FACTORS INFLUENCING NUTRITIONAL AWARENESS, PERCEPTIONS AND CONSUMPTION OF RABBIT MEAT AMONG HOUSEHOLDS IN NJORO SUB-COUNTY, KENYA

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A Thesis Submitted to the Graduate School in Partial Fulfilment of the Requirements for the Master of Science Degree in Agribusiness Management of Egerton University

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DECLARATION AND RECOMMENDATION

Declaration

This thesis is my original work and has not been presented in this University or any other for the award of a degree.

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DEDICATION

This work is dedicated to my father Bernard Muchira Gutu, my mother Rebecca Muthoni Muchira, my lovely sisters Deborah Wanjiru and Rose Wairimu, my nephews Sydney Olwako and Liam Kamanu for their relentless support in this long academic journey.

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ABSTRACT

Globally, the livestock sector is undergoing a transformation driven by rapid urbanization, population growth and increasing incomes. This has led to the rising demand for sustainable and healthy protein sources. Rabbit meat has been highlighted as a nutritious food option. Its high protein, low cholesterol, and rich mineral content, makes it a potential alternative to conventional meats such as beef, pork, and poultry. Despite its advantages, consumption remains low in Kenya due to limited nutritional awareness, negative consumer perceptions and other socioeconomic and demographic factors. The specific objectives of this study were to identify factors influencing nutritional awareness, perceptions of rabbit meat and determine factors influencing consumption of rabbit meat among households in Njoro Sub-County, Kenya. Data from 186 households in three wards (Njoro, Kihingo, and Mauche) were collected using face-to-face interviews. A multistage approach consisting of purposive, simple and systematic random sampling methods was used to select households. Multivariate probit regression, ordered probit regression analysis and the double hurdle model were employed for analysis using SPSS 16 and STATA 27 software. The results of the study indicated that education, marital status, occupation, and age significantly influence households' nutritional awareness of rabbit meat. Households perceived rabbit meat favorably regarding taste, smell, nutrition, and preparation time, but noted concerns about its affordability and accessibility. Age, education, awareness, income, and location significantly influenced overall perceptions of rabbit meat. Factors that influenced initial decision by households for rabbit meat consumption were awareness on nutritional value, age, education level, knowing a rabbit keeper, distance to market and taste. Age, household size, distance to market, affordability and location significantly influenced the consumption per capita of rabbit meat by households. The study concluded that rabbit meat was perceived positively for its taste, nutrition and ease of preparation while its consumption was constrained mainly by affordability and accessibility. To boost rabbit meat consumption, the study recommends awareness campaigns with a focus on younger individuals. Regional disparities on rabbit meat perception call for location-specific outreach, while improved distribution networks and pricing incentives can enhance accessibility and affordability. Further research should explore how sensory attributes and preparation methods influence acceptance across demographic groups.

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LIST OF ABBREVIATIONS AND ACRONYMS

AU	African Union
CIDP	County Integrated Development Plan
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
KALRO	Kenya Agricultural and Livestock Research Organization
KNBS	Kenya National Bureau of Statistics
Ksh	Kenya Shillings
NACOSTI	National Commission for Science, Technology and Innovation
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
SSA	Sub-Saharan Africa
UMT	Utility Maximization Theory

CHAPTER ONE
INTRODUCTION

1.1 Background information

Global animal production systems have undergone major shifts due to the livestock revolution, which had played a key role in enhancing food security and supporting economic growth across many countries. The 'Livestock Revolution' paradigm, as outlined by Pica-Ciamarra and Otte (2011), rests on the interaction of urbanization, population growth, and rising incomes, which together fuel rapid increases in demand for animal-derived foods in developing nations, with major implications for global opportunities and risks. This rising demand is not only transforming production systems but also reshaping consumption patterns. Consumers, particularly in urban areas, are increasingly concerned with the nutritional quality, safety, and health implications of their meat choices. As a result, understanding the drivers behind consumer preferences and behaviors regarding animal-sourced foods, especially emerging options like rabbit meat has become a crucial area of research and policy interest (FAOSTAT, 2018; Thornton, 2010).

Rabbit meat has gained attention in recent years due to its nutritional value, affordability, and ease of production (Nkukwana *et al.*, 2014).The meat is regarded as a healthy food owing to its high contents of proteins, polyunsaturated fatty acids, essential amino acids, along with its moderate energy values and relatively low fat and cholesterol content, particularly vitamin B12 (Dallezotte & Szendro, 2011). It contains abundant phosphorus and relatively little amount of sodium, with selenium levels influenced by the type of supplementation provided. Owing to its richness in bioactive elements such as linoleic acid and antioxidants, rabbit meat has been classified as a functional food. Bioactive compounds in rabbit meat have been shown to reduce gastrointestinal inflammation and oxidative stress, resulting in positive effects on human digestion and immunity (Dallezotte & Szendro, 2011).

Nistor *et al.* (2013) did a comparative analysis of rabbit meat chicken, beef and pork where he found that rabbit meat contained greater amount of phosphorus (347mg/100g) and calcium (21.4mg/100g) than the other domestic meat varieties. Rabbit meat also had the lowest amount of fat (9.2g/100g) and cholesterol (56 mg/100 g). Beef had the greatest quantity of cholesterol with 114.5mg/100g which is almost double the amount in rabbit meat. In the era where people are conscious about what they consume and prefer foods with less cholesterol level and fat level to prevent contraction of lifestyle diseases, rabbit meat consumption is therefore an option to consider. As a result of rabbit meat's superior nutritional qualities, nutritionists in Europe

continue to advocate for its consumption. According to Petracci *et al*. (2018) there are further currently ongoing research efforts to improve rabbit meat's nutritional value.

On a worldwide scale, consumption of rabbit meat represents a mere 0.19% of total meat intake per capita. In 2017, people around the world consumed rabbit meat at an estimated amount of 1.7 million tonnes, marking a 2.9% rise from 2016 (Zoltan *et al*., 2017) . From 2007 to 2017, overall consumption rose by an average of 2.8% per year (Zoltan *et al.*, 2017). The study by Cullere and Dallezotte (2018) reported that rabbit meat is not widely consumed globally and is largely confined within the Mediterranean nations such as Italy, France, Algeria and Egypt, among others.

In their study on Spanish consumers, Petrescu *et al*. (2018) observed that rabbit meat was consumed far less frequently than chicken or pork, 2.2 times less than chicken and 1.8 times less than pork. The limited availability of rabbit meat was largely restricted to household production, small farms, and a few urban supermarkets. This was seen as a major reason for this gap. When evaluating their choices, consumers highlighted health, taste, and price as the most influential factors, with rabbit meat rated as the healthiest option among all the meats assessed. However, the promotion and consumption of rabbit meat was hampered by the perception that it was more expensive yet tastier than other types of meat.

In a survey by Sanah *et al*. (2020) on meat consumption preference in East Africa, The most preferred meat was sheep, followed by beef, poultry meat and rabbit meat was placed in fourth overall chosen by 14% of consumers. Goat meat was ranked the least chosen by 8% of consumers.

In Benin, Adanguidi (2020) found that fish accounted for the highest household expenditure on meat, while rabbit ranked fourth in terms of expenditure. In contrast, when measured by preference, rabbit meat was placed second after indigenous chicken. Despite being favored more than goat and fish on preference, actual consumption remained modest. This was mainly attributed to rabbit meat's price which was higher than other local meat options. In Kenya, urban areas such as Nairobi and Mombasa account for a significant share (75%) of formal meat market transactions (Kenya Market Trust, 2019). Meat consumption decisions in households within these areas are largely influenced by their income budget. However, this does not mean rural households consume less meat overall; rather, many rural families rely on backyard or small-scale livestock production, especially for poultry and goats, for subsistence consumption. This means the meat is produced and consumed within the household (Kenya Market Trust, 2019). Beef consumption surpasses all the other meat varieties in Kenya with 17kg per capita consumption per year followed by chicken with 1.70kg per

capita per year making it the most preferred white meat due to its perceived health benefits and accessibility., particularly among high-income households that favor white meat over red meat (Helgi Library, 2021; Kenya Market Trust, 2019).

In contrast, rabbit meat consumption remains negligible at approximately 0.008 kg per person annually, underscoring its marginal position in the national meat consumption profile. White meat, being pricier in the market, is predominantly consumed by upper-income families. According to a report by Kenya Market Trust (2019), 96% of high-income families consume chicken, followed by 88% of middle-income and 82% of low-income households. Fish was ranked as the second most consumed meat among high-income households, with beef and goat meat following. However, rabbit meat is less commonly consumed within this group. These patterns highlight the complexity of meat consumption dynamics across different household settings.

Through a number of projects and programs, the Food and Agriculture Organization of the United Nations (FAO) has promoted rabbit meat production and consumption globally. The FAO has developed guidelines on rabbit production that include technical details on rabbit keeping and meat production. The organization also urges people to eat rabbit meat as a nutritious and environmentally friendly protein source (FAOSTAT, 2018). However, while production strategies are well documented and supported, consumer-focused interventions remain limited. Uptake of rabbit meat in regular diets, particularly in developing countries, remains low (Adanguidi, 2020; Petrescu *et al*., 2018).

Several policies, initiatives, and programs have been introduced in Africa to encourage the consumption of rabbit meat. The African Union (AU) has been promoting rabbit production and consumption with the goal of improving food security and support sustainable agriculture. African Rabbit Association was founded by the AU with the goal of promoting rabbit production and consumption throughout the continent through research, training, and awareness campaigns (Jaiyebo & Ajayi, 2021). However, much of the attention has remained skewed toward supply-side improvements, while demand-side factors like consumer education, cultural perceptions, and market development have received minimal focus (Jaiyebo & Ajayi, 2021).

The Kenyan government in partnership with German International Development Agency had an initiative called The National Rabbit Development Agency whose efforts were to promote the raising of rabbits and consumption of rabbit meat. The National Rabbit Development Agency helped rabbit farmers by offering training, financial assistance, extension services and raised awareness on the nutritional value of rabbit meat (Mbutu, 2013). The

Kenyan National government also set up the National Breeding Centre in Ngong Veterinary farm to provide breeding materials to the farmers countrywide and also organize seminars monthly to educate the farmers on the best farm management practices and how to earn from rabbit keeping. Despite the efforts put in place, consumption of rabbit meat remained hindered by socio-cultural factors whereby rabbit production and consumption was considered an activity for the young boys (Mbutu, 2013). Several multiplication centers were established across the country, but due to low farmer participation, most centers were eventually closed, with only the National Raabbit Conservation and Training Institute Centre in Ngong remaining operational. (Mbutu, 2013).

The potential of rabbit meat in numerous developing nations is yet to be fully realized, with these countries producing under 20% of the global supply. Most of the existing research on rabbits, particularly in the developing countries, has concentrated on production aspects (Adanguidi, 2020). In contrast, limited attention has been given to consumption patterns, despite the documented nutritional advantages of rabbit meat relative to other meat varieties, thereby underscoring the need for this study in Kenya (Adanguidi, 2020). There is scarce information on consumption of rabbit meat despite its health benefits over other types of meat, hence the reason for this study in Kenya. This consumption gap underscores the need for this study, which seeks to explore why rabbit meat has not achieved widespread adoption in Kenyan households, despite its documented nutritional and environmental advantages (Jaiyebo & Ajayi, 2021).

Consumer awareness and perception are crucial factors in shaping dietary choices, especially when dealing with non-conventional meat sources such as rabbit meat. Awareness involves knowledge of the product's existence, availability, and attributes, including nutritional value and health benefits (Petrescu *et al*., 2018). Perception refers to the attitudes, beliefs, and personal evaluations individuals hold toward a product, which are often shaped by cultural norms, social influences, and past experience (Sanah *et al*., 2020). For rabbit meat, low awareness of its nutritional properties and negative or unclear perceptions such as beliefs that it is exotic, expensive, or culturally inappropriate may significantly hinder its acceptance, regardless of availability or affordability (Petrescu *et al*., 2018). Prior research in other contexts has shown that even when healthy foods are accessible, low consumer knowledge and unfavorable attitudes can suppress demand (Petrescu *et al*., 2018; Sanah *et al*., 2020). Understanding extent of awareness and nature of perceptions about rabbit meat in Kenyan households is therefore essential for designing interventions that can stimulate consumption through better marketing, education, and policy design.

Rabbit meat remains a marginal protein source in most developing countries, despite its health and sustainability potential (Cullere & Dallezotte, 2018). In Kenya, particularly in counties like Nakuru where rabbit farming is present, consumption rates remain low. Few studies have examined the underlying factors such as awareness, perception, and socio-economic conditions that shape this reality (Adanguidi, 2020). This study focuses on Njoro Sub-County, Nakuru, a region with a blend of rural and urban population characterized by socio-economic diversity, varying cultural norms and active rabbit farming (KNBS, 2019). The area offers a unique setting to explore household consumption behavior, nutritional awareness, and perceptions regarding rabbit meat. This study therefore seeks to inform more targeted policy and marketing strategies to reposition rabbit meat within mainstream Kenyan diets.

1.2 Statement of the problem

In an era where there is rising health awareness among people, the demand for white meat has been on the rise due to its nutritional advantage of containing lower fat and cholesterol content as compared to red meat. Rabbit meat has high phosphorus and calcium content while having low fat and low cholesterol level compared to beef, pork, and chicken which is the most preferred type of white meat in Kenya. The consumption of rabbit meat in most countries, including Kenya, remains low. According to FAOSTAT (2023), production of rabbit meat in Kenya was estimated at approximately 400 metric tonnes, placing Kenya among the lowest producers globally, contributing just 0.027% of global output. However, even this modest level of production does not necessarily reflect widespread consumption. Much of the meat is consumed by producers themselves or sold through niche markets, while large segments of the population remain unaware or culturally averse to rabbit meat as a protein source for their consumption (FAOSTAT, 2023). Existing research and policy efforts have primarily focused on rabbit production rather than household consumption behavior. Consequently, little is known about the actual nutritional awareness, consumer perceptions, and drivers that influence whether or not households choose to consume rabbit meat. Understanding these factors is essential for narrowing the gap between production and demand and to develop approaches that encourage rabbit meat as a viable, nutritious, healthy, sustainable and accessible protein in Kenyan households. Njoro Sub-County was chosen for this study due to its mix of urban and rural settings, active rabbit farming practices, and diverse population, offering an ideal setting to investigate the consumption dynamics of rabbit meat at the household level.

1.3 Objectives

1.3.1 General objective

The general objective of this study is to contribute to improved food and nutrition security by assessing the household factors that determine awareness, perceptions and consumption of rabbit meat among households in Njoro Sub-county.

1.3.2 Specific objective

i. To identify the factors influencing nutritional awareness of rabbit meat among households in Njoro Sub-County.
ii. To identify the factors influencing perceptions of rabbit meat among households in Njoro Sub-County.
iii. To determine the factors influencing household consumption of rabbit meat in Njoro Sub-County.

1.4 Research questions

i. What factors influence nutritional awareness of rabbit meat among households in Njoro Sub-County?
ii. What factors influence perceptions of rabbit meat among households in Njoro Sub-County?
iii. What factors influence household consumption of rabbit meat in Njoro Sub-County?

1.5 Justification

This study is anchored in the broader context of the Livestock Revolution, a shift fueled by urbanization, population expansion and increasing incomes levels, which has led to surging demand for animal-based foods in across the world and especially in the third world economies (Pica-Ciamarra & Otte, 2011; Thornton, 2010). This trend has created both opportunities and challenges, particularly the need for nutritionally superior, environmentally sustainable, and economically viable protein sources. Rabbit meat, with its minimal resource requirements and high nutritional value, is increasingly recognized as a strategic alternative protein that aligns with this global shift in food systems. This study is important because the rabbit enterprise could be an affordable and environmentally friendly approach of producing nutritious and healthy animal protein for the population in Kenya and the rest of the world which is continuously growing. Rabbits have a high reproduction rate, early maturity, strong genetic

improvement potential, efficient use of feed and land, minimal competition with humans for similar food resources, and production of highly nutritious meat (Mbutu, 2013). It may contribute to the enhancement of food security and improved nutrition, which are targeted in the second Sustainable Development Goal of the United Nations, and outlined in the agricultural objectives of the Kenya Vision 2030.

The study is also in tandem with Nakuru County Integrated Development Plan (CIDP) 2023-2027 which prioritized rabbitry enterprise as one of key livestock economic activities (Nakuru County Government, 2018). The study findings will therefore form the foundation for policy formulation that will lead to the advancement of the rabbitry enterprise in Nakuru County and Kenya at large.

1.6 Scope and limitations of the study

This research study focused on factors influencing nutritional awareness, consumer perception and consumption of rabbit meat among household members. The reliability of the data depended heavily on the ability of the respondents to accurately recall past information and to answer the questions correctly. To ensure this, the respondents were probed and guided in case of inconsistencies.

1.7 Definition of terms

Accessibility- this is the ability to obtain rabbit meat from the market by the households for consumption purposes which will be measured by the distance in kilometers from the household place of residence to the market.

Perception- overall opinion, thoughts and feelings about rabbit meat by households

Household-A group of people occupying one housing unit while sharing resources and daily living arrangements including sharing meals.

Level of awareness- level of know-how by households on the benefits of consuming rabbit meat obtained from different sources of information; school, internet, TV, radio, among others.

Rabbitry- keeping of rabbits for subsistence or commercial purposes.

CHAPTER TWO
LITERATURE REVIEW

2.1 Continental review of the rabbit meat enterprise

Globally, the highest consumption of rabbit meat is observed across the Mediterranean region, particularly in countries like Algeria, Egypt, Cyprus, Italy, and Spain, as well as in others such as Malta, Portugal, and France. Beyond this region, notable consumers include several European nations, namely Belgium, Germany, Luxembourg, and the Czech Republic. However, its popularity is limited in many regions, particularly in the Western Hemisphere (Cullere & Dalle Zotte, 2018). Moreover, in 2015, the European Commission noted a lack of diverse official data on rabbit meat consumption. Despite this, rabbit meat is considered a niche market within the European Union (EU) accounting for less than 3% of total meat consumption (Cullere & Dalle Zotte, 2018).

Commercial rearing of rabbits for meat consumption for meat production began in the 1920s in Southern California and in various European countries, including Belgium, France, Italy, Spain and West Germany, gaining further traction in the 1970s (Lebas *et al.*, 1997). In the Mediterranean region, rabbit farming evolved into a highly specialized and technologically advanced livestock industry, distinguished by its unique characteristics (McNitt *et al*., 2013).

According to FAOSTAT (2018) Asia was the leading producer of rabbit meat producing approximately 1.4 million tonnes of rabbit meat, accounting for 75.3% of global production followed by Europe (21.3%), Africa (7.1%) and the Americas (1.2%) (FAOSTAT, 2018). China dominated rabbit meat production at 849,150 (t/year) tonnes per year. Other leading producers included North Korea (172,680 t/year), Egypt (65,602 t/year), Italy (54,397t/year), Spain (50,552 t/year), and France (48,396 t/year) (FAOSTAT, 2018).

In a more recent data from FAOSTAT (2023), China continued to lead with a production of approximately 900,000 tonnes per year. The Democratic People's Republic of Korea (North Korea) increased production to 180,000 tonnes per year. Egypt, Italy, Spain, and France also showed slight increases, producing 70,000, 55,000, 51,000, and 49,000 tonnes per year, respectively. Continental production trends revealed that Asia remained the top producer, accounting for 76% of global production. Europe followed with 20%, while Africa and the Americas contribute 8% and 2%, respectively. This distribution highlights the continued dominance of Asia and Europe in rabbit meat production, with growing contributions from Africa and the Americas.

Table 1: Rabbit meat production by country (2018-2023)

Country	**Production (t/year) in 2018**	**Production (t/year) in 2023**
China	849,150	900,000
North Korea	172,680	180,000
Egypt	65,602	70,000
Italy	54,397	55,000
Spain	50,552	51,000
France	48,396	49,000
Italy	42,174	43,109
Mexico	4,160	4,483
Kenya	350	400

Table 2: Rabbit meat production by continents (2018-2023)

Continent	Production (%)
Asia	76
Europe	20
Africa	8
Americas	2

The study conducted by Ardeng (1999) in 64 developing countries found that 30% of the respondents believed that religious and social factors hindered the growth and development of rabbit production. However, in many nations, particularly in Europe, rabbit farming has proven to be a successful agricultural business venture (Bashi, 2002).

In developing countries, smallholder rabbit farming has been promoted as a means to alleviate poverty due to its low startup costs and quick returns (Dolberg, 2001; Owen *et al*., 2005). In Cameroon, a five-year budget plan for starting with three does demonstrated the minimal investment needed for small-scale rabbit farming. This plan could be scaled up to include five to ten does for greater impact on the farmer's family (Oseni & Lukefahr, 2014). Over the decades, rabbit farming has significantly contributed to food security in developing nations, making small-scale rabbit projects a viable option for boosting the incomes of those in poverty (Cheeke, 1986; Lukefahr & Cheeke, 1991; Owen, 1976). Numerous reports have documented the positive impact of rabbit development projects in the communities where they have been implemented.

2.2 Constraints faced by the African continent in the rabbit enterprise

Oseni and Lukefahr (2014) investigated rabbit production practices in Africa's low-input systems. They noted that the growth of a sustainable rabbit industry is hampered by institutional and policy-related barriers, which restrict the creation and implementation of long-term programs designed to support and incentivize smallholder rabbit producers (Oseni & Lukefahr, 2014). The absence of a suitable legislative framework for breeding stock development that supports backyard and small-scale rabbit farming operations and the lack of insufficient documented information on consumer consumption trends and perceptions regarding rabbit meat over time for rabbit meat were also characterized as predicaments for developing viable smallholder rabbit units (Lekota, 2021).

Adu *et al*. (2005) noted that the special benefits of the smallholder rabbit production units were well known and documented but Oseni and Lukefahr (2014) claimed that the benefits of rabbits to household nutrition, revenue generation and food security were not recorded. Although it has been observed that there is no legislative framework for breeding stock development or acknowledgement of the contributions that rabbits make to domestic production, considerable evidence exists of initiatives undertaken by self-organized rabbit farmers in South Africa's Eastern Cape, many of which have produced positive outcomes. Their efforts have shown that backyard sustainable rabbit farming can be started with little financial outlay and can be run without the need for technical assistance or technology. There are documented instances of marginal land communities implementing environmentally friendly and economically viable smallholder rabbit production systems which have led to improved living standards of poor families.

Heat stress represents a primary constraint to commercial and subsistence rabbit rearing in the tropics and arid regions (Savietto *et al*., 2012). This is especially evident if the housing constructed by the farmers is poorly designed. In addition, Lukefahr and Cheeke (1991) emphasized that infertility may likely occur if the threshold of 30°C is surpassed in breeding rabbits. Sub-optimal management could also lead to inadequate nutrition that could lead to slow growth rate and premature death of rabbits could also occur as a result of inability to notice signs and symptoms of a disease in their early stages (Lekota, 2021).Nevertheless, rabbits are raised productively and make a substantial contribution to the welfare and nutrition of families in spite of the challenging environmental conditions. This is because of improved strategies in regards to appropriate housing designs depending on the environmental conditions, keeping of quality breeds of rabbits and mating of rabbits of breeding age in the

initial hours after sunrise especially in areas experiencing high temperatures among other management techniques, had been encouraged (Lukefahr and Cheeke, 1991). Additionally, rabbit production in Africa has been hampered by the absence of traditions and culture of eating rabbit meat in some parts of Sub-Saharan Africa (Oseni and Lukefahr, 2014). Countermeasures such as , hosting food festivals, fairs and exhibitions for rabbit farmers and field days as well as cooperative stock marketing could help mitigate this challenges (Oseni, 2010).

In Kenya, the rabbit venture has stagnated for multiple reasons which include market disarray, inadequate promotion of rabbit meat, erratic supply of rabbit meat in market outlets and high prices as a result of brokerage and insufficient supply. Competition from other types of meat that are easily available in the market and popular compared to rabbit meat (Mailu *et al*., 2017). In a study by Hungu *et al*. (2013) in Central, Nairobi and Rift Valley regions in Kenya, diseases were a significant constraint in rabbit production with 83% of rabbit farmers reporting disease issues and 69% reporting frequent deaths of rabbits. This high incidence of disease and mortality discourages farmers from continuing or expanding their rabbit farming operations hence leading to reduced rabbit meat supply in the market (Hungu *et al*., 2013). Many rabbit farmers also lacked access to adequate technical information on rabbit farming, leading to substandard design and construction of rabbit hutches. This lack of technical support affects overall farm management and productivity (Hungu *et al*., 2013). FarmersTrend (2023) further added that limited customer acceptance, inadequate rabbit feed resources and insufficient breeder training on rabbit-specific habits have led to reduced output and intake of rabbit meat.

2.3 Awareness on the benefits of rabbit meat consumption

The call to action to promote sustainable nutrition and health has led to a continued expansion of the scope of public health practice in recent years. Research on the nutritional value of foods is becoming more crucial in an effort to support healthy eating. Implementation of public awareness initiatives that disseminate information on the nutritive value of different types of food and their contribution to body maintenance, reproduction, growth, overall health and prevention of diseases in humans is therefore essential. (Eze *et al.*, 2017).

According to Costell *et al.* (2010), adoption and consumption of rabbit meat by consumers are influenced by their knowledge of the health benefits it possesses. Beyond their nutritional content, rabbits also cater to particular consumer demands (Szakaly *et al*., 2009a). Currently, the most significant limitation is that many consumers lack sufficient knowledge of the nutritional and biological advantages of foods that support health. In this predicament the most

immediate course of action is to relay reliable information on nutritional benefits of consuming rabbit meat.

In an attempt to promote consumption of rabbit meat, the study by Bodnar and Horvath (2008) in Hungary called for initiating long-term consumer education campaigns to sensitize the people on the benefits of rabbit meat. This study therefore endeavored to assess the awareness of nutritional benefits of rabbit meat among households in Njoro Sub County.

Rabbit meat stands out among the widely eaten meat varieties for having the least amount of cholesterol (on average 53 mg/100 g of fresh meat). The study done by McLean-Meyinsse (2000) in Louisiana, Texas, noted that the nutritional qualities of rabbit meat should be the key focus of any marketing campaign aimed at increasing rabbit meat consumption and less focus and less focus on its price. If rabbit meat is viewed as of value for consumption by people, they will be willing to purchase it at any price. This may be true in some cases but at the same time, price also plays a big role in consumer's decision. It is therefore necessary to evaluate through further studies how price affects consumption of rabbit meat.

Sanah *et al*. (2020) reported from Algeria that vast majority of the consumers (61%) were aware of rabbit meat's nutritional value, particularly its low cholesterol, reduced fat, and rich protein and vitamin levels. Consequently, it was recommended for inclusion in diets of individuals under conditions such as pregnancy, diabetes, anaemia and cardiovascular disorders.

According to Adanguidi (2020), up until now, majority of rabbit-related studies in Benin have frequently concentrated on meat yield and production (Adanguidi, 2020). No scholarly work has so far focused on the important topic of rabbit meat consumption and demand in Benin. Conducting such research, however, is necessary to gain insight into what motivates consumers, which in turn influence households to adopt rabbit meat as part of their diet (Montero-Vicente *et al*., 2018). In the same way, the information on consumers' awareness level and product-specific marketing is regarded as a key ingredient for success in Kenya's competitive and dynamic market place (Mailu *et al*., 2017). This study will therefore be beneficial even to marketers of rabbit meat in Njoro Sub-County as the findings will provide data on the awareness level among households within the study area.

2.4 Nutritional value of rabbit meat

Several authors have reviewed various research studies on the health advantages gained from consumption of rabbit meat that have revealed that it has a higher nutritional advantage relative to other types of meat (DalleZotte & Szendro, 2005). Rabbit meat has 618 kJ/100g energetic value which is lower than other domestic types of meat especially red meats such as beef and lamb. Low energetic values in meat is important for individuals aiming to reduce their dietary fat intake for health reasons such as reducing weight (Lekota, 2021).

Rabbit meat has also been found to have high levels of phosphorus (230mg and 222mg/100g for back leg and loin part respectively) and low quantities of iron (1.3mg and 1.1mg/100g for hind leg and loin part, respectively) and sodium (49mg and 37mg/100g for hind leg and loin part, respectively) (Combes, 2004). It is a reliable dietary source of potassium (on average 430mg/100g edible fraction), selenium (on average 12µg/100g edible fraction, considering non-supplemented diets), B vitamins and specifically being one of the most abundant sources of vitamin B12 (Lekota, 2021). Supplementation or dietary changes with health-promoting ingredients can improve further the nutrient content of rabbit meat since rabbits are monogastric animals (Lekota, 2021).

In the modern era, consumers are paying greater attention to food safety and healthy attributes gained from the kinds of food they consume, especially due to the rise in terminal diseases such as diabetes, cancer, and hypertension, which are often linked to diet and food additives (Eze *et al*., 2017; WHO, 2021). Healthiness of meat products has become a primary factor influencing purchase decisions, as many meat products contain additives used to increase shelf life, treat animal diseases, or stem from pesticide residues in animal feed (Dalle Zotte & Szendro, 2011; McAfee *et al*., 2010). These residues, even in trace amounts, can build up in the human body and create potential health hazards. In contrast, rabbit meat aligns with the health expectations of the modern consumer due to its low-fat, high-protein profile and its production under minimal chemical exposure (Cullere & Dalle Zotte, 2018). Rabbits are typically fed on forages such as hay, which are often free from chemical treatments, and their production rarely involves the use of heavy medications or synthetic inputs (Combes, 2004; Cullere & Dalle Zotte, 2018). Consequently, rabbit meat is recognized as a clean and functional meat choice with reduced risk of harmful residues, meeting the nutritional and safety concerns of today's health-conscious consumers (Combes, 2004; Cullere & Dalle Zotte, 2018).

2.5 Perceptions on rabbit meat

Different factors can shape people's food choices (Hoek *et al*., 2011). Meat may be preferred by people because it is tasty, healthy, reasonably priced, or simply because they are accustomed to eating it. (Hoek *et al.*, 2011). All of these are reasonable and conceivable factors that can shape a person's choice to take or not to take meat products and more so rabbit meat. It is therefore an interplay of different motives that determine a consumer's decision (Renner *et al*., 2012).

Hoffman *et al*. (2010) stated that one primary factor influencing rabbit meat consumption and preventing its popularity is a lack of appeal to potential consumers. In this study, the lack of consumer preference towards consuming rabbit meat is seen in the comparison of a rabbit carcass to a cat or human infant in regard to appearance as viewed by a potential consumer. It is therefore evident that this form of presentation in the market is not appealing or attractive enough to persuade some people's purchase decision.

In Italy, 70% of the rabbit meat distributors promoted the product as a whole carcass, while a quarter (25%) sold it as cut up carcass (Petracci *et al*., 2011). Most consumers, especially the young ones were deterred from purchasing rabbit meat presented as a whole carcass as they considered product presentation as an important factor to consider when purchasing meat (Petrraci *et al*., 2011). Consumers use sensory qualities of animal-based products to define their quality (Lekota, 2021). A key step to stimulating consumption is improving the rabbit meat image to retain and attract new consumers of rabbit meat through attractive packaging and presentation in form of cut up pieces instead of a whole carcass (Cullere & Dalle Zotte, 2018).

Petrescu *et al*. (2018) reported that consumers in Spain chose taste, nutrition and price as the most important attribute that influenced their dietary choice. In a different In a study conducted in Spain, the top four reasons people chose to eat rabbit meat were still good taste (72.4%), healthiness (35.9%), and low fat content (14.6%) than the other types of meat. Most of the interviewed respondents were well aware of the nutritional advantages of rabbit meat, as evidenced by their positive perception that it is healthier than chicken, beef, pork, sheep and fish (Petrescu *et al*., 2018). These findings were almost similar to the results of a survey in Australia that concluded that 82% of Australian consumers identified taste as a factor of utmost importance in selecting the type of food to consume (Kouroniotis *et al*., 2016).

A Hungarian survey by Bodnar and Horvath (2008), pointed out that negative views towards rabbit meat were mainly rooted in emotional reasons which made persuasion challenging. In their attempts to effectively change their mindset, the researchers recommended more education to provide information combined with introductory price reduction. The price

reduction aspects showed that price also influenced purchase decision by the consumer. Although rabbit meat was considered to be tastier than other types of meat although it was also regarded to be more expensive hence a barrier to its promotion to potential consumers (Petrescu et al., 2018). However, the high prices acted as an incentive to producers or sellers with strategic ideas on popularizing rabbit meat in the market (Petrescu *et al*., 2018). This is in contradiction to the research by McLean-Meyinsse (2000) who recommended promoting rabbit meat through focusing on nutritional benefits and not much emphasis on price.

Taste and good value for money received the lowest ratings of 3.86 and 4.11, respectively, in a study to determine Spanish consumers' perceptions of rabbit meat. The attributes with the highest scores were availability of rabbit meat in shopping outlets and rabbit meat being clean and healthy meat with 4.5 and 4.4 respectively. The authors further reported that 'taste with good flavour' (1.25) and attribute such as 'quick and easy meat to cook' (0.86) displayed greater variations compared to 'rabbit is a clean and healthy meat' (0.67) and 'rabbit meat is easily digestible, it doesn't sit heavy' (0.73) that had a lower standard deviation (Montero-Vicente *et al*., 2018).

A research study carried out in South Africa by Nolwandle (2021) on perceptions of consumers, retailers and their attitude towards rabbit meat indicated that 8.6% of the respondents considered the consumption of rabbit meat as religiously forbidden. It was also noted that a small minority of the population (3.4%) expressed disgust at the mere thought of eating rabbit meat. There were also a further 2% of the respondents who viewed rabbits as pets and not as animal meant for human consumption (Nolwandle, 2021)**.** Nolwandle (2021) additionally found that 12.6% of the respondents consumed rabbit meat due to its perceived superior nutritional advantages over other domestic meat types. On the contrary, 12% simply admitted to generally disliking this type of meat. A smaller segment of the respondents (1.2%) consumed beef and chicken only. They claimed that they do not purchase rabbit meat because its aroma was unpleasant and it took longer to cook while only 9.6% perceived rabbits as pet and not suitable for human consumption. A small percentage (3.6%) said that they abstained from eating rabbit meat as it was forbidden according to their religious beliefs and another 4.2% claimed that they needed further scientific evidence to convince them about the benefits of rabbit meat consumption. This research further demonstrated positivity towards rabbit consumption among the bigger proportions of the respondents as 25.1% were willing to try it and 29.3% enjoyed consuming rabbit meat.

In an Algerian study, Sanah *et al*. (2020) posited that some of the consumers viewed rabbit meat as comparable to poultry meat (35%), goat meat (17%), cattle meat (7%) and sheep (4%)

while 35% stated that rabbit meat bore no similarity to any other meat variety. The respondents who regarded rabbit meat as similar to chicken were referring to the organoleptic qualities specifically smell, shape and tenderness. In regards to taste and colour, some of the respondents found rabbit meat to be similar to goat meat (Sanah *et al*., 2020).

A survey done in Nigeria found that most of the respondents referred to rabbit as a tasty meat of high nutritive value. They considered rabbit meat to be delicious and the rabbit carcass to be appealing. Nevertheless, rabbit meat was perceived to be unavailable and more expensive, and consumers had to spend more of their disposable income to purchase it. This contributed to other common domestic types of meat to be more preferred to rabbit meat (Maigida *et al*., 2018).

A portion of the respondents expressed the view that processing rabbit meat was complicated, hence making it difficult to promote in the market for consumption (Maigida *et al*., 2018). Lekota (2021) concluded that sensory properties, convenience, process attributes and consumers' socio-economic characteristics shape consumers' perception on rabbit meat.

2.6 Consumer perception on rabbit meat compared to other types of meat

In a South African study, Lekota (2021) reported that respondents rated chicken meat more favorably in terms of taste (2.16), availability (2.0), and aroma when compared to rabbit meat. Conversely, rabbit meat was perceived as superior in texture, affordability, nutritional value, ease of preparation and cooking, and ease of swallowing.

Relative to both beef and chicken meat, rabbit meat was rated to be the least tasty. Respondents also associated beef with a pleasant aroma whereas rabbit meat was considered to have an undesirable smell and was reported as being difficult to access (Lekota, 2021). Relative to pork, rabbit meat was ranked to be tastier, tenderer, easier to cook, easier to prepare, cheaper, easily swallowed and more nutritive compared to pork meat. However, pork meat was considered to be easily available when compared to rabbit meat (Lekota, 2021). In comparison to mutton, rabbit meat was classified to be tenderer, easier to cook, easier to prepare, cheaper, more nutritious and easier to swallow compared to mutton. However, rabbit meat was considered to be a rarely found product in market outlets compared to mutton (Lekota, 2021).

For all the used items to study comparison between rabbit meat and other domestic meat types, a South African study by Lekota (2021) showed that rabbit meat was perceived to be tenderer, easier to cook, easier to prepare, cheaper and more nutritious compared to chicken, beef, pork and mutton. However, rabbit meat was perceived as less tasty than chicken, beef and mutton and also unavailable in the market stores.

2.7. Factors influencing consumption of rabbit meat

2.7.1. Pricing and accessibility of rabbit meat

In a Romanian study, Petrescu *et al*. (2018) reported that rabbit meat was considered to be having higher protein content, lower cholesterol levels, and being tastier and healthier than other domestic types of meat such as chicken, beef, and pork. It is therefore more expensive resulting to low consumer preference. Mailu *et al*. (2017) reported that the frequency of rabbit meat consumption was 2.2 times lower than chicken and 1.8 times lower than pork, with 29.6% of respondents indicating they had never consumed it. The comparatively high cost of farmed rabbit meat was identified as a factor reducing its competitiveness relative to chicken.

Another study carried out in Catalonia, Spain, identified price as the primary barrier restricting rabbit meat consumption among new consumers who were considered un-traditional (Kallas & Gil, 2012**).** In Benin, Adanguidi (2020) found that rabbit meat consumption was limited by several factors, with over half of respondents (56%) highlighting the higher purchase price in comparison to chicken and small ruminant meat as the main constraint. The studies done by Mailu *et al.* (2017) in Kenya assessing the consumption patterns between rabbit farmers and non-rabbit farmers reported that the relatively high purchasing price of rabbits reared in farms made them less affordable compared to chicken in the market.

However, differing from the studies outlined above, a study by Szakaly *et al.* (2009b) in Hungary indicated that the price of rabbit meat did not influence its consumption. Nevertheless, most of the households interviewed were more inclined to pay more for poultry meat than rabbit meat (Bodnar & Horvath, 2008). Due to the contradicting nature of different studies on whether price influences consumption of rabbit meat, this research will contribute to fill this knowledge gap in Njoro Sub-County by determining whether price of rabbit meat compared to price of different types of meat such as chicken, beef, pork, fish and chevon influences the purchase decision by households within the study area.

2.7.2 Households income

There is ample evidence linking meat consumption and income. (Brunner *et al*., 2010). A period of prolonged and accelerated economic growth has been observed in China, whereby the living standards have also increased. Consequently, the Chinese per capita meat consumption increased from 8.3 kg to 55.1 kg between 1997 and 2013 (Szendro *et al*., 2020). Delport *et al*. (2017) also evaluated meat demand in South Africa and noted that an increase in real disposable income was associated with higher consumption levels of meat since it's considered a normal or luxurious good for the majority of the people.

In reference to rabbit meat, Szendro (2016) made an observation in Hungary that the consumption level varied from one social group to another. Different social economic groups have different frequencies of consumption. This was seen in research done by Escriba-Perez *et al*. (2017) on the rabbit meat consumption among different socioeconomic groups in Spain whereby the frequency of consumption was increasing in a linear pattern from the lower class to the upper class. This demonstrated a direct relationship between income level and rabbit meat consumption.

A contradictory situation was observed in Southern United States whereby it was reported that rabbit meat was consumed more by men aged over 36 years with an income below $50,000. Findings in Egypt indicated that the demand for rabbit meat was not directly responsive to income growth of the Egyptian people**.** This inverse relationship between income and rabbit meat consumption was also observed in a survey done in Kirinyaga County, Kenya whereby at least 80% of the respondents with modest incomes consumed rabbit meat (Mailu *et al.*, 2017).

2.7.3 Households education levels

In a Spanish study, Szendrő *et al*. (2020) found that individuals with higher levels of formal schooling were frequent rabbit meat consumers and preferred products that were easier to cook compared to those with lower educational level background. The results of the research showed that higher educated individuals appreciated a semi-finished product 3.1 times, the loin 2.8 times and boneless meat 2 times more than secondary school graduates. It was also noted that the higher educated individuals embraced more the different forms of rabbit meat preparation in higher percentages such as roasting, smoking and canning.

In a study done by Mailu *et al.* (2017) in seven counties in Kenya namely; Meru, Nakuru, Kiambu, Kirinyaga, Taita Taveta, Nyeri, and Tharaka Nithi, the respondents included households with heads who had formal education and household heads without formal education. The results showed that only 47% of the households with heads without formal education consumed rabbit meat. Households with heads who had some formal education had well over 50% who consumed rabbit meat. Thus, the education level of the household head is an important driver of rabbit meat consumption decision and also an indicator of the level of awareness on nutritional benefits of rabbit meat.

2.7.4 Age and gender

The study by Beal *et al*. (2004) observed that food consumption in general is affected by age categories. He highlighted that a demographic structure with more elderly than young people experienced decline in food consumption per capita and dietary patterns shifted as preferences changed. Beal *et al.* (2004) further stated that in Southern United States, rabbit meat was consumed by men aged over 36 years. Apart from the age category, these results also bring the aspect of gender. According to Sanah *et al.* (2020), men primarily valued rabbit meat's good taste, easy digestibility and tenderness, while women tended to emphasize its nutritional benefits as the most important reason for consumption. The authors concluded that men appreciated rabbit meat more than women.

In their study on the variables influencing Spanish university students' consumption of rabbit meat, Gonzalez-Redondo *et al*. (2010) indicated that females expressed greater dislike for rabbit meat in comparison to males, due to moral and emotional reasons while pricing, eating habits and availability of rabbit meat emerged as the primary barriers influencing rabbit meat consumption patterns amongst men. In women, factors such as insufficient information, perceived physical outlook of rabbit meat to cat meat (carcass) and unsatisfactory taste discouraged them from consuming rabbit meat (Sanah *et al*., 2020). Another study was done two years later in Spain by González-Redondo and Contreras-Chacón (2012) on the perception of rabbit as companion animals versus a livestock kept for meat among university students in Seville, Spain. It was revealed that women associated rabbits with companionship relative to their male counterparts and therefore less inclined to consume rabbit meat.

Petrescu *et al*. (2018) in Romania found significant gender-based differences in rabbit meat consumption, whereby men expressed greater preference for rabbit meat whereas women reported stronger feelings of disgust and ethical concerns.

In a more contemporary investigation by Szendro *et al*. (2020) on consumers' attitudes towards rabbit meat consumption across eight countries; Spain, France, Mexico, Italy, Poland, Hungary, China, and Brazil , it was noted that both age and gender had an association with consumption frequency. This was in contrary to the outcome of the investigation done by Sanah *et al*. (2020) in Algeria that found no association between low consumption of rabbit meat and age. However, in regards to gender, there was a statistically significant difference, with male consumers reportedly being more than the female consumers.

2.7.5 Household size

Research studies by Owino *et al*. (2017) and Nyambo *et al*. (2020) highlighted that household size was a significant determinant of meat consumption in Kenya, with larger households consuming more meat overall. However, the studies did not look at rabbit meat consumption specifically. The connection between rabbit meat consumption and household size remains underexplored in most studies.

Rabbit meat consumption in Kenya is limited in relation to other meat varieties but it has been gaining popularity in recent years due to its nutritional benefits and lower cost compared to other meats (Omondi *et al*., 2018). Overall, more research is needed to determine how household size specifically influences rabbit meat consumption in Kenya.

2.8. Theoretical framework

There are several theories that could be used to guide this study. For instance, the Theory of Planned Behaviour, Social Cognitive Theory, and Utility Maximization Theory (UMT). To explain further, theory of planned behaviour could be used to explore how attitudes, subjective norms, and perceived behavioural control may impact actual rabbit meat consumption behaviour (Ajzen, 1991). One limitation about theory of planned behaviour is that it focuses primarily on individual-level attitudes, beliefs, and intentions, and may not adequately account for broader external factors that can influence behaviour, such as cultural norms and social influence. For instance, household food consumption decisions may be influenced by cultural traditions or social norms related to the consumption of certain types of meat. This may not be captured by this theory. There may be other external barriers such as lack of access to rabbit meat or limited financial resources that may prevent an individual from acting on their intentions. In this case, intention may not be the best predictor of behaviour (Armitage & Conner, 2001).

Moreover, the Social Cognitive Theory may be applied to explore how personal, behavioural, and environmental factors interact to shape actual rabbit meat consumption behaviour (Bandura, 1986). The potential weakness of this theory is that behaviour is primarily driven by individual factors, such as self-efficacy and outcome expectancies, and may not fully capture the influence of broader social and economic factors, such as availability and affordability of rabbit meat (Bandura, 2004). It may also not adequately account for the complex interactions between individual-level factors and broader contextual factors in shaping behaviour. Household-level decisions about meat consumption may be influenced by a range of factors, including social norms, cultural values, economic constraints, and individual-level beliefs and attitudes, which may not be fully captured by Social Cognitive

Theory (Bandura, 2004). Although the above explained theories could apply in this study, the UMT has been considered to be the best because it accounts both external and internal factors which influence rabbit meat consumption.

The utility maximization theory is a fundamental concept in economics that was developed by various economists including William Stanley Jevons, Leon Walras, and Carl Menger in the late 19th century. UMT assumes that households make consumption decisions by maximizing their utility or satisfaction subject to their budget constraint (Varian, 2010). To apply UMT to the consumption of rabbit meat in Njoro Sub County, household demand for rabbit meat will be estimated using data on price of rabbit meat, price of other types of meat (mutton, beef, pork, poultry, fish, and chevon), household income, awareness on nutritional benefits of rabbit meat, perception by household members on rabbit meat consumption, age and gender. This will also involve estimating the household's demand curve, which shows the quantity of rabbit meat that the household is willing and able to purchase at different prices. For consumers, the utility maximization problem can be expressed mathematically as:

Maximize $U(x_1, x_2 ... x_n)$ (1)

Subject to

$p_1x_1 + p_2x_2 + ... + p_nx_n \leq I$

where U is the utility function that represents the individual's preferences, xi is the quantity of good i consumed, pi is the price of good i, and I is the individual's income or budget.

This demand curve can be useful in examining how changes in the price of rabbit meat or household income affect consumption patterns, and how changes in the availability of alternative meat sources affect demand for rabbit meat. Using this theory, it is possible to explore how household preferences, such as taste and nutritional preferences, influence demand for rabbit meat. For instance, if households value the nutritional benefits of rabbit meat, this may increase demand for the meat, even if its price is relatively high (Varian, 2010).

2.9. Conceptual framework

In this conceptual framework, several independent variables such as awareness on the nutritional value of rabbit meat, household perceptions of rabbit meat, household income, education level of households, gender, age, household size, religion, marital status, and membership to social groups individually have some level of influence on rabbit meat consumption. The relationship between these independent variables and rabbit meat consumption is moderated by factors such as taste, smell, nutritional value, time of preparation, physical appearance (color, texture), affordability, and accessibility. These moderating

variables influence the frequency of rabbit meat consumption among households. Increase in rabbit meat consumption is expected to bring about improved nutrition and health of consumers, increased production and income for rabbit meat producers, improved food security, and increased awareness about the benefits of consuming rabbit meat among households within Njoro Sub-County.

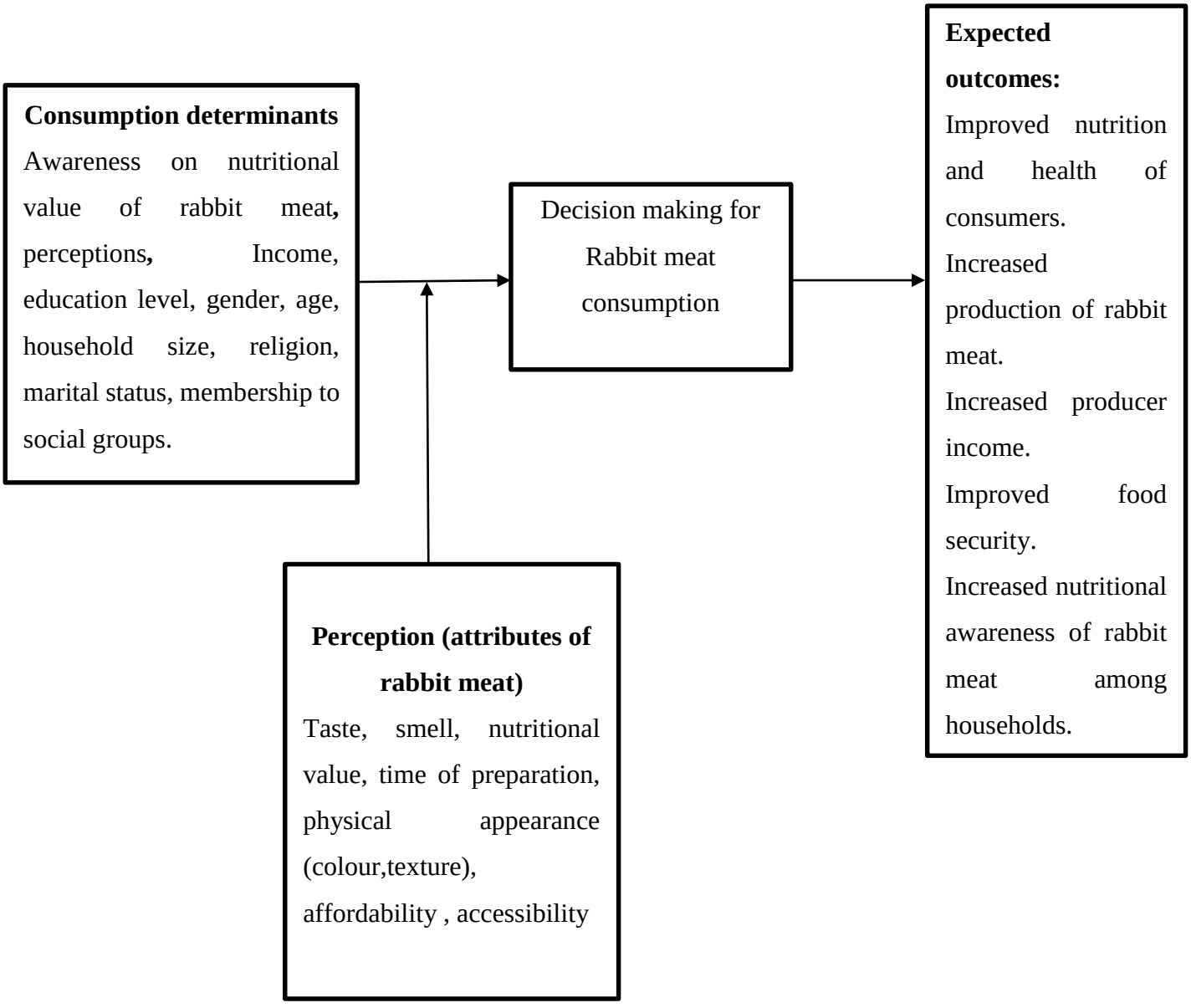

Figure 1: Conceptual framework

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Research design

Descriptive survey design was adopted for this study which aimed at assessing the current situation in regards to consumption of rabbit meat in Njoro Sub-county. According to McCombes (2022), it is appropriate to use descriptive research design when the researcher aims at identifying characteristics, frequencies, trends and categories. This made it ideal for this research since it intended to assess household level of awareness, consumer perception and other factors influencing the consumption of rabbit meat among households in Njoro Sub-County. This survey involved gathering of data using interviews and observations that were analyzed for frequencies, averages and patterns.

3.2 Study area

Nakuru County is widely recognized as one of the leading counties in Kenya in the production and consumption of rabbit meat (Mutsami & Karl, 2020). In Nakuru, several sub-counties such as Nakuru Town East, Nakuru Town West, and Bahati have been at the forefront of rabbit farming initiatives. According to Mutsami and Karl (2020), significant rabbit production and consumption activity also occurs in sub-counties like Njoro, Molo, and Naivasha, which are known for their relatively advanced rabbit production systems.

Despite this prominence, there remains a notable research gap concerning Njoro Sub-County. While it ranks among the top producers, there is limited academic documentation exploring the dynamics of rabbit meat consumption within this region (Mutsami & Karl, 2020). This study focuses on Njoro Sub-County, investigating the socio-cultural, economic, and infrastructural factors influencing consumption behavior. The selection of Njoro is not only based on its production potential but also on the need to understand why, despite high production levels, the area has not received commensurate scholarly attention. This contrast provides an opportunity to examine whether proximity to rabbit farming necessarily translates into higher consumption or awareness (Bett *et al*., 2012).

Furthermore, Njoro Sub-County was selected due to its proximity to Egerton University which is Kenya’s premier agricultural university. The university's presence is assumed to contribute to higher agricultural literacy and awareness levels among the surrounding communities about rabbit production and consumption (Mutisya, 2014).

Njoro sub-county lies on the Western edge of the Rift Valley and covers an area of about 780 square kilometres. It is located 18km South West of Nakuru town. It neighbours Molo sub-county on the West, Rongai sub-county on the North, Nakuru West on the East, Gilgil Sub-County and Narok County on the Southern side (Figure 2). Njoro Sub-County lies between Latitude 0° 19′ 44.40″ N and Longitude 35° 56′ 38.40″ East, with an average altitude of 2400 meters above sea level. Njoro Sub-County has six wards which include Njoro, Lare, Nesuit, Kihingo, Mauche and Mau Narok (Taiy *et al.*, 2016). This study focused on Njoro, Kihingo, and Mauche whose populations were 98,376, 35,087, and 17,243, respectively (KNBS, 2019).

The prevailing climate of Njoro sub-county is classified as warm and temperate with an average temperature of 16^0C. The rainfall ranges between 950mm-2000mm per annum. The dominant soils are volcanic sandy clay loams. The major crop enterprises include maize, beans, wheat, barley, Irish potatoes, cabbages, garden peas and carrots, whereas the dominant livestock enterprises include dairy cattle, poultry, sheep, goats, piggery, fishery, rabbitry and beekeeping. The main economic activities include large-scale wheat and barley farming, horticulture and dairy production, keeping of small animals including rabbits (Taiy *et al.*, 2016).

Njoro sub-county has a human population of 238,233 and 61,271 households according to the most recent census done by the Kenya National Bureau of Statistics (KNBS) 2019. The study area has also been reported to have 700 rabbit farmers with a total of 7000 rabbits (Mutsami & Karl, 2020). This study focuses on Njoro Sub-County, Nakuru, a region with a blend of rural and urban populations, characterized by socio-economic diversity, varying cultural norms, and active rabbit farming. The area provides a unique context to explore household consumption behavior, nutritional awareness, and perceptions regarding rabbit meat (KNBS, 2019).

Figure 2 is the map of the study area, which is in Njoro Sub-County. In the top right corner of the map, there is a smaller map which indicates the position of Njoro Sub-County in Kenya.

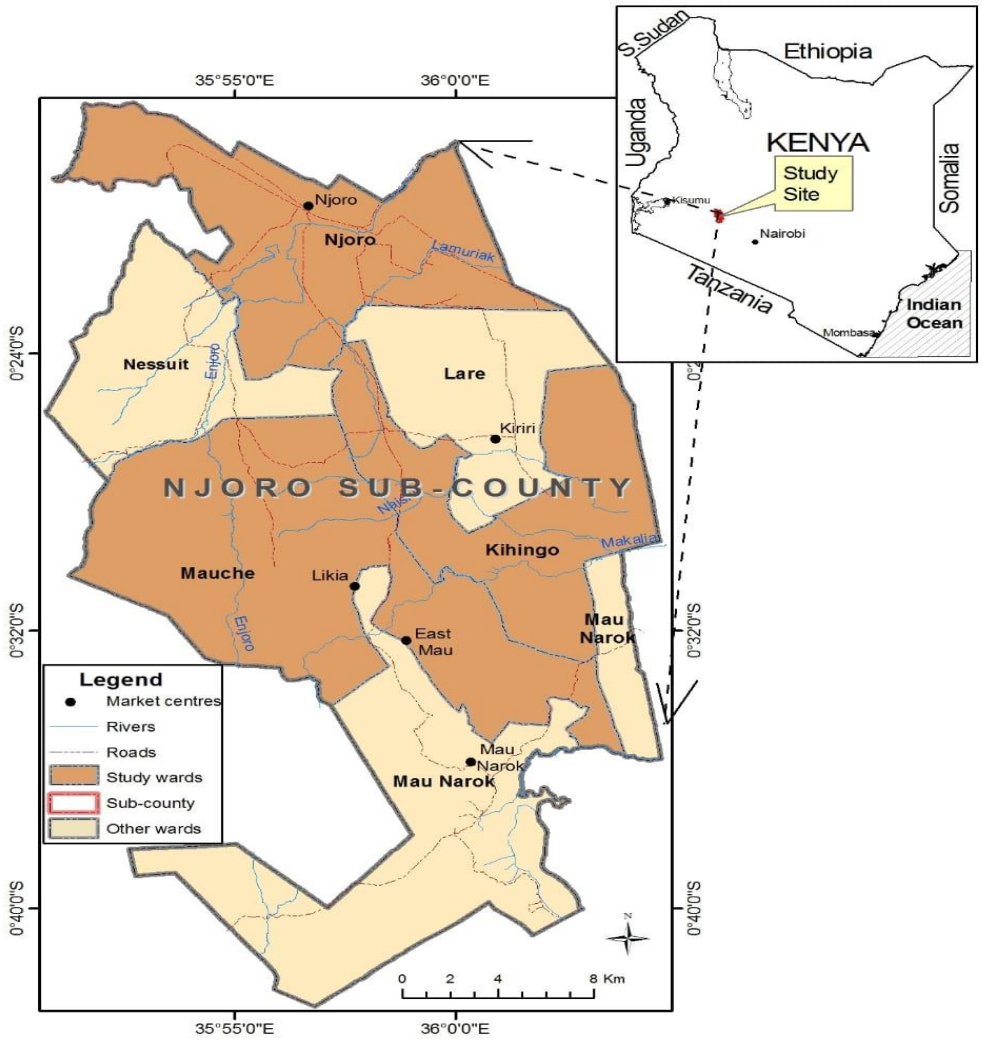

Figure 2: Map of Njoro Sub-County

Source: Environmental Science Department, Egerton University

3.4 The target population and respondents

The target population for the study was all households within the study area. The respondents consisted of household heads or members responsible for household consumption decisions in the absence of the household heads.

3.5 Sampling procedure and determination of sample size

Njoro division has six wards. A multi-stage sampling method was applied. Using purposive sampling method, the researcher chose three wards to sample from; Njoro, Kihingo and Mauche. The three wards were selected because of their proximity to urban area and they cut across different ethnic groups and agro-ecological zones. The researcher used simple random sampling through lottery method to select villages out of the three chosen wards. The sub-county agricultural officer provided the researcher with a list of households that were used to

sample households within the chosen villages using systematic random sampling method. The sampling interval was calculated by dividing the total number of households in the given list by the sample size determined below to help the researcher achieve the desired number of households.

To determine the sample size for the target population of 238,233 people in 61,271 households, the formula by Anderson (2007) for sample size determination was used as shown in equation (2) below. The formula is suitable in cases where the population of interest is unspecified and is generally applicable.

$n=\left(\frac{Z}{m}\right)^2(1\text{-}p)$…… (2)

Z value= 1.96 for 95% confidence level

M (margin of error) =0.05

P= Estimated value for the proportion of a sample that will be consumers of rabbit meat.

$n= \left(\frac{1.96}{0.05}\right)^2 x0.15(1-0.15)= 196$…… (3)

The target number of households that were to be sampled within the three wards was 196. The sample size was initially calculated using Cochran's formula (Anderson, 2007) at a confidence level of 95% and margin of error of 5%. In the proposal phase of this study, a convenient estimate (p = 0.5) was used, producing a sample of 384 households. However, further literature search and information from the study area during field work literature suggested that the actual prevalence of rabbit meat awareness or consumption is lower. Sanah *et al*. (2020), for instance, found that only 14% of consumers in East Africa preferred rabbit meat. Accordingly, the value of p was revised to 0.15, yielding a recalculated sample of 196 respondents. This adjustment ensured the sample size reflected a more realistic estimate of the target population.

The 196 households were distributed proportionately to the size of the population within the wards between the three wards using Proportionate stratified sampling. The basis of stratification was the wards. Each ward represented a stratum. Each stratum was converted to percentages. The percentage of each ward was then multiplied by the overall determined sample size (196 households) to generate the sample size for each ward as shown in Table 3.

Table 3: Household population and sample size

Wards	Number of households(N)	Percentage (%)	Sample size
Kihingo	4,435	11.49	23
Mauche	7,150	18.50	36
Njoro	27,050	70.01	138
Total	**38,635**	**100**	**196**

Ultimately, 186 complete questionnaires were collected, representing 95% of the proposed sample. The difference between the planned and realized sample size resulted from respondent unavailability, refusal to participate, and time and financial limitations. Those interviewed in Kihingo and Mauche were the same number as proposed, however only 127 respondents were interviewed from Njoro out of the planned 138 respondents. Despite this, the final sample remained robust for statistical analysis and aligned with the study's confidence level requirements.

3.6 Methods of data collection

The study relied on primary data obtained from respondents via face-to-face interviews. The Data was collected on the factors influencing rabbit meat consumption in Njoro Sub-County such as level of awareness by households on the nutritional benefits of rabbit meat consumption, consumer perception on rabbit meat consumption, price of rabbit meat within Njoro Sub-county, income level of household heads, age, gender, education level of the household heads and the sources of information that the households have benefitted in acquiring knowledge about the rabbit enterprise; production, rabbit meat consumption benefits among other types of rabbit information.

More data was collected on the number of rabbits kept by the respondents, household size, religion (including denomination, if Christian or Muslim), membership to social/farmer groups, distance to market, distance from the extension offices and the reasons as to why some households have never consumed rabbit meat.

The interview schedule/semi-structured questionnaire used during the face-to-face interviews was pre-tested for its reliability and validity by interviewing the households in the neighbouring sub-county (Molo Sub-County) and was considered viable to be used in the study

area. The data obtained was reviewed to ensure comprehensibility and completeness, then summarized, coded and organized into tables.

3.7 Measurement of key variables

This section outlines how the core dependent and independent variables used in the study were measured. The dependent variables include awareness, perception, and consumption of rabbit meat. Each was measured using tailored questions in the questionnaire and analyzed using appropriate statistical models. The independent variables include demographic and socio-economic factors such as age, gender, education, household size, income, rabbit keeping status, and social group membership.

3.7.1 Measurement of dependent variables

3.7.1.1 Nutritional awareness

Awareness of rabbit meat's nutritional value was measured using four binary questions that asked respondents whether they were aware of specific attributes of rabbit meat, namely: high protein content, low fat/cholesterol content, ease of digestibility, and richness in minerals (e.g., calcium and phosphorus). Each question required a Yes (1) or No (0) response. These responses were treated as multiple binary dependent variables in a multivariate probit regression model to capture correlated awareness outcomes. The model enabled the assessment of factors influencing the likelihood of awareness for each nutritional benefit.

3.7.1.2 Consumer perception

Perception was measured using a composite index developed from six likert-scale statements on rabbit meat attributes: taste, smell, nutritional value, physical appearance, affordability, and accessibility. Respondents rated their agreement with each statement on a five-point scale from 1 (Strongly Disagree) to 5 (Strongly Agree). The average of these responses created a continuous perception index, which was then categorized into three levels: low perception (<2.75), moderate perception (2.75–3.24), and high perception (≥3.25). This ordinal dependent variable was analyzed using an ordered probit model.

3.7.1.3 Rabbit meat consumption

Consumption was assessed through two components: (i) whether the household had consumed rabbit meat in the past 12 months (Yes = 1, No = 0), and (ii) the quantity of rabbit meat consumed per household per month (in kilograms). This structure was suitable for analysis using the Double Hurdle Model, where the first hurdle (participation decision) used a probit regression, and the second hurdle (consumption intensity) used a truncated regression model.

3.7.2 Measurement of independent variables

Independent variables used across the models included gender, age, education level, household income, household size, marital status, rabbit keeping status, location, social group membership, awareness level, distance to market, affordability, taste perception, and whether the respondent knows a rabbit keeper. These were measured via structured questionnaire responses and coded as categorical or continuous variables depending on their nature. Detailed descriptions of how each variable was defined and used are presented in Tables 4, 5, and 6, corresponding to awareness, perception, and consumption models, respectively.

3.8 Data analysis

3.8.1 Factors influencing nutritional awareness among households in Njoro Sub-County

Multivariate probit regression analysis was used to determine the factors that influence nutritional awareness of rabbit meat among households in Njoro Sub-County. The multiple binary dependent variables were household responses (Yes = 1, No = 0) to awareness questions on nutritional and health benefits of rabbit meat. The selected predictors that were assessed to determine whether they influenced the level of awareness were education level, age, income of household head, marital status, social group membership, rabbit keeping and household size.

The multivariate probit model allows for the simultaneous estimation of multiple binary dependent variables while accounting for the correlation between their unobserved error terms, providing more efficient and consistent estimates than estimating each binary outcome separately. Other models, such as multinomial logit or corner solution models, were inappropriate because the dependent variables were not mutually exclusive choices, nor were they censored continuous variables.

$$Y_{ij}*=X_i\beta j+\varepsilon ij \quad \text{..... (4)}$$

Where:

$Y_{ij}*$ is the latent (unobserved) propensity for awareness of attribute j (high protein, low fat, high digestibility, high mineral content)

$Y_{ij}=1$ if $Y_{ij}*>0$, and 0 if otherwise

X_i is the vector of explanatory variables (gender, age, education, income, marital status, social group membership, household size, rabbit keeping, location)

β_j is the coefficient vector for awareness item j

ε_{ij} is the error term, assumed to follow a multivariate normal distribution with zero mean and correlated error terms across equations.

These variables in the above equation were described as shown in Table 4.

Table 4: Description of the variables used in assessment of nutritional awareness

Variables	Description and measurement	Priori sign
Awareness level	A set of binary dependent variables indicating whether the household head was aware of specific nutritional attributes of rabbit meat (high protein, low fat, digestibility, mineral content). Each attribute was coded as 1 = Aware, 0 = Not aware.	+/-
Gender	Sex of the household head. Male=0, female=1	+/-
Education level	Enters as a dummy variable as defined below: Primary=0, secondary=1, tertiary=2	+/-
Age	Age of the household head in years	+/-
Income	The total income that household gets per month in Ksh. 0-19,999=0, 20,000-30,000=1, 40,000 and above=2	+/-
Marital status	Single=0, married=1, divorced/widowed/separated=3	+/-
Social group membership	Member=1, Non-member=0	+
Household size	The number of people living in one household.	+/-
Rabbit keeping	Determine whether the respondent kept rabbits or not.(Rabbit keeper=1, non-rabbit keeper=0)	+/-
Location	Kihingo ward=0, Mauche ward=1*, Njoro ward=2*	+/-

3.8.2 Factors influencing consumer perception of rabbit meat by households in Njoro Sub-County

An ordered probit regression model was employed to analyze the factors influencing household perception of rabbit meat. The dependent variable was constructed from a composite index of six Likert-scale questions in which respondents rated their level of agreement (1 = Strongly Disagree to 5 = Strongly Agree) with statements on rabbit meat's taste, smell,

nutritional value, physical appearance, accessibility, and affordability. This generated statements and six scores for each statement. The six individual scores were averaged to compute a composite index, generating a single continuous score for each household reflecting their overall perception of rabbit meat. Prior to aggregation, internal consistency of the items was evaluated using Cronbach's alpha to ensure reliability of the scale. The resulting perception scores ranged from 1 to 5, with a sample mean of approximately 3.04 and a standard deviation of 0.28 (as shown in ordinal logistic regression results in the appendix section).

To fit the dependent variable into an ordinal regression framework, the continuous index was categorized into three ordered levels; low perception: scores below 2.75, moderate perception: scores from 2.75 to less than 3.25, high perception: scores of 3.25 and above. These categories reflected ascending levels of positive perception toward rabbit meat attributes. The resulting ordinal dependent variable thus captured a ranked, multiple-response outcome that was suitable for analysis using the ordinal logistic regression model. This model was selected due to the natural ordering of the perception categories and its appropriateness for modeling the influence of household demographic and socio-economic factors on perception levels. The dependent variable was ordinal in nature, capturing the ordered categories of consumer attitudes. Independent variables included education, age, gender, household size, marital status, income, awareness, social group membership, rabbit keeping and location. These variables were selected based on theoretical relevance, prior empirical studies, and their potential influence on consumer perception. The model estimated the likelihood of a respondent having a more favorable perception of rabbit meat based on these predictor variables. It also estimates the likelihood that a household falls into a particular perception category based on the combination of predictor variables. The description of the variables used in the ordinal logistic model are shown below in Table 5.

Table 5: Description of variables used in the ordinal logistic model

Variable	Description and Measurement	A Priori Sign
Dependent Variable: Perception of rabbit meat	An ordinal variable representing the household head's overall perception of rabbit meat. Constructed as a composite index derived from six Likert-scale items evaluating taste, smell, physical appearance, nutritional value, affordability, and accessibility. Responses were averaged, and the resulting index was categorized into three levels: Low perception, Moderate perception, and High perception.	+/-
Education level	Educational attainment of the household head: Primary = 0, Secondary = 1, Tertiary = 2.	+/-
Age	Age of the household head (in years).	+/-
Gender	Gender of the household head: Male = 0, Female = 1.	+/-
Household size	Total number of individuals living in the household.	+/-
Marital status	Marital status of the household head: Single = 0, Married = 1, Divorced/Widowed/Separated = 2.	+/-
Income	Monthly household income category: Ksh 0–19,999 = 0; 20,000–39,999 = 1; 40,000 and above = 2.	+/-
Awareness	Whether the respondent was aware of the nutritional benefits of rabbit meat: Yes = 1, No = 0.	+
Social group membership	Household head’s membership in a social or economic group: Member = 1, Non-member = 0.	+
Rabbit keeping	Whether the household engages in rabbit farming: Yes = 1, No = 0.	+/-
Location	Residence ward of the household: Kihingo = 0, Mauche = 1, Njoro = 2.	+/-

To assess the perceptions of rabbit meat among consumers, Likert-scale responses were analyzed using mean score calculations. Respondents rated their level of agreement with six positive statements regarding rabbit meat attributes; taste, smell, nutritional value, physical appearance, affordability, and accessibility on a five-point Likert scale ranging from 1

(Strongly Disagree) to 5 (Strongly Agree). The formula to generate the mean score was as follows:

$X=\sum Fx/N$…… (5)

Where X = mean score

$\sum$ = summation sign

F = frequency

N = no of respondents.

x = no of nominal value of each response category as follows:

5+4+3+2+1= 15

15/5=3

Interpretation was guided by the midpoint value of 3.0, which represented a neutral or indifferent perception. Therefore, mean scores more than 3 indicated positive perception. Mean scores less than 3 indicated negative perception. These results, as presented in Table 10, provided insight into how rabbit meat consumers evaluated specific rabbit meat attributes and informed overall perception trends among the sampled population.

To examine how non-consumers perceived rabbit meat, an open-ended question was included in the questionnaire asking respondents why they do not consume rabbit meat. The responses were then subjected to qualitative content analysis, where similar themes were grouped into categories based on recurring patterns and expressions. This inductive categorization led to the creation of specific perception-related variables, such as inaccessibility, religious beliefs, dislike of taste, unattractive smell, traditional beliefs, cultural norms, physical appearance, and lack of awareness. Once categorized, the frequency of responses in each category was computed using descriptive statistics, and the results were summarized as percentages of the total number of non-consumers. These findings were presented in Table 11, which illustrates the distribution of reasons given for rabbit meat non-consumption. This approach enabled the transformation of open-ended qualitative feedback into quantifiable indicators that enriched the descriptive component of the study.

To assess how households perceived rabbit meat in comparison to other commonly consumed types of meat, a structured set of attribute-based comparison questions was included in the questionnaire. Respondents were asked to indicate which meat they preferred for each of eight specific attributes; taste, smell, physical appearance, cooking time, tenderness, nutritional value, affordability, and accessibility, by choosing between rabbit meat and other meat varieties: poultry, pork, mutton, beef, and fish. Respondents could also select both options if they perceived no difference. For each attribute comparison, for instance, rabbit vs. poultry,

frequencies were calculated for the number of respondents who preferred rabbit meat. These frequencies were then converted to percentages of total respondents, and the results were presented in table 12. Each meat comparison (rabbit vs. poultry, pork, mutton, beef, and fish) was summarized across all eight attributes, with an average preference percentage computed to capture the overall preference level for rabbit meat in that pairing. This descriptive approach allowed for an intuitive assessment of rabbit meat's perceived strengths and weaknesses relative to other meat types, and provided additional context to the regression analysis on perception.

3.8.3 Factors influencing the consumption of rabbit meat in Njoro Sub-County.

The Double Hurdle Model was applied to identify the factors influencing the consumption of rabbit meat. This model is appropriate when the decision to consume a product and the quantity consumed are influenced by different factors, and when the data includes a large proportion of zero observations (non-consumers) alongside positive continuous values (consumers). The double hurdle model, proposed by Cragg (1971), separates the consumption process into two sequential decisions or "hurdles".

The Double Hurdle Model was selected for this study in preference to the Tobit model due to its superior flexibility in distinguishing between two conceptually and behaviorally distinct decisions underlying rabbit meat consumption: the decision to participate (consume) and the decision regarding the quantity consumed. The Tobit model approaches these decisions as a single outcome driven by the same explanatory variables as a single process influenced by the same set of explanatory variables, the Double Hurdle model accommodates the possibility that different socio-economic, cultural, and informational factors may independently affect each stage. By modeling participation and consumption intensity as separate hurdles, the Double Hurdle Model provides a more realistic and robust framework for analyzing household-level consumption behavior. This two-step structure allows for improved identification of the determinants specific to each decision stage, ultimately enhancing policy relevance and predictive accuracy (Jones, 1989).

The first hurdle modeled the binary decision to consume or not to consume rabbit meat using a probit regression. This part of the model estimates the probability that a household consumes rabbit meat, based on socio-demographic and economic variables. The second hurdle modeled the intensity of consumption (amount of rabbit meat consumed per capita per month in kilograms) using a truncated regression (conditional on consumption). This accounts for the fact that only households that chose to consume rabbit meat appear in the second part of the analysis.

Independent variables included in both hurdles were: age, gender, household size, education level, income, marital status, group membership, rabbit keeping status, awareness of rabbit meat's nutritional benefits, taste preference, affordability, and distance to market. These were selected based on theoretical relevance and availability in the data.

In the first hurdle to determine consumption decision,

$Y_i^* = \alpha\, x_i + v_i$, ... (6)

$\begin{pmatrix} Yi = 1 \; if \; Yi^* > 0 \\ 0 \; otherwise \end{pmatrix}$ ..... (7)

'Y_i^*' is a dependent dichotomous choice variable that took the value of 1 if a household has consumed rabbit meat and zero if otherwise.

'x_i' is a vector of household characteristics, i.e., income, price, age and gender, education level, accessibility and awareness. It is the independent variable of the equation. These are the factors that hypothesized to determine the consumption decision(Y*).

'α' is a vector of parameters for the first hurdle. The error term (v_i) was assumed to be independent and normally distributed as ($v_i \sim N(0, 1)$).

Interpreted results identified factors that significantly influence the consumption decisions positively or negatively at 1%, 5% and 10% significance level. After establishing positive consumption decision in the first hurdle (Y*>0), we moved to the second hurdle to determine the consumption intensity (W*).

The equation in the second hurdle was:

$W_i^* = \beta\, z_i + u_i$ ..... (8)

Where $\mathbf{W_i} = \beta\, Z_i + u_i \; if \begin{pmatrix} Yi = 1, \; if \; Yi^* > 0 \\ 0 \; otherwise \end{pmatrix}$ ..... (9)

Equation (9) explains that W_i (intensity of consumption) is only determined if the threshold of Y_i=1 is met, if it is not met (Y_i=0), then intensity of consumption would not be determined.

Z_i= Explanatory variables/determinants of individual consumption per capita (w); rabbit keeping, level of awareness, and socioeconomic characteristics such as income level, age, gender, education level, household size and income, price of rabbit meat.

W_i is the dependent variable with factors that determine individual consumption per capita; level of awareness, education, gender, age, household size and income level.

'β' is a vector of parameters for the second hurdle.

The error term (u_i) was assumed to be independent and normally distributed, i.e., $u_i \sim N(0, \sigma^2)$

Table 6: Description of variables used in the double hurdle model

Variables	**Dependent variables**	**Priori sign**
Consumption decision (Yi *)	The initial decision to consume rabbit meat. Categorical variable. (1=Yes, 0= No).	+/-
Consumption per capita (Wi*)	The intensity of consuming rabbit meat. Measured as quantity in Kilograms consumed by a household per month.	+
Independent variable		
Distance to the market	Measured in kilometers from the households to marke Where rabbit meat is sold.	+/-
Taste	Dummy variable where (rabbit meat is tasty=1, Rabbit meat is not tasty=0)	+/-
Affordability	Dummy variable (rabbit meat is affordable=1, Rabbit meat is unaffordable=0)	+/-
Location	Categorical variable. Kihingo ward is the reference category The other wards are Njoro and Mauche. (Kihingo=0, Mauche=1, Njoro=2).	+/-
Knowing a rabbit keeper	Refers to the respondent having relations with someone who keeps rabbits. (Knows a rabbit keeper=1, doesn't Know a rabbit keeper=0).	+/-

Other independent variables include Income, education level, age, gender, awareness, group membership and household size and were defined as mentioned previously.

CHAPTER FOUR
RESULTS AND DISCUSSIONS

4.1. Introduction

This chapter outlines research findings in relation to the three specific objectives. The analysis employs both descriptive statistics and econometric models namely; the multivariate probit, ordered probit, and double hurdle models to examine the factors influencing nutritional awareness, consumer perceptions of rabbit meat, and consumption behavior among households in Njoro Sub-County.

4.2. Descriptive results

4.2.1 Characteristics of the sample

A total of 186 households were interviewed for this study. The unit of analysis was the household, and the respondents were primarily the household heads. In cases where the household head was unavailable, the interview was conducted with another adult member of the household who actively participated in food purchase and consumption decisions.

Of the total respondents, 117 (62.9%) were male and 69 (37.1%) were female. While these figures reflect the gender of the individuals interviewed, they are representative of household-level decision-makers rather than a general individual-level population. Full-timr farmers accounted for 68.3% of the respondents, whereas the others were involved in salaried, casual or off-farm self-employment. Nearly half of the respondents (47%) reported keeping rabbits with New Zealand White, California white and Chinchilla as the principal breeds raised. The surveyed population had a mean age of 47 years and the average farming experience was 46 years. Among the farmers interviewed, 30.6% were youths (below 35 years) and 69.4% were above 35 years. The larger proportion of farmers being above 35 years of age and 46 years on average indicates that only a few young people have embraced farming in Kenya. This matches with the outcomes of the study by Adeyanju *et al*. (2023) who found that the engagement of youths in agriculture across Kenya, Uganda and Nigeria was very low which may be attributed to lack of access to land, inadequate capital to kick start agricultural enterprises and negative perceptions towards agriculture considering it a low-level occupation. The households interviewed had an average size of 4 people per household with the largest household having 9 people and the smallest household had 1 person.

Most respondents, 72.6% were married whereas just over a quarter (27.4%) were unmarried. The largest share of respondents (41.4%) reported primary school as their highest educational attainment, followed by 30.2% who had attended vocational colleges, secondary school or post-

primary polytechnics. University graduates comprised 12.9% of the respondents, while 10.8% had attained middle-level college degrees and a small fraction (3.8%) had only received informal education. The sample was predominantly Christian, including 61.8% Protestants and 22% Catholics. Only 12.1% of the interviewed respondents were non-Christian. In terms of group involvement, 42.5% participated in social farmer associations while 57.5% did not.

The largest percentage of respondents (78.5%) fell within the lowest income bracket (KES 0–19,999 per month), while only 7.0% reported earnings above KES 40,000. A moderate proportion (14.5%) belonged to the middle-income group of KES 20,000–39,999. Cumulatively, 93% of the respondents earned less than Ksh 40,000 per month by estimation. Those who depended on casual employment among the respondents were 17.2%.

The most used sources of information about the rabbit enterprise including spreading awareness on nutritional benefits are Television (80.1%) followed by information by word of mouth from family and friends (46.2%). Schools (12.9%), radio (11.8%), print media (10.2%) were all considered vital sources of information. The least used as a source of information was social media (5.9%). Social media is widely used by many people nowadays but mostly among the youth. In the rural areas, the older population have not fully embraced social media as a useful source of information on rabbit meat nutritional benefit and educative content in general and hence explains the low percentage. The youth in the remote areas may also have less access to the internet due to poor reception or are unable to afford data bundles regularly due to low-income levels.

All the channels or sources of information are important avenues to spread awareness campaigns about the nutritional benefits of eating rabbit meat as individuals may use a combination of the different sources at the same time to acquire more knowledge about rabbit meat. In Spain, INTERCUN which acts as a rabbit meat marketing board in Spain launched campaigns to promote rabbit meat consumption. One of their strategies involved featuring celebrities on television, complemented by recipe publications, articles in widely circulated magazines and advertorials, with an aim of reaching the general public (Bodnar & Horvath, 2008). The findings presented in Table 7 shows the characteristics of the sample as explained above.

Table 7: Descriptive statistics for variables used in the study

Continuous variables	**Mean**	**Standard deviation**
Age	46.83	17.82
Household size	3.43	1.714
Categorical variables	**Frequency (186)**	**Percentage (%)**
Sex		
Male	117	62.9%
Female	69	37.1%
Marital status		
Married	135	72.6%
Single	37	19.9%
Divorced/separated/ Widowed	14	7.5%
Level of education		
None/informal	7	3.8%
Primary	77	41.4%
Post primary polytechnic/ Vocational college/Secondary	58	30.2%
Middle level college	20	10.8%
University	24	12.9%
Age Group		
Below 35 years	57	30.6%
Above 35 years	129	69.4%
Religion		
Catholic	41	22.0%
Protestants	122	61.8%
Non-Christians	23	12.1%
Social/farmer group		
Members	79	42.5%
Non-members	107	57.5%
Income level		
KES 0-19,000	146	78.5%
KES 20,000-39,999	27	14.5%

KES 40,000and above	13	7.0%
Occupation		
Casual employment	32	17.2%
Farmers	127	68.3%
Salaried and self-employed	27	14.5%
Rabbit keeping farmers		
Rabbit farmer	88	47.3%
Non-rabbit farmer	98	52.7%
Sources of information on rabbits		
Television	37	80.1%
Radio	22	11.8%
Print media	19	10.2%
Friends/family	86	46.2%
School	24	12.9%
Social Media	11	5.9%

4.2.2 Nutritional awareness

The level of awareness on nutritional benefits of rabbit meat was 64% among respondents interviewed in Njoro Sub-County. Similarly, Sanah *et al*. (2020) reported in Algeria that 61% of rabbit meat consumers identified its nutritional advantages, particularly its low cholesterol level, low fat, high protein and vitamin content. Rabbit meat was recommended by dieticians in Algeria for consumption by people in certain circumstances such as pregnancy, chronic illnesses such as diabetes, cardiovascular diseases and anaemia among others (Sanah *et al*., 2020). Bodnar and Horvath (2008) studied rabbit meat perception in Hungary and 76% of the respondents perceived rabbit meat as healthy due to its nutrition content. The study by Lekota (2021) in South Africa corroborated with the above findings as 69% of the respondents did not consume rabbit meat at all, they nevertheless acknowledged its low-fat content, particularly when compared to pork, poultry, mutton and beef among other types of meat. This shows that many people are aware of the nutritional content of rabbit meat compared to those who are unaware.

Respondents were asked about their awareness of various nutritional benefits associated with rabbit meat. As shown in Table 8, 64% of the respondents reported general awareness that rabbit meat possesses superior nutritional value compared to other meat types. However, when

asked about specific benefits, awareness varied. Only 33.3% knew that rabbit meat contains more calcium and phosphorus than other commonly consumed types of meat. Awareness was relatively higher regarding its protein content, with 55.4% acknowledging that rabbit meat has a higher protein level than beef, pork, mutton, poultry, and fish. Additionally, 44.6% of respondents were aware that rabbit meat is lean and easily digestible, while a majority (62.4%) recognized that it has lower fat and cholesterol content compared to other commonly consumed meats.

Table 8: Awareness on different rabbit meat nutritional benefit

Nutritional Benefit	**% of Respondents Aware**
Aware that rabbit meat has superior nutritional value compared to other meats	64.0%
Aware that rabbit meat contains more calcium and phosphorus	33.3%
Aware that rabbit meat has the highest protein content (vs. beef, pork, mutton, poultry, and fish)	55.4%
Aware that rabbit meat is easily digestible due to its lean nature	44.6%
Aware that rabbit meat has lower fat and cholesterol levels (vs. other commonly consumed meats)	62.4%

4.2.3 Consumer perceptions

Table 9 shows the consumer perception on rabbit meat based on taste, smell, nutrition, preparation time, physical appearance, affordability and accessibility. The results were measured using a Likert Scale and the scores were defined as discussed in section 3.7.2 above.

Respondents found rabbit meat to be tastier (3.9), have good smell (3.6), more nutritious (3.5), and faster to cook (3.8) compared to pork, chicken, beef, mutton, fish and pork. However, respondents viewed rabbit meat to be relatively costly (2.8) and less accessible (2.5) in the market compared to chicken, beef, mutton, fish and pork. Consumption of rabbit meat was not substantially affected by the physical appearance of the carcass, which respondents rated as relatively unimportant (2.5)and many highlighted its nutrition (3.2) as the key motivating factor

as to why they consumed rabbit meat. The evidence obtained in this research concurs with the outcomes by Lekota (2021) who observed that South African respondents viewed rabbit meat as easier to cook, nutritionally superior and more tender relative to chicken, pork, beef and mutton. Nonetheless, a contrast emerged in terms of taste, as respondents indicated that its taste was inferior to chicken, beef and mutton. Similarly, Montero-Vicente (2018) found in Spain that consumers regarded rabbit meat as less tasty than chicken (14.88%), pork (14.88%) and beef (35.54%).Rabbit (9.19%) and turkey (4.24%) were ranked the lowest in terms of taste and there was a lot of differing opinions on the tastiness of rabbit meat among the respondents (Montero-Vicente, 2018).

In conclusion, rabbit meat is perceived positively by respondents in regards to taste, smell, nutritive value, easy preparation and less cooking time while households perceive it negatively when it comes to affordability and accessibility. The respondents were neutral about rabbit meat's physical appearance and therefore does not influence their purchasing or consumption decision.

Table 9: Consumer perception on rabbit meat based on taste, smell, nutrition, preparation time, physical appearance, affordability and accessibility

Rabbit meat attributes	**Mean score**	**Conclusion**
Taste	3.9	Rabbit meat tastes good
Smell	3.6	Rabbit meat smells good
Nutritional value	3.5	Rabbit meat is more nutritious compared to other types of meat.
Nutrition as the main attraction to consume rabbit meat.	3.2	Main reason for consumption
Preparation/cooking time	3.8	Takes short time to prepare/cook
Physical appearance	2.5	Physical appearance doesn't affect respondents' decision to consume rabbit meat
Affordability	2.8	Rabbit meat is expensive
Accessibility	2.5	Rabbit meat is inaccessible

Table 10 shows perceptions by non-consumers. Out of the sampled population 20% of the respondents who were non-consumers reported that the scarcity of rabbit meat restricted their

opportunities for consumption. Similarly, Hoffman *et al*. (2010) reported that rabbit meat was seldom consumed in South Africa due to its scarcity, with most of those who had eaten it having acquired it through hunting. Moreover, 20% of non-consumers reported that their dietary choices were shaped by their religious beliefs, which prevented them from consuming rabbit meat and also expressed unwillingness to consume it in the future. A comparable result was observed in South Africa's study by Nolwandle (2021) who documented that 8.6% of the study participants viewed eating rabbit meat as contrary to their religious beliefs. Some non-consumers (15%) indicated no specific reason for abstaining other than a general dislike of rabbit meat, while another 15% cited its unpleasant smell as the source of their aversion. An additional 10% of the respondents cited traditional beliefs while another 10% of Traditional beliefs and cultural factors each accounted for 10% of the reasons given for non-consumption. The least cited reasons for non-consumption were the physical appearance (5%) and lack of awareness regarding their edibility and nutritional value (5%).

Table 10: Perceptions by non-consumers on rabbit meat

Reasons for non-consumption	**Percentage (%)**
Hard to find (inaccessibility)	20
Religious beliefs	20
Just did not like the meat	15
Unattractive smell	15
Traditional beliefs	10
Cultural reasons	10
Physical appearance	5
Unawareness about consumption and nutritional benefits	5

Table 11 presents households' perceptions of rabbit meat attributes compared to five other commonly consumed meat types; poultry, pork, mutton, beef, and fish. For each attribute, respondents indicated which meat type they perceived to be better. The responses were recorded in percentages of the total responses for each comparison. Each row of the table represents a specific rabbit meat attribute, while each column pair (i.e., Rabbit/Poultry, %) shows the percentage of respondents who preferred rabbit meat over the specified meat type for that attribute. An average percentage score was also calculated across all eight attributes

for each comparison, providing a general perception indicator of how rabbit meat is rated relative to other meat types.

Based on the results in Table 11, an average of 40% of the respondents preferred rabbit meat to poultry in regards to taste, smell, physical appearance, cooking time, tenderness, nutritional value, affordability and accessibility. Less cooking time (48%) and tenderness (47%) were the most frequently cited advantages of rabbit meat, whereas accessibility (20%) and affordability (38%) ranked lowest. This suggests that most of the respondents' preference for rabbit meat over poultry was significantly driven by its shorter cooking time and tenderness while its inaccessibility and higher cost were the main factors limiting its preference.

Among the respondents interviewed, 29% indicated a preference for rabbit meat over pork. The respondents who preferred rabbit meat over pork mainly preferred it due to its tenderness (34%) and its superior nutritional advantage (33%). The least valued qualities over pork were smell (20%) and affordability (26%). This outcome implied that that rabbit meat consumers preferred the meat over pork mainly because of its tenderness and nutritional value and least valued rabbit meat over pork because of its smell and affordability.

On average, 36% of households expressed a preference for rabbit meat over mutton. Among households favouring rabbit meat over mutton, the key reasons cited were less cooking time (45%), tenderness (42%), taste (42%) and nutritional value (42%). The least valued qualities of rabbit meat over mutton were accessibility (20%) and physical appearance (24%). In comparison with mutton, rabbit meat was perceived by households that consume it as easier to cook, more tender, tastier, and nutritionally superior. Most households reported that rabbit meat was comparatively inaccessible and less attractive in physical appearance than mutton.

Findings showed that 34% of the respondents, on average, favoured rabbit meat over beef. Among those who preferred rabbit meat over beef, the main factors driving preference were tenderness (40%) and shorter cooking time (40%), while limited accessibility (17%) and cost (30%) were regarded as its least advantageous characteristics. Accordingly, most households that consumed rabbit meat perceived it to require less cooking time and to be more tender, while also recognizing challenges of limited accessibility and less affordability compared to beef.

On average, 27% of the surveyed households preferred rabbit meat to fish. The attributes most frequently selected in favor of rabbit meat were its physical appearance (33%) and smell (32%), whereas nutritional value (24%) and tenderness (23%) were rated lowest. These results indicate that households preferring rabbit meat over fish largely associated it with superior

visual appeal and smell, while relatively few considered it to be nutritionally superior or more tender in comparison to fish.

Table 11: Households' perception of rabbit meat attributes in comparison to common types of meat

Meat attributes	**Proportion (%) of respondents perceiving rabbit meat to be better than:**				
	Poultry	**Pork**	**Mutton**	**Beef**	**Fish**
Taste	41	31	42	39	27
Smell	40	20	34	35	32
Physical appearance	43	30	24	33	33
Less cooking time	48	32	45	40	25
Tenderness	47	34	42	40	23
Nutritional value	40	33	42	37	24
Affordability	38	26	37	30	26
Accessibility	20	25	20	17	25
Average percentage	**40**	**29**	**36**	**34**	**27**

4.2.4 Consumption

Out of the 186 households interviewed, 41.4% reported having consumed rabbit meat at least once, while the remaining 58.6% had never consumed it. Cross-tabulation of rabbit meat consumption with rabbit keeping revealed notable consumption behavior among producers. Among households that kept rabbits (47.3% of the sample), 56.8% reported that they had consumed rabbit meat, while 43.2% had not. In contrast, among households that did not keep rabbits, only 27.6% had consumed rabbit meat, while a significant majority (72.4%) had never consumed it. These results suggest that rabbit keeping may positively influence consumption behavior, possibly due to increased familiarity, accessibility, or reduced cost barriers.

Consumers reported purchasing rabbit meat at an average price of Ksh 800 per kilogram. Monthly household consumption among those who consumed rabbit meat averaged 1.6 kilograms per household. On a per capita basis, this translates to approximately 0.6 kilograms per person per month. These consumption levels reflect relatively low intake, possibly due to limited availability, affordability concerns, or prevailing perceptions surrounding rabbit meat.

Table 12: Descriptive overview of rabbit meat consumption behavior among households in Njoro Sub-County

Consumption Indicator	Value
Households that have consumed rabbit meat	41.4%
Households that have never consumed	58.6%
Rabbit keepers who consume	56.8%
Rabbit keepers who do not consume	43.2%
Non-keepers who consume	27.6%
Non-keepers who do not consume	72.4%
Average market price of rabbit meat	Ksh 800 per kg
Average household consumption	1.6 kg/month
Average per capita consumption	0.6 kg/month

4.3 Factors influencing nutritional awareness of rabbit meat among households

A multivariate probit regression was performed to determine the factors that influence nutritional awareness of rabbit meat among households in Njoro Sub-County. Table 13 presents the results of the Multivariate Probit (MVP) regression analysis. The model assessed five binary awareness indicators: general awareness, high protein content, digestibility, mineral content, and low fat content.

In Table 13, each column under the awareness indicators shows the regression coefficients (outside the brackets), representing the direction and magnitude of influence of each independent variable on the respective awareness outcome. The values shown in brackets indicate the corresponding p-values, which indicate the statistical significance of the results. For instance, in the "Low Fat" column, marital status (married) has a coefficient of 0.2631 with a p-value of 0.021, showing a statistically significant positive influence at the 5% level. Similarly, the variable Mauche ward has a strong negative and significant effect on awareness of digestibility and low fat attributes. Significance levels are denoted below table 13.

The level of education, marital status, location and age were found to have significant influence on nutritional awareness of rabbit meat among households in the study area.

Household size, gender, group membership, and rabbit keeping did not have a significant influence on nutritional awareness of rabbit meat among households in Njoro Sub-County.

The level of education was reported to have a positive significance influence on the nutritional awareness of rabbit meat among households in Njoro Sub County. In general awareness level, mineral content awareness and low-fat content awareness, education level was significant at 10% significance level respectively. Secondary level of education was the common significant influencer on general awareness, mineral content and low-fat content awareness. Since Informal education was the reference category, an increase in formal education among households increases the probability by households to get awareness on rabbit meat nutritional benefits. Hence as a household head's level of formal education level increase, probability of general nutritional awareness, mineral content and low-fat content awareness on rabbit meat increases. This finding aligns with the study by Mailu *et al*. (2017) who concluded that the education of the household head was a primary driver of rabbit meat consumption in Kenya. It was further reported that Individuals with a formal education were more informed about the benefits of consuming white meat over red meat and more so, rabbit meat, due to its exceptional properties of containing low fat, cholesterol and calories while having high protein content (Mailu *et al*., 2017). Findings showed that 47% of households headed by persons lacking formal education consumed rabbit meat, in contrast to 53% of households with heads who had attained some formal education.

Age of respondent had statistical significant influence on nutritional awareness of rabbit meat specifically on the digestibility awareness and mineral content awareness at 10% significance level respectively. As age increases by one year, the probability of awareness by the households increases by 0.0044 units and 0.0047 units respectively. As one continues to grow older, he/she has a chance to be exposed to information about the benefits of rabbit meat. Also, the older one gets, his food preferences may also change. They start to look for information on the most nutritious types of food to consume and may come across rabbit meat. Age also comes with susceptibility to lifestyle diseases among older people especially around food consumed and there is need for awareness of the types of food to consume. These findings corroborate with Mbutu (2013) who stated that as individuals grow older, their patterns of food consumption tend to change. As a population ages, food consumption per capita declines due to change in preferences as well as the types of food consumed (Mbutu, 2013).

Marital status of the respondents had a statistically significant influence on low-fat content awareness at 5% significance level. The respondents who were single were the reference category and therefore the household heads who were married were likely to be aware about

the low-fat content attribute of rabbit meat compared to those who were single by 0.2631 units. This could be because the married individuals need to evaluate more food options to feed their families and may come across rabbit meat as a source of healthy protein for their families especially the children. Married individuals are also more likely to exchange information among their family and hence increased likelihood of having information about nutritional benefits of consuming rabbit meat. A study by Carrillo *et al*. (2012) found that married individuals, particularly women, are more involved in planning, purchasing, and preparing meals, leading to greater awareness of food nutrition information. This finding was also in contradiction to the study done in Indonesia by Herawati (2013) who found marital status, to have no statistically significant influence on awareness of the nutritious benefits and consumption of rabbit meat.

Location also showed significant influence on nutritional awareness level. In Table 13, Ward 2 (Mauche) and Ward 3 (Njoro) have significantly lower awareness of rabbit meat's nutritional benefits compared to Ward 1 (Kihingo) in regards to general awareness, protein content awareness, digestibility, and low-fat content awareness. The lower awareness level in Mauche and Njoro compared to Kihingo may be attributed to cultural constraints among the communities that live there. Some of the communities consider rabbits to be for young boys and are therefore unconcerned about the nutritious benefits associated with consuming its meat hence influencing nutritional awareness. Location also influences awareness through agricultural engagement, access to information, economic activities, and community engagement. This outcome supports the observations by Kittler and Sucher (2008) who highlighted in their study how cultural practices and perceptions significantly influence dietary choices and awareness. According to FAO (2016), the regions where agriculture is the main economic activity, there is likelihood of higher nutritional awareness due to better exposure to agricultural education and practices.

Table 13: Multivariate probit regression results

Predictor	General Awareness	High Protein	Digestibility	Mineral Content	Low Fat
Household Size	-0.0148 (0.513)	0.0257 (0.256)	-0.0026 (0.902)	0.0047 (0.831)	0.0164 (0.460)
Gender (Female=1)	-0.0903 (0.263)	0.0368 (0.647)	0.0493 (0.514)	0.0181 (0.816)	0.1145 (0.149)
Married	0.1086 (0.345)	0.1736 (0.132)	0.1111 (0.303)	0.0448 (0.687)	**0.2631 (0.021)****
Household head's age	0.0019 (0.467)	0.0015 (0.559)	**0.0044 (0.076)***	**0.0047 (0.068)***	-0.0008 (0.757)
Separated/Divorced	0.0530 (0.768)	0.1241 (0.490)	0.0348 (0.836)	0.1355 (0.436)	0.1283 (0.468)
Secondary Education	**0.1576 (0.075)***	0.0939 (0.287)	0.1077 (0.193)	**0.1446 (0.091)***	**0.1471 (0.090)***
Tertiary Education	0.1226 (0.270)	0.1475 (0.185)	0.1676 (0.109)	0.1191 (0.268)	0.0964 (0.377)
Income: 20k–39k	-0.0943 (0.364)	-0.1037 (0.318)	-0.0972 (0.728)	0.0202 (0.841)	0.0215 (0.833)
Income: ≥40k	0.0554 (0.716)	0.1992 (0.190)	0.0859 (0.547)	0.0401 (0.785)	0.1061 (0.478)
Rabbit Keeper	-0.0281 (0.729)	-0.0659 (0.416)	0.0413 (0.587)	-0.0700 (0.372)	0.0082 (0.917)

Group Member	0.0149 (0.849)	0.0599 (0.443)	0.0660 (0.368)	0.0087 (0.908)	0.0456 (0.552)
Location: Mauche	**-0.2496** **(0.057)***	**0.4891** **(0.000)*****	**-0.7173** **(0.000)*****	-0.2076 (0.101)	**-0.3514** **(0.007)*****
Location: Njoro	-0.1737 (0.147)	**0.3093** **(0.010)****	**-0.5296** **(0.000)*****	0.0073 (0.949)	**0.2177** **(0.064)***

Key:

***=significant at 1%,

**=significant at 5%,

*=significant at 10%.

4.4. Factors influencing consumer perception of rabbit meat among households in Njoro Sub-County

Ordinal logistic model was used to determine the level of influence of factors such as education, age, gender, household size, marital status, income, rabbit keeping, awareness of nutritional benefits, geographical location and social group membership on households' perceptions of the nutritional value of rabbit meat in Njoro Sub-County, as shown in Table 14.

According to the results, age, awareness, education, income level and geographical location of the household significantly influenced consumer perception of rabbit meat. As the age of the respondent increased by one year, the likelihood of perceiving rabbit meat positively increased by 0.0263 units. This suggests that older individuals demonstrate a greater appreciation for rabbit meat, which may be linked to its perceived nutritional value. The positive influence of age on the perception of rabbit meat aligns with the research study outcomes of Mailu *et al*. (2017), who observed that older participants were more aware of and valued the healthy benefits gained rabbit meat consumption. However, the result contrasts with Beal *et al*. (2004), who concluded that younger people were more likely to consume rabbit meat than elderly individuals due to other reasons such as taste, not necessarily for its nutritive values.

Increased awareness about the nutritional benefits of rabbit meat significantly improved the perception of rabbit meat by households. Households with greater awareness are 1.3619 units more likely to perceive rabbit meat positively compared to those who are unaware. Similar to Bodnar and Skobrak (2008), who highlighted that awareness campaigns significantly boosted the consumption and positive perception of rabbit meat in Spain, this study confirms that awareness of rabbit meat's nutritional attributes is a critical factor in positively influencing individuals' perceptions of rabbit meat.

Higher education levels marginally increased the likelihood of perceiving rabbit meat positively. Respondents with tertiary education are more likely to have a positive perception compared to those with only primary education by 0.8594 units. The marginal significance of education aligns with Verbeke *et al*. (2010), who observed that higher education levels were associated with increased awareness and consumption of healthier meat options like fish. This suggests that educated individuals are more inclined to appreciate the nutritional values of specific types of meat, including rabbits.

Higher-income levels significantly influenced perception of rabbit meat by households. Households with an income of Ksh.40, 000 and above show a positive and statistically significant coefficient at the 5% significance level. This indicated that higher-income households with an income of Ksh 40,000 and above are significantly more likely to have a positive perception of rabbit meat compared to households with an income of Ksh 0-19,999 by 1.4894 units. This result suggests that higher income may provide better access to information on healthier food options hence increase the likelihood of learning about rabbit meat consumption benefits, leading to a positive perception of the meat. The significant positive impact of income on the perception of rabbit meat is consistent with the findings of Anderson (2007), who noted that higher income levels correlate with a preference for nutritionally superior food products, including lean meat.

Households in Ward 3 (Njoro) are significantly less likely to positively perceive rabbit meat as compared to those in Ward 1 (Kihingo), by -1.244 units. This suggests regional or geographical differences in households influence the perception of rabbit meat. The regional differences in perceptions noted in this study are consistent to the observations by Hoffman and Wiklund (2006), who reported varying perceptions and consumption patterns of game meat across different regions, influenced by local cultural and socio-economic factors.

Table 14: Results on ordinal logistic regression analysis

Consumer perception	**Coef.**	**Std. Err.**	**z**	**P>z**
Age	0.0263	0.0109	2.4100	0.0160**
Household size	0.0821	0.0935	0.8800	0.3800
Gender	-0.1345	0.3278	-0.4100	0.6810
Membership(non-member=0)	0.2393	0.3174	0.7500	0.4510
Rabbit keeping(non-keepers=0)	0.5023	0.3398	1.4800	0.1390
Awareness(unaware=0)	1.3619	0.3225	4.2200	0.0000***
Marital status(single=0)				
married	-0.0642	0.4631	-0.1400	0.8900
separated/divorced/widowed	-0.9167	0.7229	-1.2700	0.2050
Education(primary=0)				
Secondary	0.1543	0.3637	0.4200	0.6710
Tertiary	0.8594	0.4540	1.8900	0.0580*
Income (0-19,999=0)				
20,000-39,999	0.5616	0.4342	1.2900	0.1960
40,000 and above	1.4894	0.6143	2.4200	0.0150**
Location(Kihingo ward=0)				
Mauche ward	-0.2783	0.5448	-0.5100	0.6090
Njoro ward	-1.2443	0.5104	-2.4400	0.0150**

Key:

***=significant at 1%, **=significant at 5%, *=significant at 10%.

4.5. Factors influencing rabbit meat consumption among households in Njoro Sub-County.

A double hurdle model was used for this analysis. The first hurdle (Tier 1) was to determine the initial decision for a respondent to consume rabbit meat and what factors influence the decision. The second hurdle (Tier 2) determined the factors that influence consumption intensity per capita in Njoro Sub- County as shown in Table 15.

The results from the double hurdle model suggested that there are different factors influencing the initial decision of households to consume rabbit meat and the consumption per capita in kilograms monthly. According to the findings of this study, awareness, age, education, knowing a rabbit keeper, distance to the market and taste influence initial decision to decision to consume rabbit meat. Factors that influence significantly the consumption per capita by the households in Njoro Sub-County include age household size, distance to market, affordability and location (wards) as discussed below.

The study revealed that age exerts a negative effect, at 1% significant level, on households' initial decision to consume rabbit meat. Specifically, with each additional year of age, the likelihood of a household opting to consume rabbit meat decreases by 0.0155 units. This outcome indicates that households headed by younger individuals are more inclined to try rabbit meat compared to those with older heads of household. This may be as a result of younger people being more receptive to experimenting with new or trendy food items or recipes especially those that are hyped through social media, which is a platform that provides great exposure to information on rabbit meat's availability, taste and nutritional value. This observation contradicts the outcomes of a research survey by Beal *et al*. (2004) who concluded that in Southern United States, men aged over 36 years had a higher likelihood to consume rabbit meat relative to those who were below 36 years. Mailu *et al*. (2017) undertook a survey in Kenya; Nakuru, Kiambu, Taita Taveta, Nyeri, Meru and Tharaka Nithi and noted no association between age and rabbit meat consumption. In the second hurdle, age continued to exhibit a negative and significant influence on rabbit meat consumption at the 1% level, where each additional year of age reduced consumption by 0.0232 units. The younger household heads were also likely to consume more per capita.

Households' awareness of the nutritional benefits associated with eating rabbit meat significantly increases the likelihood of them choosing to consume it, with the effect being positive at the 1% significance level. This implies that as awareness increases by one unit, the decision to consume increases by 0.005 units holding all other factors constant. Increased health consciousness among individuals as a means to fight lifestyle diseases, some caused by the type of foods we consume, people are slowly shifting towards eating foods proven to be healthy, rabbit meat being among them. Bodnar and Horvath (2008) found that in Spain, doctors, dieticians and nurses among other health professionals prescribed rabbits to their patients and information about rabbit meat consumption benefits were advertised to the public through newspapers, celebrity advertisement in television with recipes on how to cook it in an effort to promote awareness. The promotional campaigns played a key role in slowing the

decrease in production and consumption of rabbit meat at a time when they were decreasing. This shows that awareness on nutritional benefits of rabbit meat can boost consumption of rabbit meat (Bodnar & Horvath, 2008).

It was also observed that attaining tertiary education exerted a marginal impact on the initial decision to consume rabbit meat, with the effect being significant at the 10% level. Tertiary education was also found to have a marginally significant influence on initial decision to consumer rabbit meat at 10% significance level. According to findings, tertiary education has a negative marginal significant influence suggesting that household heads with tertiary education were 0.456 units less likely to consume rabbit meat than those with only primary level education. This suggests that higher education might be associated with lower likelihood to consume rabbit meat which may be as a result of factors such as preference for other types of domestic meat that are widely accepted. They may have concerns over sourcing, handling and possibly less accessible to them as compared to those who are less educated that are likely to be found in the rural areas and may easily access rabbit meat raised for subsistence in the village. These conclusions were in contradiction with the outcomes of a study by Mailu *et al*. (2017) in Kenya who found that higher education levels were more likely to consume rabbit meat. He found that 47% of the households headed by a formally educated individual consumed rabbit meat compared to over 50% of the household heads who had lower level of education, that is, informal education or primary level.

At the 1% significance level, taste demonstrated a strong influence on the likelihood of households opting to consume rabbit meat for the first time (initial decision). Households that perceive rabbit meat to be tasty are 1.371 units more inclined to consume rabbit meat. Households may have heard that rabbit meat is tasty from their neighbours or friends and may desire to consume it. These output is consistent with the results of a survey by Mailu *et al*. (2017) who concluded that taste was a crucial determinant in meat consumption choices.

Distance to the market played a dual role. It negatively influenced households' first decision to consume rabbit meat at 5% significance level and also had a positive effect on per capita consumption at the 1% significance level. For the initial decision to consume, for each kilometer added, the likelihood of eating rabbit meat by a household decreases by 0.0057 units. The farther the market is, the more expensive rabbit meat may become, since transport expenses drive up the overall purchasing cost. This lowers chances of new households deciding to consume rabbit meat. For consumption per capita, for each kilometer added, consumption per capita is likely to increase by 0.1625 units. This may be attributed to households purchasing in

bulk to avoid going back and forth to the market because of the distance and hence may end up consuming more per capita.

The analysis results further indicated an inverse relationship between household size and consumption per capita with statistical significance at 1% level. This means that households with fewer members have a high likelihood to consume more rabbit meat per capita by 0.1625 units. This may be linked with affordability of rabbit meat hence due to financial constraint, consumption per capita may be low. These observations contrast with the findings of a study by Lukefahr and Cheeke (1991) who found no significant association between meat consumption and household size.

Affordability was found to have a positive and significant effect on per capita rabbit meat consumption, with significance established at the 5% level. This implies that when rabbit meat becomes more price-friendly by Ksh 1, households' consumption per capita increases by 0.6708 units. This is because households will have a higher purchasing power to acquire rabbit meat and therefore consume more. The study be Verbeke *et al.* (2010) in Europe on critical factors that influence meat consumption decisions also found that higher prices of meat led to reduced meat consumption per capita.

Location was found to significantly affect per capita consumption of rabbit meat, with the effect being notable at the significance level of 5%.The location also showed some significant influence on consumption per capita of rabbit meat at 5% significant level. The consumption in Mauche ward was much lower compared to Njoro and Kihingo. This may be due to strong traditions and culture of the majority of the people in Mauche who believe that rabbit meat is for young boys. This may therefore decrease consumption per capita in households. Njoro had more consumption per capita than Kihingo and Mauche.

Knowing a rabbit keeper has shown to play a key role in shaping the initial decision by households to consume rabbit meat. Households that have relations or networks with individuals who keep rabbits are 0.578 units more likely to consume rabbit meat compared to households without such connections. This finding aligns with the results of the study by Adanguidi (2020) in Benin who found that respondents who knew rabbit farmers or were knowledgeable on rabbit farming practices were more likely have consumed rabbit meat. Their connections with rabbit farmers made rabbit meat easily accessible to them and therefore can be influenced to consume it.

Table 15: Results on double hurdle model analysis

Variables	Coef.	Robust Std. Err.	Z	P>z
Hurdle 1				
Awareness	0.5721	0.2049	2.79	0.005***
Gender	0.3063	0.2207	1.39	0.165
Age	-0.0155	0.0076	-2.04	0.041**
Group membership_	0.0483	0.2078	0.23	0.816
Education(secondary)	-0.1057	0.2170	-0.49	0.626
Education(tertiary)	-0.4562	0.2667	-1.71	0.087*
Income (20,000-39,999)	0.1644	0.2508	0.66	0.512
Income (40,000 and above)	-0.2500	0.3973	-0.63	0.529
Household size	-0.0071	0.0610	-0.12	0.906
Knowing a rabbit keeper	0.5775	0.2156	2.68	0.007***
Distance to market	-0.0057	0.0027	-2.11	0.035**
Taste	1.3711	0.3381	4.05	0.000***
Affordability	-0.2763	0.2592	-1.07	0.286
Location(wards):				
Mauche	0.4033	0.3418	1.18	0.238
Njoro	0.4383	0.2826	1.55	0.121
Hurdle 2				
Awareness	-0.5527	0.3491	-1.58	0.113
Gender	-0.2297	0.2319	-0.99	0.322
Age	-0.0232	0.0074	-3.1	0.002***
Membership_	0.0777	0.1895	0.41	0.682
Education(secondary)	0.1650	0.2908	0.57	0.570
Education(tertiary)	0.0199	0.3007	0.07	0.947
Income(20,000-39,999)	-0.1102	0.2121	-0.52	0.603
Income(40,000 and above)	0.1462	0.4285	0.34	0.733
Household size	-0.5112	0.0895	-5.71	0.000***
Knowing a rabbit keeper	0.2254	0.3674	0.61	0.539
Distance to market	0.1625	0.0233	6.97	0.000***

Taste	-0.5679	0.5010	-1.13	0.257
Affordability	0.6708	0.2891	2.32	0.020**
Location(wards)				
Mauche	-0.7676	0.3273	-2.35	0.019**
Njoro	0.1505	0.2578	0.58	0.559

Key:

***=significant at 1%, **=significant at 5%, *=significant at 10%

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of findings

This study explored the factors influencing nutritional awareness, perceptions, and consumption of rabbit meat among households in Njoro Sub-County, Nakuru County, Kenya. The research was motivated by the low uptake of rabbit meat despite its nutritional and sustainability advantages. A descriptive survey design was adopted, targeting households across three wards (Njoro, Kihingo, and Mauche). Using multistage sampling, data were collected from 186 households through face-to-face interviews with a semi-structured questionnaire that had been pre-tested for reliability and validity.

Data analysis employed descriptive statistics, multivariate probit regression to assess nutritional awareness, ordered probit regression to examine perceptions, and a double hurdle model to evaluate consumption decisions and consumption intensity. Independent variables included age, gender, education, income, household size, marital status, location, group membership, distance to market, affordability, taste, and familiarity with rabbit keepers.

The findings revealed that education, marital status, occupation, and age significantly influenced awareness of rabbit meat's nutritional benefits. Households generally perceived rabbit meat positively in terms of taste, nutrition, and preparation time, but highlighted affordability and accessibility as major barriers. Perceptions were significantly influenced by age, education, income, awareness, and location. The decision to consume rabbit meat was determined by factors such as awareness, education, age, taste, knowing a rabbit keeper, and distance to market, while the intensity of consumption was influenced by household size, affordability, location, and distance to market.

The study concludes that rabbit meat is widely recognized for its nutritional and sensory qualities but remains underutilized due to affordability and accessibility constraints. It recommends targeted awareness campaigns, especially for younger consumers, improved distribution networks, and pricing incentives to enhance accessibility and affordability. Location-specific outreach and further research into sensory attributes and preparation methods are also suggested to promote its consumption and support food and nutrition security.

5.2 Conclusions

i. The nutritional benefits of rabbit meat among households in Njoro Sub-County varies significantly. A minority of the respondents interviewed (33.3%) were aware of rabbit meat's high calcium and phosphorus content. A significant portion (55.4%) of the respondents were aware of rabbit meat's superior protein content compared to other domestically consumed types of meat and 62.4% knew about rabbit meat's low fat and cholesterol attributes. However, a significant portion of the respondents (55.4%) lacked knowledge about rabbit meat's lean and easy digestibility. These findings therefore suggest that households have a moderately high level of awareness about some of the key health benefits of rabbit meat consumption.

ii. The assessment of consumer perceptions of rabbit meat among households in Njoro Sub-County revealed that rabbit meat was perceived positively especially as a result of its nutritional value, taste, smell and ease of preparation. However, it is viewed negatively in terms of accessibility and affordability. Physical appearance of rabbit meat was perceived by the respondents as neutral which meant that it does not significantly influence consumers' decisions concerning rabbit meat consumption. These findings indicate that there is an appreciation by households for the intrinsic nutritional qualities of rabbit meat but there are external factors, such as accessibility and cost that pose as barriers to its consumption.

iii. Specific comparisons between rabbit meat and other domestically consumed types of meat such as poultry, pork, mutton, beef and fish revealed that rabbit meat's main advantage over them was its cooking time and tenderness while its disadvantage over the other types of meat was its cost and accessibility. These results further suggest the need to address economic and distribution barriers which is crucial in promoting rabbit meat consumption. The low socio-economic status of households and challenges in supply or distribution results to low rabbit meat consumption.

iv. For the non-consumers of rabbit meat, religious beliefs (20%) and inaccessibility (20%) were cited as their primary reasons for non-consumption. Other reasons included the dislike of the smell (15%), lack of a specific reason (15%), traditional beliefs (10%), culture (10%), physical appearance (5%) and lack of awareness (5%). These results implied that barriers to rabbit meat consumption among households of non-consumers were mainly logistical or deeply rooted in cultural and personal preferences. Therefore, addressing these diverse factors is essential in promoting rabbit meat consumption.

v. This study also revealed that age, awareness, education level, taste, distance to the market place, household size, affordability and location have significant impact on both the initial decision to consume and the consumption per capita of rabbit meat. Households headed by young people, higher awareness of rabbit meat's nutritional value, positive perception of taste and having connections with rabbit keepers favour the consumption of rabbit meat. However, factors such as long distance to the market and higher educational level pose challenges to rabbit meat consumption among households.

5.3 Recommendations

Guided by the outcomes of the study these recommendations will be appropriate to promote rabbit meat consumption and the rabbit value chain at large:

i. Since awareness plays a pivotal role in shaping perception and consumption, targeted campaigns, especially through schools, social groups, and agricultural extension should be intensified to promote the health benefits of rabbit meat.
ii. Regional differences suggest that interventions should be location-specific. For instance, increasing outreach in Njoro ward, where perception was lower, could help close the awareness and perception gap.
iii. To stimulate both uptake and frequency of consumption, policies should encourage decentralized distribution networks (e.g., local markets, cooperatives), while supporting production incentives to stabilize or reduce retail prices.
iv. Since younger individuals and urban households have lower awareness and consumption levels, involving youth in rabbit farming clubs and promoting rabbit meat in urban food festivals can enhance uptake.

5.4 Suggestions for further study

i. Future studies should investigate sensory perceptions such as taste and smell in more detail, and assess how various forms of rabbit meat preparation influence acceptance among different demographic groups.
ii. This study emphasized affordability and accessibility as barriers. Further research should analyze rabbit meat value chains, including marketing channels, distribution systems, and pricing mechanisms, to identify where inefficiencies suppress supply and demand.

iii. Longitudinal studies assessing how rabbit meat consumption contributes to household nutrition, dietary diversity, and income generation would expand the evidence base for positioning rabbit meat in national food security strategies.

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APPENDICES

Appendix 1: Questionnaire

My name is Anthony Munene, a Masters student at Egerton University. This questionnaire has been developed to gather data for the purpose of assessing rabbit meat consumption among households in Njoro Sub-county. Results of this study will provide useful information for designing policies and strategies for promoting rabbit meat consumption in the County and the country. You are among the households that have been selected for the study. The data you provide will be used for the purpose of this study only and will be highly appreciated and treated with utmost confidentiality.

PART ONE; General Information (*tick where appropriate*).

1. Questionnaire Number (Researcher to fill)…….
2. Respondent's Name…….
3. Name of the Enumerator……
4. Date of interview……
5. Sub County……
6. Ward: [1]Njoro [2] Kihingo [3] Mauche
7. Village……
8. Distance to all weather road…….
9. Distance to main shopping Centre ……
10. Transport cost to sub-county headquarter……..

PART TWO: Respondents Demographic and Business Characteristics (*please tick as appropriate*)

1. Gender of respondent [1] Male [2] Female
2. Gender of household head if not the respondent [1] Male [2] Female
3. Age of respondent (years) ……..

4. Age of household head if not the respondent (years) …….
5. What is your marital status

   [1] Married [2] Single [3] Divorced [4] Widowed

   [6] Other, Specify……
6. What is your highest level of education?

   1. None

   2. Primary in complete years

   3. Post primary polytechnic/vocational college

   3 Secondary in complete years

   4 Middle level college years

   5 University years
7. Occupation of the household head:

   1 Unemployed

   2 Self-employed

   3 Salaried and self-employed

   4 Salaried employment
8. What is your religion?

   [1] Catholic

   [2] ACK

   [3] Methodist

   [4] PCEA

   [5] Akorino

   [6] SDA

   [7] Other. Specify……..
9. Are you a member in any social group/farmer group

   [1] Yes [2] No
10. Income level of the household head:

    [1] KES 0-19,999

    [2] KES 20,000-39,999

    [3] KES 40,000-59,999

    [4] KES 60,000 and above

General information about the other household members: Household member	Age	Gender	Education level	Occupation	Income

PART THREE: HOUSEHOLD LEVEL OF AWARENESS ON RABBIT MEAT BENEFITS

11. Do you know rabbits? [1] Yes [2] No
12. Are you aware that rabbit meat is consumed?
    [1] Yes [2] No
13. Have you ever consumed rabbit meat?
    [1] Yes [2] No
14. If no, why have you never consumed rabbit meat? Specify…….....
15. Would you consider consuming rabbit meat in future?
    [1]Yes [2] No
16. Do you know anyone else who consumes rabbit?
    [1]Yes [2] No
17. Do you keep rabbits?
    [1] Yes [2] No
18. If yes, how many? .....

19. Do you know anyone who keeps rabbit meat?

[1]Yes [2] No

20. Do you know anyone who sells rabbit meat?

[1]Yes [2] No

21. What other types of meat do you consume apart from rabbit meat? (*Tick all that apply*)?

[1] Beef [6] Other. Specify……

[2] Mutton

[3] Fish

[4] Poultry

[5] Pork

Meat type	**Consumption frequency(per month)**	**Quantity consumed each time (kg/unit)**	**Price/kg**	**Value of consumed meat (KES)**	**Source of the meat**	**Distance to source(km)**	**Transport cos to source**
Beef Poultry Pork Mutton Fish Rabbit Other(Specify)							

22. Are you aware of the nutritional benefits of rabbit meat compared to other types of meat?

    [1]Yes [2] No

Awareness level on nutritional benefits of rabbit meat	**Yes**	**No**
Rabbit meat has high protein content		
Rabbit meat is easily digestible		
Rabbit meat has more calcium and phosphorus compared to beef, pork, poultry		
Rabbit meat has low fat and cholesterol content		

23. Which is your source of general information on rabbit meat?

    [1] TV [5] Friends/family

    [2] Radio [6] School

    [3] Newspapers [7] Scientific Journals

    [4]Periodical magazines [8] Social Media platforms

    [9]Any other source. Specify…….

PART FOUR: CONSUMER PERCEPTION ON RABBIT MEAT

24. Why do you consume rabbit meat? .....
25. How often do you consume rabbit meat?
    [1]Daily
    [2]Weekly
    [3]Monthly
    [4]Quarterly
    [5]Annually
26. If you don't consume rabbit meat, what is your reason? .....
27. What is the distance from your household to the nearest market in kilometers where rabbit meat is sold? .....
28. Please indicate/rate your level of agreement with the following statements: with 1= Strongly disagree(SD), 2=Disagree(D), 3=Neutral(N), 4=Agree(A), 5=Strongly agree(SA).

No.	**Organoleptic features of rabbit meat**	**1 SD**	**2 D**	**3 N**	**4 A**	**5 SA**
1.	Rabbit meat tastes good					
2.	Rabbit meat smells good					

No.	**Rabbit meat nutritional benefits**	**1 SD**	**2 D**	**3 N**	**4 A**	**5 SA**
1.	Rabbit meat is more nutritious than other types of meat					
2.	The main reason why I consume rabbit meat is because of its nutritional benefits.					

No.	**Rabbit meat preparation duration**	**1 SD**	**2 D**	**3 N**	**4 A**	**5 SA**
1.	Rabbit meat takes long to prepare and that is why I don't prefer it					
2.	Rabbit meat takes long to prepare but I still prefer to eat it.					
3.	Rabbit meat takes a short time to prepare					

No.	Physical appearance	1 SD	2 D	3 N	4 A	5 SA
1.	The physical appearance of rabbit carcass influences my consumption decision.					

No.	Affordability and accessibility	1 SD	2 D	3 N	4 A	5 SA
1.	Rabbit meat is sold at a good price and therefore affordable					
2.	Rabbit meat is easily accessible in the local market					
3.	Rabbit meat is hardly accessible in the local market					

Rabbit meat Attributes	Tick the better one in the attribute indicated (tick both if indifferent)									
	Rabbit	Poultry	Rabbit	Pork	Rabbit	Mutton	Rabbit	Beef	Rabbit	Fish
Taste/flavour										
Smell										
Physical appearance (colour, fatness)										
Less cooking time										
Tenderness/texture										
Nutritional value										
Price										
Availability/accessibility										
Other										

Appendix 2: NACOSTI research permit

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Appendix 3: Ordinal logistic results

Ordered logistic regression

Perception	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age_resp	.009	.01	0.90	.366	-.01	.028	
Hhsize	.09	.085	1.07	.286	-.076	.256	
Gender_2	.318	.312	1.02	.309	-.294	.93	
Membership_2	-.453	.299	-1.51	.13	-1.04	.134	
R_keeping_2	.11	.303	0.36	.715	-.483	.704	
Awareness_2	1.122	.307	3.66	0	.522	1.723	***
n_marital2	-.408	.441	-0.93	.354	-1.273	.456	
n_marital3	-.93	.655	-1.42	.155	-2.213	.353	
n_education2	.251	.347	0.72	.47	-.43	.932	
n_education3	.106	.412	0.26	.797	-.702	.914	
n_income2	.331	.389	0.85	.394	-.431	1.093	
n_income3	.696	.665	1.05	.295	-.607	2	
Religion_3	-.69	.433	-1.59	.111	-1.538	.158	
Religion_2	-.646	.774	-0.84	.404	-2.162	.87	
Religion_1	-.236	.483	-0.49	.624	-1.182	.71	
ward_1	-1.207	.444	-2.72	.007	-2.076	-.337	***
ward_2	.23	.378	0.61	.544	-.512	.971	
o	0	.	.	.	.	.	
cut1	-4.949	1.212	.b	.b	-7.324	-2.574	
cut2	-4.25	.984	.b	.b	-6.179	-2.32	
cut3	-3.287	.82	.b	.b	-4.893	-1.68	
cut4	-2.225	.74	.b	.b	-3.675	-.775	
cut5	-1.348	.706	.b	.b	-2.733	.036	
cut6	-.726	.695	.b	.b	-2.087	.635	
cut7	-.139	.691	.b	.b	-1.493	1.215	
cut8	.863	.696	.b	.b	-.502	2.228	
cut9	1.323	.703	.b	.b	-.054	2.7	
cut10	2.043	.713	.b	.b	.645	3.441	
cut11	2.938	.73	.b	.b	1.508	4.369	
cut12	3.724	.766	.b	.b	2.223	5.224	
cut13	4.107	.798	.b	.b	2.544	5.671	
cut14	5.407	1.003	.b	.b	3.44	7.374	
cut15	6.106	1.228	.b	.b	3.699	8.512	

Mean dependent var	3.038	SD dependent var	0.283

Pseudo r-squared	0.040	Number of obs	182
Chi-square	34.258	Prob > chi2	0.008
Akaike crit. (AIC)	886.805	Bayesian crit. (BIC)	989.333

*** p<.01, ** p<.05, * p<.1

Appendix 4: Double Hurdle regression results

Estimating Cragg's tobit alternative

Assumes conditional independence

initial: log pseudolikelihood = -<inf> (could not be evaluated)

feasible: log pseudolikelihood = -546.28696

rescale: log pseudolikelihood = -338.9682

rescale eq: log pseudolikelihood = -228.4887

Iteration 0: log pseudolikelihood = -228.4887 (not concave)

Iteration 1: log pseudolikelihood = -214.9423 (not concave)

Iteration 2: log pseudolikelihood = -195.81873 (not concave)

Iteration 3: log pseudolikelihood = -190.32633 (not concave)

Iteration 4: log pseudolikelihood = -187.35489 (not concave)

Iteration 5: log pseudolikelihood = -184.0459

Iteration 6: log pseudolikelihood = -180.37214

Iteration 7: log pseudolikelihood = -178.86912

Iteration 8: log pseudolikelihood = -178.81523

Iteration 9: log pseudolikelihood = -178.81517

Iteration 10: log pseudolikelihood = -178.81517

Number of obs = 185

Wald chi2(11) = 52.58

Log pseudolikelihood = -178.81517 Prob > chi2 = 0.0000

(Std. Err. adjusted for 45 clusters in village)

	Coef.	Robust Std.Err.	z	P>z	[95%Conf.	Interval]
Tier1						
Awareness_2	0.730	0.212	3.450	0.001	0.315	1.145
Gender_2	0.132	0.193	0.680	0.494	-0.246	0.510
agehhh	-0.014	0.007	-1.980	0.048	-0.028	-0.000
Membership_2	-0.097	0.177	-0.550	0.582	-0.443	0.249
n_education2	-0.015	0.221	-0.070	0.946	-0.449	0.419
n_education3	-0.317	0.277	-1.150	0.252	-0.859	0.225
n_income2	0.075	0.293	0.260	0.798	-0.500	0.650
n_income3	-0.160	0.367	-0.430	0.664	-0.879	0.560
Hhsize	-0.001	0.064	-0.020	0.987	-0.126	0.124
Dist_Mkt	-0.009	0.003	-3.330	0.001	-0.014	-0.004
knwrabkeepr	0.715	0.206	3.480	0.001	0.312	1.118
_cons	-0.547	0.511	-1.070	0.284	-1.548	0.454
Tier2						
Awareness_2	-0.503	0.290	-1.740	0.083	-1.071	0.065
Gender_2	0.112	0.277	0.410	0.685	-0.430	0.655

agehhh	-0.019	0.008	-2.550	0.011	-0.034	-0.004
Membership_2	0.028	0.216	0.130	0.897	-0.396	0.452
n_education2	0.339	0.287	1.180	0.238	-0.224	0.902
n_education3	0.041	0.376	0.110	0.912	-0.695	0.778
n_income2	-0.119	0.251	-0.470	0.637	-0.612	0.374
n_income3	0.552	0.430	1.280	0.200	-0.291	1.395
Hhsize	-0.574	0.094	-6.120	0.000	-0.758	-0.390
Dist_Mkt	0.131	0.027	4.900	0.000	0.079	0.184
knwrabkeepr	0.573	0.392	1.460	0.144	-0.195	1.342
_cons	3.765	0.530	7.100	0.000	2.726	4.804
sigma						
_cons	0.829	0.109	7.590	0.000	0.615	1.043

Appendix 5: Multivariate probit regression full results

General awareness on nutritional benefits	**Coef.**	**Std. Err.**	**t**	**P>t**
Household size	-0.0148	0.0226	-0.6600	0.5130
Gender (female, male=0)	-0.0903	0.0804	-1.1200	0.2630
Marital status(single**=0)**				
(married)				
	0.1086	0.1147	0.9500	0.3450
(separated/divorced)	0.0530	0.1795	0.3000	0.7680
Education (primary=0)				
(secondary)	0.1576	0.0879	1.7900	0.0750*
Education (tertiary)	0.1226	0.1109	1.1100	0.2700
Income(0-19,999=0)				
(20,000-30,000)	-0.0943	0.1037	-0.9100	0.3640
(40,000 and above)	0.0554	0.1517	0.3600	0.7160
Rabbit _keeping_(non-rabbit keepers=0)	-0.0281	0.0809	-0.3500	0.7290
Membership(non-members=0)	0.0149	0.0780	0.1900	0.8490
Location (Kihingo=0)				
(Mauche ward)	-0.2496	0.1300	-1.9200	0.0570*
(Njoro ward)	-0.1737	0.1192	-1.4600	0.1470
Age	0.0019	0.0026	0.7300	0.4670

Rabbit meat has high protein content	**Coef**	**Std.Err.**	**t**	**P>t**
Household size	0.0257	0.0226	-1.1400	0.2560
Gender (male=0)	0.0368	0.0803	-0.4600	0.6470
Marital status(single=0)				
Married	0.1736	0.1146	1.5200	0.1320
Separated/divorced	0.1241	0.1792	0.6900	0.4900
Education (Primary=0)				
Secondary	0.0939	0.0878	1.0700	0.2870
Tertiary	0.1475	0.1107	1.3300	0.1850

Income(0-19,999)	-0.1037			
20,000-39,999		0.1036	-1.0000	0.3180
40,000 and above	0.1992	0.1515	1.3200	0.1900
Rabbit keeping (non-rabbit keepers=0)	-0.0659	0.0808	-0.8200	0.4160
Membership(non-members=0)	0.0599	0.0779	-0.7700	0.4430
Location (Kihingo ward =0)	-			
Mauche ward_	0.4891	0.1298	-3.7700	0.0000***
Njoro ward	0.3093	0.1190	-2.6000	0.0100**
Age	0.0015	0.0026	0.5900	0.5590

Rabbit meat has high digestibility	**Coef**	**Std.Err.**	**t**	**P>t**
Household size	-0.0026	0.0212	-0.1200	0.9020
Gender(male=0)	0.0493	0.0754	-0.6500	0.5140
Marital status(single=0)				
Married	0.1111	0.1076	1.0300	0.3030
Separated/divorced	0.0348	0.1683	0.2100	0.8360
Education (primary=0)				
Secondary	0.1077	0.0824	1.3100	0.1930
Tertiary	0.1676	0.1039	1.6100	0.1090
Income(0-19,999=0)	-0.0338			
20,000-39,999		0.0972	-0.3500	0.7280
40,000 and above	0.0859	0.1422	0.6000	0.5470
Rabbit keeping (non-rabbit keepers)	0.0413	0.0759	-0.5400	0.5870
Membership(non-members)	0.0660	0.0731	0.9000	0.3680
Location (Kihingo ward=0)				
Mauche ward_	-0.7173	0.1219	-5.8800	0.0000***
Njoro ward	-0.5296	0.1117	-4.7400	0.0000***
Age	0.0044	0.0025	1.7800	0.0760*

Rabbit meat has high mineral content	**Coef**	**Std.Err.**	**t**	**P>t**
Household size	0.0047	0.0219	0.2100	0.8310
Gender (male=0)	0.0181	0.0777	0.2300	0.8160
Marital status (single=0)				
Married	0.0448	0.1110	0.4000	0.6870
Separated/divorced	0.1355	0.1736	0.7800	0.4360
Education (primary=0)				
Secondary	0.1446	0.0850	1.7000	0.0910*
Tertiary	0.1191	0.1072	1.1100	0.2680
Income(0-19,999)				
20,000-39,999	0.0202	0.1003	0.2000	0.8410
40,000 and above	0.0401	0.1467	0.2700	0.7850
Rabbit keeping (non-rabbit keepers=0)	-0.0700	0.0783	-0.8900	0.3720
Membership (non-members=0)	0.0087	0.0754	0.1200	0.9080
Location (Kihingo ward=0)	-0.2076			
Mauche ward		0.1257	-1.6500	0.1010
Njoro ward	0.0073	0.1152	-0.0600	0.9490
Age	0.0047	0.0025	1.8400	0.0680*

Rabbit meat has low fat content	**Coef**	**Std.Err.**	**t**	**P>t**
Household size	0.0164	0.0222	-0.7400	0.4600
Gender(male=0)	0.1145	0.0790	-1.4500	0.1490
Marital status (single=0)				
Married	0.2631	0.1127	2.3400	0.0210**
Separated/divorced	0.1283	0.1763	0.7300	0.4680
Education (primary=0)				
Secondary	0.1471	0.0863	1.7000	0.0900*
Tertiary	0.0964	0.1089	0.8900	0.3770
Income(0-19,999=0)				

20,000-39,999	0.0215	0.1018	0.2100	0.8330
40,000 and above	0.1061	0.1490	0.7100	0.4780
Rabbit keeping (non-rabbit keeper=0)	0.0082	0.0795	0.1000	0.9170
Membership(non-members=0)	0.0456	0.0766	0.6000	0.5520
Location (Kihingo ward=0)				
Mauche ward	-0.3514	0.1277	-2.7500	0.0070***
Njoro ward	0.2177	0.1170	-1.8600	0.0640*
Age	-0.0008	0.0026	-0.3100	0.7570

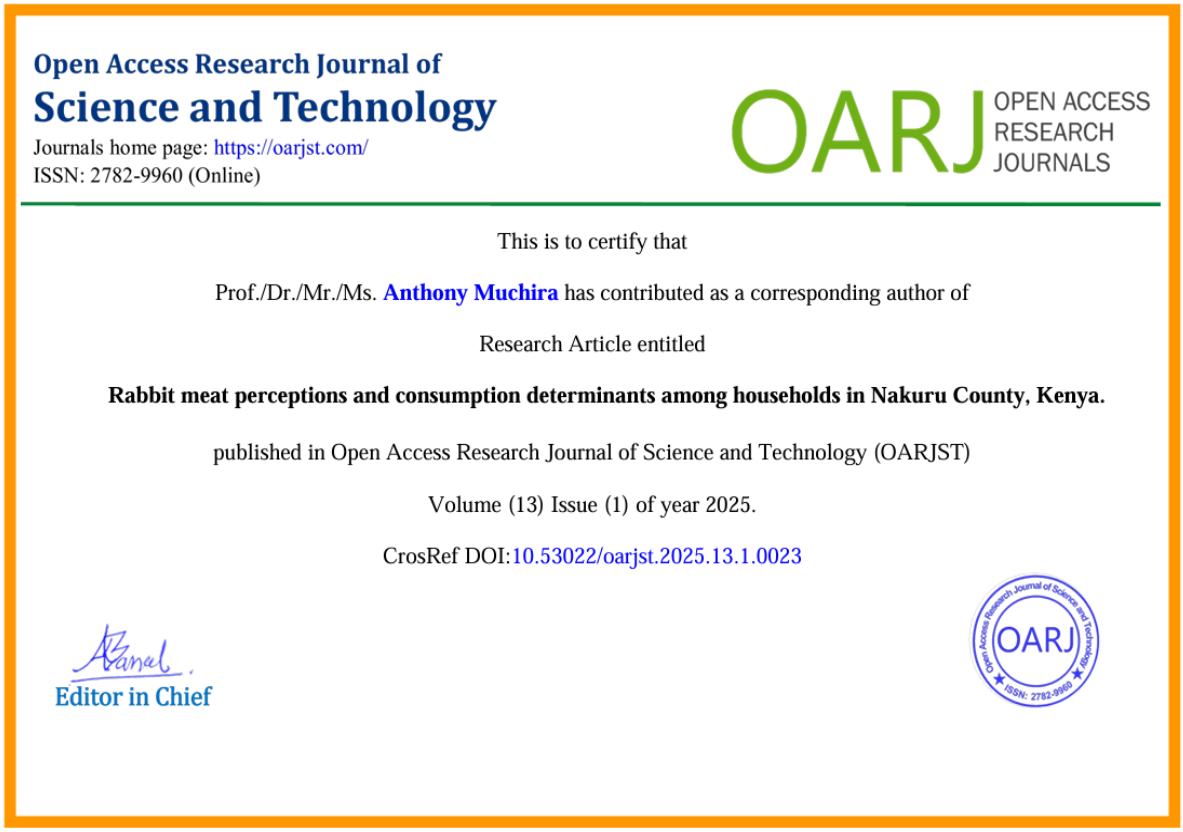
Key:

*****=significant at 1%,**

****=significant at 5%,**

***=significant at 10%.**

Appendix 6: Publication certificate



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