specific foods and emotions can impact consumer preferences (Cazacua et al, 2014). Donkey milk has gained attention for its potential health benefits (Martini et al., 2021). However, consumer preferences based on actual tasting of donkey milk-based products such as yoghurts is not understood. By assessing consumer liking we can gain insights into the market potential and factors influencing the adoption of this functional dairy product.

Yoghurt is a semi-solid fermented product which is popular globally and is obtained through lactic acid fermentation of milk by lactic acid bacteria known as *Lactobacillus bulgaricus* and *Streptococcus thermophilus* (Madhusudan et al., 2017). Some benefits associated with eating yoghurt have been documented by various scholars. Yoghurt is a source of proteins and minerals. Furthermore, owing to the partial or total hydrolysis of fat, lactose and proteins, yoghurt has desirable digestibility making it recommendable for people with lactose intolerance or milk protein allergy (Njoya et al., 2018; Martini et al., 2021). While donkey milk yoghurt itself is a nutritionally rich product, blending the yoghurt with ginger, honey or baobab potentially makes it more unique. The blending with these herbs was intended to add more potency to the health benefits that can accrue from consumption of the products. El-Sayed and Youssef (2019) posit that fortifying dairy products with herbs adds antioxidative, anti-inflammatory, antidiabetic, antihypertensive and antimicrobial qualities to the nutritional and medicinal values apart from improving the appearance and attractiveness.

The yoghurt can be made according to the modified method of Lee and Lucey (2010). The milk mixed with a stabilizer (cornstarch) is pasteurized by heating at 85-90°C for five minutes in a boiling water bath during which 6.5% (w/v) of sugar is added. The milk is then rapidly cooled to inoculation temperature (42 °C) followed by addition of 2.5% (w/v) yoghurt starter culture (Lyofast Y 259A) comprising *Streptococcus thermophilus* and *Lactobacillus delbrueckii* spp *bulgaricus* in a 1:1 ratio and incubation at 42 °C for 3 hours when the yoghurt is set. The set yoghurt is directly cooled in refrigerator (4 – 6°C for 12h) before manual stirring. After stirring, respective blends can be added, and potassium sorbate added as a preservative. When ready, volunteers can be asked to taste the packaged blended yoghurt.

The objective of this study was to determine the consumer preferences for the developed blended donkey milk yoghurt products namely ginger, honey and baobab.

6.2 Material and Methods

Details regarding the study area, sampling procedures, data collection methods and analysis are described in chapter three. For the purpose of this chapter, only a summary is provided.

6.2.1 Description of study area

The study was conducted in Beitbridge District in Matabeleland South Province of Zimbabwe. Details on the description of the study location are given in Chapter three.

6.2.2 Research Design

Survey research design was used which involved purposively sampling volunteers to taste the donkey milk yogurt blends. A researcher administered pre-tested questionnaire was used to collect data. Details regarding the research design is given in Section 3.3 of Chapter 3

6.2.3 Sampling procedure

Considering that donkey milk yoghurt was not yet known in Zimbabwe, volunteers to taste the blended yoghurts were purposively sampled in 3 Wards in Beitbridge. Details regarding the sampling procedure are given in Section 3.5 of Chapter 3.

6.2.4 Data collection procedure

The study employed a researcher administered pre-tested questionnaire and observation techniques for data collection when participants were asked to taste the donkey milk yoghurt. More details concerning data collection procedure are given in Section 3.6 of Chapter 3.

6.2.5 Data analysis procedure and description of variables used in the analysis

The data that was collected using questionnaire was coded, entered, cleaned and run in Statistical Package for Social Sciences (SPSS Version 20) software. Descriptive statistics was applied, and Chi-square test done to analyse the association between demographic characteristics and preference of blended donkey milk yoghurt More details on the data analysis method and analytic presentation is given in Section 3.8.3 of Chapter 3.

6.3 Results and Discussion

6.3.1 Socio-demographic characteristics

Table 6.1: Demographic characteristics of respondents

Respondents	Sample size (n) = 54			
<i>Variables</i>				
Ward	Ward 6	Ward 8	Ward 9	
	37% (n=20)	27.8% (n=15)	35.2% (n=19)	
Gender	Male	Female		
	51.9%(n=28)	48.1% (n=26)		
Age	18-30	31-40	41-50	51 & above
	33.3%(n=18)	29.6% (n=16)	16.7% (n=9)	24.4%(n=11)
Education	None	Primary	Secondary	Tertiary
	11.1%	18.5%	48.1%	22.2%
Annual income	Below \$500	\$501-\$1000	Above \$1000	
	7.3%	29.1%	63.6%	
Family size	Less than 3	4 to 6 people	Above 6 people	
	39.1%	21.8%	38.2%	

Table 6.1 above shows the demographic characteristics of the respondents. They were more males (51.9%) than females (48.1%) who volunteered to be subjects in the tasting of blended donkey milk yoghurt. The modal age group was 18 to 30 years comprising 33.3% of the sample. It was interesting to note a considerable number (24.4%) of old people (above 51 years) willing to taste the yoghurt. This could be attributable to inherent willingness to try out new things and trust especially considering that the milk used to make the yoghurt had been collected from that community.

In terms of education level, the majority (48.1%) of the participants had attained secondary education. This cross-section of people has according to Cazacua et al (2014) will have better attitudes towards new dairy products as their understanding is reinforced by what they will have learnt. The least (11.1%) had not attended any schooling. Their willingness to try new

products may have been driven by the urge to “become first” in exploring new products from donkeys.

Figure 6.1 below shows the frequency of conventional yoghurt consumption

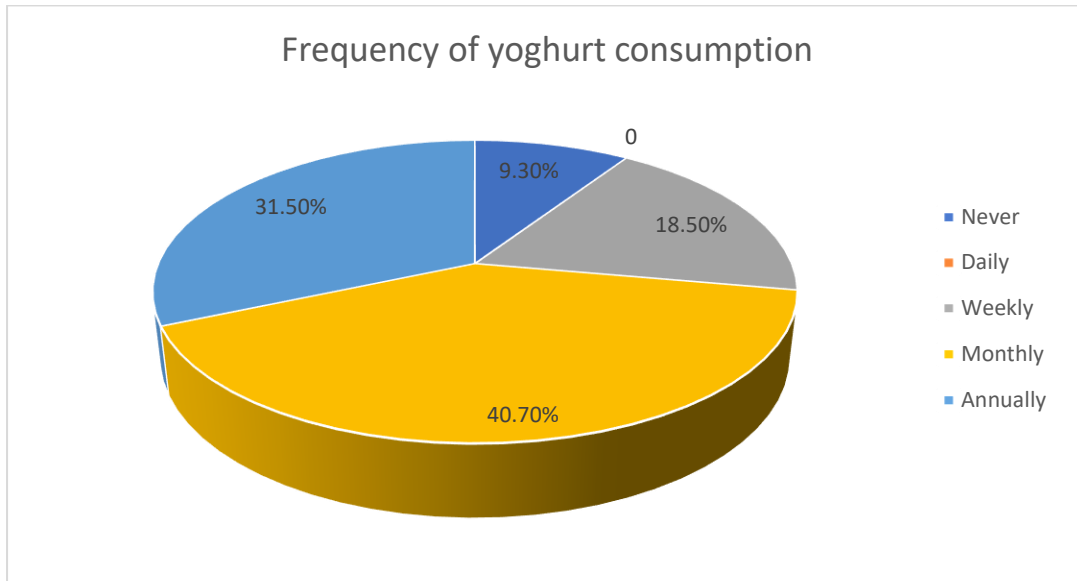


Figure 6.1: Chart showing frequency of conventional yoghurt consumption

The majority of participants (40.7%) consumed conventional yoghurt once a month. None of the participants consumed yoghurt on a daily basis. This is expected especially in a rural area where liquidity is a challenge as well as storage facilities for yoghurt not readily available unless someone has to visit shops every time.

The levels of satisfaction with various donkey milk yoghurt blends are shown in Table 6.2 below.

Table 6.2 Level of satisfaction with various donkey milk yoghurt blends

	Very dissatisfied	Dissatisfied	Unsure	Satisfied	Very satisfied	Mean
Honey Blend	0%	42.9%	32.7%	10.2%	14.3%	2.96
Ginger blend	0%	16.3%	10.2%	22.4%	51.0%	4.08
Baobab blend	6.1%	36.7%	10.2%	32.7%	14.3%	3.12

Very dissatisfied=1; Dissatisfied=2; Unsure=3; Satisfied=4; Very satisfied=5

Ginger blend had the highest mean rating of 4.08, indicating that most participants agreed that they were positive about their experience with the ginger yoghurt blend. This may be due to perceived health properties that ginger has. Honey blend had the lowest mean rating of 2.96, suggesting the least favourable customer sentiment on average. Baobab blend had a moderate mean rating of 3.12. The ginger blend product seems to be the most well-received by customers hence the best performer in the product portfolio. Given 51% of consumers were "Very satisfied", ginger blend strong appeal. Ginger has been known to have medicinal properties and this may be the factor influencing the liking. Ginger has antibacterial, antioxidant, anti-inflammatory and anti-fungal properties (Nile and Park, 2015). Furthermore, it has anticancer properties (Crichton et al., 2019). The blending of yoghurt with ginger has been documented to render the yoghurt more functional (Njoya et al., 2018).

Honey blend is the least favoured product, with a low mean rating of 2.96. Honey Blend may not be meeting customer expectations underperforming compared to customer expectations and may require further investigation or improvements to address the dissatisfaction. However, the fact that honey blend was not popular with consumers does not render honey blend inferior in terms of qualities. Sarkar and Chandra (2019) assert that honey improves the viability of bifidobacteria which is a probiotic that assist in maintaining gut health.

With a mean rating of 3.13, baobab blend occupies middle ground in terms of consumer preferences. Baobab blend reflected a reasonably good performance but with a need for improvement to drive higher consumer satisfaction levels.

The participants who liked ginger stated that they were more interested in its inherent medicinal properties. Those who liked honey stated that they liked its natural sweetness in the yoghurt. Those who liked baobab mentioned that the sour baobab taste was preferable. Ginger was disliked for its sour and pungent taste, while honey blend was disliked for the poor viscosity that it showed. Those who disliked ginger were mostly concerned about the bitterness.

6.3.2 Association between demographic characteristics and preference of blended donkey milk yoghurt

Demographic characteristics were assessed to determine whether they were associated with consumers' preference to a particular blended donkey milk yoghurt. The demographic characteristics analysed included gender, age, and educational level, main source of income,

family size as well as frequency of general yoghurt consumption. The relationship was analysed using chi-square.

Table 6.3 Association between demographic characteristics and blended donkey milk yoghurt

Demographic characteristics (n=110)	Ginger		Baobab		Honey	
	χ^2	ρ	χ^2	ρ	χ^2	ρ
Age	8.276	0.041	7.721	0.050	9.382	0.025
Gender	12.679	0.000	10.666	0.001	10.986	0.000
Income level	0.809	.847	0.227	.973	0.573	.903
Educational level	3.926	.270	3.516	.319	3.813	.282
Family size	0.660	.719	0.086	.958	1.039	.595
Frequency of yogurt consumption	1.938	.585	0.176	.981	1.521	.677

Table 6.3 above indicates that 2 of the demographic characteristics were established to have statistically significant association with each of the 3 blended donkey milk yoghurt. These were **age** and **gender** as they both had p-values which were less than 0.05. Therefore, the results indicate that the consumer's age had a statistically significant association with them preferring the ginger ($\chi^2 = 8.276$; $\rho < 0.05$); baobab ($\chi^2 = 7.721$; $\rho < 0.05$) and honey ($\chi^2 = 9.382$; $\rho < 0.05$) blended donkey milk yoghurts. In terms of age, the propensity towards ginger may arise from the appreciation of the medicinal value and nutrient uniqueness that the ginger brings into the yoghurt. The finding on age may be explained by Chambers et al, (2008) who argue that older participants (aged 60 and above) are more likely to base their food choices on health considerations, while those aged 18 to 30 tend to focus on factors related to food preparation, price, and convenience. With old age, a gradual decline in the sensitivity of taste and smelling (Jeon et al.,2021).

The study also established gender had a statistically significant association with them preferring the ginger ($\chi^2 = 12.679$; $\rho < 0.05$); baobab ($\chi^2 = 10.966$; $\rho < 0.05$) and honey ($\chi^2 = 10.986$; $\rho < 0.05$) blended donkey milk yoghurts. On the other hand, the rest of the remaining demographic characteristics namely income level; educational level; family size & frequency

of general yoghurt consumption were all established not to have a statistically significant relationship with their taste perceptions for any of the 3 donkey milk yoghurt blends. The finding contrast with Possa et al (2015) who showed that in Brazil income level and education level had effect on dairy product preferences. This discrepancy may be assumed to come from the different geographical study areas focused on by the respective studies.

6.3 Conclusion

The study sought to determine the consumer preferences for the three developed blended donkey milk yoghurt products through sensory tasting. The most preferred yoghurt blend was ginger. The results suggest that age and gender are important demographic characteristics that differentiate the Ginger, Baobab, and Honey groups, while income level, educational level, family size, and frequency of yogurt consumption did not appear to be significantly associated with perceived taste of yoghurt. The findings are useful in segmenting the donkey milk yoghurt taking into consideration age and gender dynamics

6.4 Recommendations

Segmentation of market by age and gender

- Considering that age has been shown to impact on yoghurt blend preferences, it is ideal to specifically market the yoghurt blends to old people who appreciate the health benefits of blended donkey milk yoghurt. As for the young age cross section, there is need to develop the market so that they get to appreciate the health benefits associated with blended donkey milk yogurts.
- Marketing should also be sensitive to gender sub-group in terms of method of delivery and content. Emphasis on the unique health and nutritional benefits of donkey milk yoghurt in the product positioning and marketing communications.

Optimise the most preferred yoghurt blend formulations:

- Ginger and Baobab being the most preferred blends it is important to optimise their packaging, taste, texture, and nutritional profile. Regular consumer testing and sensory evaluations should be made to identify areas for further product refinement and innovation. At the same time looking honey yoghurt blend may be improved by focussing on the factors that contributed to it being unliked such as viscosity.

Price considerations

- Although study gave indications on the preferred yoghurt blends, affordability may be a concern especially for the rural people whose income base is weak. Considering that the reported frequency of convectional yoghurt consumption is low and more skewed around once per month, this reflects that affordability has to be addressed in order for consumers to enjoy the benefits of yoghurt. A careful look into the prospective production process with a view of reducing the cost of production and make yoghurt more affordable should be done.

6.5 References

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CHAPTER 7

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The broad objective of the study was to explore consumer preferences on blended donkey milk yoghurt in Zimbabwe. Descriptive statistics, 5-point Likert scale, Chi-square tests for association, KAP analytic framework, Spearman correlation and multilinear logistic regression analysis were approaches used to analyse the specific objectives of the study. The results from a sample of 110 conveniently sampled participants who were surveyed using a pre-tested structured questionnaire are explained as stated in Chapter 4 and 5. For Chapter 6, the results relate to the sensory tasting of donkey milk yoghurt blends in which 54 volunteering participants were purposively sampled. Within the same results chapters, discussion of the results and conclusions of the study were done. Finally, this chapter summarises, concludes, makes policy recommendations while identifying areas for further research.

7.2 Research summary

Chapter one of the study encompassed introduction, problem statement, objectives, research questions, justification and outline of the thesis. Literature review was done in Chapter two. Chapter three described the methodology and covered study site, research design, sampling procedure, data collection procedure, data analysis, ethical considerations and finally the summary of the methodology chapter.

Chapter four, five and six were results chapters for each objective. Chapter four was to evaluate consumer knowledge, attitudes and practices towards donkey milk products in Zimbabwe. One hundred and ten participants were conveniently sampled (snowball sampling) from 3 wards in Beitbridge for cross-sectional household survey. KAP analysis framework, followed by

Spearman rank correlation were used to evaluate the possible association between knowledge-practices (K-P), knowledge-attitudes (K-A), and attitudes-practices (A-P).

Knowledge variables assessed the extent to which participants knew about donkey milk products as well as the nutritional and medicinal properties which each of the ginger, honey or baobab has. On average, the knowledge variables analysed revealed that participants had positive knowledge on donkey milk products such as yoghurt. The variable with the highest positive perception was on baobab that has medicinal properties. The variable with the lowest positive perception was on eating yoghurt helping in maintaining gut healthy. Participants had positive knowledge on donkey milk yogurt.

Practices variables revealed whether or not donkey milk products were commonly consumed in the community and any previous experiences with consumption of donkey milk yoghurt. On average, the practice variables analysed revealed that participants had consumed donkey milk before although this was not common practice in the community. The variable with the highest positive perception was previous consumption of donkey milk and variable with lowest positive perception was on the commonness of donkey milk consumption in the community. Attitude variables characterised participants inclination towards willingness to purchase, consuming and recommending for consumption the donkey milk products. On average, the attitude variables analysed revealed that participants interviewed had negative attitudes towards consuming donkey milk products. The variable with the highest positive perceptions was impression about donkey milk products. The variable with the lowest positive perception was on recommending donkey milk products recommended to friends and family. Spearman rank correlation was then used to evaluate the possible association between knowledge-practices (K-P), knowledge-attitudes (K-A), and attitudes-practices (A-P) on women's perceptions in the utilisation of maize metal silo technology in the district. There were strong positive correlations between K-P, K-A, and A-P respectively in the variables.

Chapter five sought to analyse factors influencing consumer preferences for different blended donkey milk yogurt formulations. A 5-point Likert scale ranging from "strongly disagree" to "a strongly agree", followed by multinomial logistic regression to analyse the influence of factors influencing consumer decision on choices of yoghurt blends. Data was analysed using SPSS software version 20. The results show that demographic factors such as higher education levels may be associated with a higher preference of baobab to ginger blended

yoghurt($p=0.005$). Honey yoghurt blend was more preferred to ginger when consumers are of higher income levels. Also, in terms of age, older individuals tend to have a lower ratio of honey to ginger preference while being male tend to make one prefer ginger blend. The regression did not show any significant effect of family size on preferences of yoghurt blends. The findings suggest that consumer preferences for the different food products are influenced by a combination of socioeconomic characteristics, personal values, and product-specific attributes. Honey is more strongly associated with higher-income and female consumers while baobab is more valued by educated consumers. Ginger yoghurt blend preference could be predicted by all except a few factors. Older people, the educated, those who are not limited by price. Health consciousness and availability were proven to be predictors of ginger donkey milk yoghurt preference.

Chapter six presents result of the consumer preferences for developed blended donkey milk yoghurt products through sensory tasting. Some purposively selected volunteering participants ($n= 54$) tasted the three blends of donkey milk yoghurt (Baobab, Ginger and Honey). After tasting, they responded to a researcher administered questionnaire to rank their levels of satisfaction for each tasted blend. A 5-point Likert scale from “very dissatisfied” to “very satisfied” was used. The subjects then stated their most preferred and most disliked donkey milk yoghurt blend. Chi-square test for association was used to check association between blend preferences and demographic features. Age had a statistically significant association with preferring the ginger ($\chi^2 = 8.276$; $p<0.05$); baobab ($\chi^2 = 7.721$; $p<0.05$) and honey ($\chi^2 = 9.382$; $p<0.05$) blended donkey milk yoghurts. Gender had a statistically significant association with preferring the ginger ($\chi^2 = 12.679$; $p<0.05$); baobab ($\chi^2 = 10.966$; $p<0.05$) and honey ($\chi^2 = 10.986$; $p<0.05$) blended donkey milk yoghurts. Other demographic characteristics (main source of income; educational level; family size & frequency of general yoghurt consumption) did not to have a statistically significant relationship with their taste perceptions for any of the 3 donkey milk yoghurt blends

Chapter seven was on summary of the study findings, conclusions and recommendations of the study based on the study findings.

7.3 Conclusions

Donkey milk yoghurt blends are a novel product in Zimbabwe. In order to strategically introduce the products to the market it was necessary to appreciate the preferences of

consumers towards them. It was, however, imperative to understand the various the baseline knowledge, attitudes, practices of consumers towards donkey milk products in Zimbabwe considering that these tend to affect preferences. While there was considerable knowledge about donkey milk products as well as the unique medicinal and nutritional contribution from ginger, honey or baobab, the attitudes and practices revealed otherwise. Considering that participants hailed from Beitbridge, a border District with Botswana and South Africa where donkey products are acceptable in the food chain, it is possible that knowledge was obtained through participants' interactions with foreign cultures but back at home not practising the same owing to cultural set ups and the commonly held taboos.

Understanding the underlying factors that affect consumer preferences towards donkey milk yoghurt blends was therefore pursued in Chapter 5 which revealed that demographic factors (age, gender, education, income level), social factors (cultural norms), economic factors (price, availability), health factors (health consciousness), product related factors (taste) had some effect on preferences of donkey milk products.

The sensory tasting done on the three donkey milk yoghurts suggested that age and gender are important demographic characteristics that differentiate the Ginger, Baobab, and Honey liking, while income level, educational level, family size, and frequency of yogurt consumption did not appear to be significantly associated with perceived taste of yoghurt. Overall, the most preferred blend was ginger followed by baobab while honey was the least liked. The findings are useful in segmenting the donkey milk yoghurt taking into consideration age and gender dynamics

7.4 Policy implication and recommendations

- Government should integrate donkeys in its Animal Health programmes so that they too can receive veterinary care. Healthy lactating donkeys will produce more milk for to channel to yoghurt production.
- Furthermore, need for developing clear quality standards and regulations tailor made for ensuring donkey milk yoghurt upholds food safety standards for product consistency and consumer confidence.
- Policy should be in place to improve rural livelihoods through sustainable exploitation of donkeys for milk. This can be achieved through rural people participation in the donkey milk value chain such as establishment of milk collection centres, provision of

incentives for setting up small scale donkey milk yogurt industries. Government and Non-governmental organisations (NGO) can establish system financing for training, and infrastructure to small-scale producers and processors.

- Dissemination of information aimed at awareness creation for consumers to be alerted of the availability of blended donkey milk yoghurt which are nutritionally and medicinally valuable as well as available opportunities to market ginger, baobab and honey. This can be done through community radios.
- Dietary education through introducing alternative food sources into the education curricular so that knowledge is inculcated from a young age
- Strengthening extension trainings in rural donkey keeping communities through which ideas and experiences can be shared about good donkey husbandry to sustain donkey milk supply chain
- Cultural exchange programmes which involve community leaders and college students between Zimbabwe and Botswana to have Expos showcasing their products and traditions.
- Explore export opportunities: Based on the study findings, assess the potential for exporting blended donkey milk yogurts to regional or international markets, and provide support for producers and exporters.

7.5 Areas for further research

- Given that yoghurt manufacturing needs a consistent and effective milk supply chain, a study to determine the capacity of local donkey farmers to produce milk, factoring the breed of donkeys local available, is recommended.
- A study to evaluate feasibility of exporting donkey milk yoghurt is also recommended so that excess yoghurts in Zimbabwe can find a market elsewhere.

APPENDICES

APPENDIX I

INTRODUCTORY LETTER FOR QUESTIONNAIRE

My name is Erick Mutizhe . I am a student at Bindura University of Science Education (BUSE). I am doing MSc in Food Security and Sustainable Agriculture. I am conducting a reseach for my thesis entitled: “*Exploring consumer preferences on blended donkey milk yoghurt in Zimbabwe*”.

The purpose of this questionnaire is to gather opinions of respondents concerning preferences of consumers on blended donkey milk yoghurt. This research is purely for scholarly purposes therefore, all information you will provide will be treated with utmost confidentiality.

Should you want to get more clarification do not hesitate to contact me on 0772 956 933 or email on vetmutizhe@gmail.com. I wish to thank you in advance for your assistance and cooperation

APPENDIX 11

QUESTIONNAIRE

EXPLORING CONSUMER PREFERENCES ON BLENDED DONKEY MILK YOGURT IN ZIMBABWE

All information provided by you (interviewee) will be treated as STRICTLY CONFIDENTIAL for mutual benefit of both the researcher and the respondents.

Questionnaire Number..... Ward Number.....
 District Province.....
 Date Name of Farm/Village/Town

SECTION A: Background Information:

Instructions: Please select the answer by placing an (X) in the box with the most appropriate option for you

Variable	Category	Tick applicable
Gender	Male	
	Female	
Age (years)	18-30	
	31-40	
	41 - 50	
	51 and above	
Highest level of education attained	None	
	Primary	
	Secondary	
	Tertiary	
Main source of income	Employment	
	Cropping	
	Livestock sales	
	Remittances	
	Others (Specify)	
Annual Income level in \$USD	Below \$500	
	\$501-\$1000	

	Above \$1000	
Family size	Less than 3 people	
	4-6 people	
	Above 6 people	

SECTION B, OBJECTIVE 1: TO EVALUATE CONSUMER KNOWLEDGE , ATTITUDES AND PRACTICES TOWARDS DONKEY MILK PRODUCTS IN ZIMBABWE

B1. How often do you consume yoghurt in general. (Tick appropriate box)

Daily []
 Weekly []
 Monthly []

Knowledge, attitudes , and practices towards donkey milk products (Tick Yes or No in the table below)		
	YES	NO
# PRACTICES VARIABLES		
B2. Are you a donkey owner		
B3. Have you consumed any donkey milk products before?		
B4. Are donkey milk products commonly consumed in your community?		
#KNOWLEDGE VARIABLES		
B5 Do you know any donkey milk derived products		
B6. Do you consider donkey milk products to have nutritional properties?		
B7. Does eating yoghurt help in maintaining gut healthy?		
B8. Does honey have healing properties?		
B9. Does ginger have medicinal properties?		

B10. Does baobab have medicinal properties?		
B11. Does blending donkey milk yoghurt with herbs make it more nutritionally rich?		
# ATTITUDES VARIABLES		
B12. Would you recommend donkey milk products recommended to friends and family?		
B13. If you had the opportunity to access donkey milk yoghurt, would you be interested in consuming it		
B14. Are you more likely to purchase donkey milk products next time you go shopping?		
B15. Overall, do you have a positive impression about donkey milk products?		

Annually []
Never []

B16. If you responded NO to B13 above is there a reason why you would not consume donkey milk yoghurt. (Explain your answer)

.....

SECTION C. OBJECTIVE 2: TO IDENTIFY FACTORS INFLUENCING CONSUMER PREFERENCES FOR DIFFERENT BLENDED DONKEY MILK YOGURT FORMULATIONS.

Instructions: Please indicate whether the following factors influence your decision to purchase the different blended donkey milk yogurt formulations.

C1. What factors influence your decision to purchase Ginger yoghurt blend? (Tick applicable)

Instructions: Please select the answer by placing an (X) in the box with the most appropriate option for you

	GINGER BLEND	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Economic Factors					
C1a.	I prefer ginger blend only if it is priced well					
C1b.	I prefer ginger blend only because if it is available					
	Product Factors					

C1c.	I prefer the ginger blend because of its good taste attributes					
C1d.	I prefer the ginger blend because of nutritional value					
	Health factors					
C1e.	I prefer the ginger blend because ginger has healing properties					
C1f.	I prefer the ginger blend because I am health conscious					
	Cultural Factors					
C1g.	I will prefer ginger blend only if friends and family prefer it					
C1h.	I will never prefer ginger blended donkey yoghurt due to taboo on donkey products					

C2. What factors influence your decision to prefer baobab yoghurt blend?

Instructions: Please select the answer by placing an (X) in the box with the most appropriate option for you

	BAOBAB BLEND	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Economic Factors					
C2a.	I prefer baobab blend only if it is priced well					
C2b.	I prefer baobab blend only because if it is available					
	Product Factors					
C2c.	I prefer the baobab blend because of its good taste attributes					
C2d.	I prefer the baobab blend because of nutritional value					
	Health factors					
C2e.	I prefer the baobab blend because ginger has healing properties					
C2f.	I prefer the baobab blend because I am health conscious					
	Cultura Factors					

C2g.	I will prefer baobab blend only if friends and family prefer it					
C2h.	I will never prefer baobab blended donkey yoghurt due to taboo on donkey products					

C3. What factors influence your decision to prefer honey yoghurt blend?

Instructions: Please select the answer by placing an (X) in the box with the most appropriate option for you

	HONEY BLEND	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Economic Factors					
C3a.	I prefer honey blend only if it is priced well					
C3b.	I prefer honey blend only because if it is available					
	Product Factors					
C3c.	I prefer the honey blend because of its good taste attributes					
C3d.	I prefer the honey blend because of nutritional value					
	Health factors					
C3e.	I prefer the honey blend because ginger has healing properties					
C3f.	I prefer the honey blend because I am health conscious					
	Cultural Factors					
C3g.	I will prefer honey blend only if friends and family prefer it					
C3h.	I will never prefer honey blended donkey yoghurt due to taboo on donkey products					

SECTION D, OBJECTIVE 3: TO DEVELOP BLENDED DONKEY MILK YOGHURT FOR CONSUMER AFFECTIVE TESTING.

D1. Using the satisfaction scale of 1 – Very dissatisfied; 2 – dissatisfied; 3 – unsure; 4 – satisfied; 5 – Very satisfied, kindly rate your level of satisfaction with the 3 yoghurt products tested

	Blend	Very dissatisfied	Dissatisfied	Unsure	Satisfied	Very satisfied
D1a.	GINGER					
D1b.	BAOBAB					
D1c.	HONEY					

D2. After tasting, what is your most preferred yoghurt blend among the 3 flavors (Ginger, Baobab or Honey)

.....

D3. Explain what you liked about the blend in D2 above

D4. After tasting, what is your most disliked yoghurt blend among the 3 flavors? (Ginger, Baobab or Honey)

.....

.....**D5.** Explain why you disliked the blend in D4 above

.....

D6. would you have access to refrigeration for yoghurt?. *Clarify.*

.....

End of Questionnaire-

APPENDIX III

Yoghurt Starter Culture



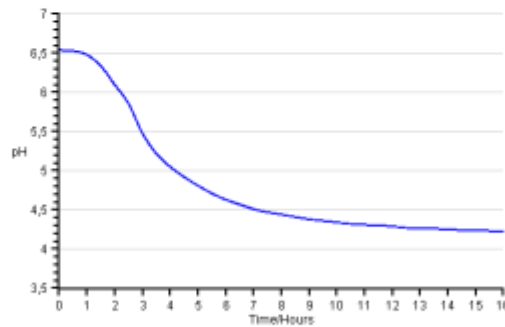
Lyofast Y 259 A

Description Lyofast Y 259 A consists of specifically selected strains of *Streptococcus thermophilus* producing EPS and a low content of *Lactobacillus delbrueckii* ssp. *bulgaricus* to ensure a uniform and controlled production of mild set and stirred yoghurt with medium viscosity. Lyofast Y 259 A is especially designed for production of very mild set yoghurt with very fast fermentation and firm set not acidifying very low and not giving much post-acidification.

Application Sprinkle the culture powder directly into process milk under aseptic conditions ensuring that the culture is well dispersed by gentle stirring. The following may be used as inoculation guidelines:

Product	UC/100 l	Product	UC/100 l
Yoghurt, short set	2.0-3.0	Yoghurt, long set	0.5-1.0

Acidification information Standardised laboratory acidification test is conducted in milk powder, reconstituted at 9%, at defined temperature. Acidification profile: inoculation level corresponding to 0.5 UC per 100 litres milk. Standard activity: expressed as temperature/time/pH relations: 43°C/7 hours/pH 4.5 ± 0.15 (blue line).



Culture information Data are obtained under standardised laboratory conditions, and consequently, should be considered as guidelines.

Optimal temperature for growth	43 °C	Aroma formation for yoghurt	+ (+)
Acidification capability	pH 4.2	Texture formation	3x1.5 sec/g

Storage Unopened pouches should be kept below -17°C.

Package data The freeze-dried culture is packed in waterproof and airproof aluminium pouches. The packaging material is food grade.

M01Y259A/0L/K0

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Rev 0 of 09/03/2016

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APPENDIX IV: Labels &Packaging of Honey blended donkey milk yoghurt



APPENDIX V: Labels &Packaging of Ginger blended donkey milk yoghurt



APPENDIX VI: Labels &Packaging of Baobab blended donkey milk yoghurt



APPENDIX VII: LABORATORY RESULTS

Aglabs Centre <aglabs01@gmail.com>
to me, Norman, Nathaniel, Antony, Martin, Rudo, Douglas ▾

Wed, May 8, 11:50 AM ☆ ☺ ↶

Please review the attached results for your raw milk and products and acknowledge receipt.

Warm Regards

Brighton T

--
Agrianalysis Centre Private Limited
Agricura House
62 Birmingham Road, Southerton
Harare
Tel/Fax: +263-4-665254/56
E-mail: aglabs01@gmail.com

Activate Windows
Go to Settings to activate



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 Tel: 0772 956 933

Lab No: 10414
 Invoice no:
 Sample Type: Raw Milk, Yoghurt
 Date in : 02/05/2024
 Date out: 08/05/2024
 Date tested: 02-08/05/2024

#	Sample Description	Sample Code		Sample Volume		BF	PROT	LACT	T/S	SNF	TBC	COLI	E coli	Y&M	LA	pH	Salt	SCC
		MNF	BB	Actual	ID	%	%	%	%	%	x10 ⁷ /ml	x10 ⁷ /ml	x10 ⁷ /ml	%	%	%	%	
4 x Yoghurt																		
10414/1	Ginger	-	-	-	-	-	-	-	-	-	-	<1	-ve	1	-	4.75	-	-
10414/2	Baobab	-	-	-	-	-	-	-	-	-	-	<1	-ve	<1	-	4.22	-	-
10414/3	Honey	-	-	-	-	-	-	-	-	-	-	<1	-ve	<1	-	4.58	-	-
10414/4	Plain	-	-	-	-	-	-	-	-	-	-	<1	-ve	<1	-	5.05	-	-
1 X Raw Milk																		
10414/5	Raw Milk	-	-	-	-	0.27	1.83	5.32	7.20	1.88	13	-	-	-	-	-	-	6

KEY: TNTC - Too numerous to count

Approved by: B Chinouya, Team Leader, N. Karonga, Laboratory Manager. Date: 08/05/2024
 Authorised by: [Signature] Date: 08/05/2024





