

(RESEARCH ARTICLE)



Rabbit meat perceptions and consumption determinants among households in Nakuru County, Kenya

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Abstract

The concept of the livestock revolution highlights significant changes in global animal production systems, driven by population growth, urbanization, and rising per capita incomes. This has resulted in unprecedented growth in the demand for animal-origin foods, particularly in developing countries. As a result, there is an urgent need for sustainable and nutritious alternatives to conventional livestock. Rabbit meat offers a viable solution due to its superior nutritional profile that includes high protein, low cholesterol, and essential vitamins. Despite its benefits, consumption of rabbit meat remains low compared to popular types of meat. Most of the previous research on rabbits has focused on production aspects and there is limited information on the current status of rabbit meat consumption. This study examines household perceptions and factors influencing rabbit meat consumption in Nakuru County, Kenya. Data was collected from 196 households using semi-structured questionnaires administered through face-to-face interviews. Data was analyzed using descriptive statistics and the double hurdle model. The study found that perceptions of rabbit meat by respondents were generally positive. Regression results show that decision to consume rabbit meat was influenced positively by respondent's awareness of rabbit meat's nutritional benefits, perceived taste, knowing a rabbit keeper and distance to the market, and negatively by respondent's age and level of education. Intensity of consumption was positively influenced by affordability of the meat and distance to market, but negatively by age and household size. The study recommends improving rabbit meat's market accessibility and affordability and increasing awareness on its nutritional benefits be pursued.

Keywords: Rabbit meat; Consumption; Perceptions; Awareness; Nutritional benefits

1. Introduction

The livestock revolution has brought about significant changes in animal production systems globally, contributing to food security in many countries and economic development. The growing global demand for livestock products, driven by population growth, rising per capita income, and urbanization, has necessitated a shift toward sustainable meat production [27]. Rabbit meat has emerged as a viable alternative due to its superior nutritional profile and environmentally sustainable production methods.

The low land requirements, cost-effective feeding options, and high reproductive rates of rabbits make rabbit farming a suitable option for households with limited resources. The meat is rich in protein, essential amino acids, polyunsaturated fatty acids, vitamins, and minerals, while containing low levels of fat and cholesterol [9]. Rabbit meat is a functional food as a result of its content of bioactive substances such as linoleic acid and antioxidants. The presence of the bioactive compounds supports the reduction of the gut inflammation and oxidative stress hence improving the digestive system and immune function in human beings [7].

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In comparison to other conventional meats, such as beef, pork, and chicken, rabbit meat offers more phosphorus, calcium, and potassium, lowest in fat and cholesterol level making it ideal for addressing malnutrition and lifestyle diseases like obesity and cardiovascular issues [24]. These nutritional attributes make rabbit meat suitable for consumption in an era where many people are conscious about the need to consume nutritious food to live a long and healthy life.

Globally, rabbit meat consumption is primarily popular in the European and Mediterranean countries such as France, Italy, Portugal, Spain, Germany, Belgium, Malta, Cyprus, Algeria and Egypt. Despite this, rabbit meat represents less than 3% of total meat consumption within the European Union (EU), categorizing it as a niche market [6]. However, rabbit meat consumption later on spread to Asia and become more popular in China. According to [11], China leads globally in rabbit meat production with 900,000 t/year in 2023, followed by North Korea with 180,000 t/year. The statistics show that in Europe, the leading producers were Italy with 55,000 t/year, Spain (51,000 t/year) and France (49,000 t/year).

Preference for and consumption of rabbit meat differs by region and country. For instance, in Spain, a study by Petrescu *et al.* [26] found that rabbit meat consumption was lower than that of chicken (2.2 times) and pork (1.8 times). The low consumption was attributed to less availability in the supermarkets and the high cost of purchase. Furthermore, consumers perceived rabbit meat to be the healthiest and tastiest compared to chicken, pork, sheep, beef and fish. In Benin, fish was ranked first, while rabbit meat was ranked fourth in regards to consumer expenditure [2]. Rabbit meat was more popular than goat and fish but consumers spent the least on purchasing it compared to the other conventional types of meat, mostly because it was more expensive.

In East Africa, a study by Sanah *et al.* [28] reported that rabbit meat ranked fifth after sheep, beef, poultry and goat respectively. Kenya only produced 400 t/year [11]. A Kenya Market Trust survey [14] revealed that the most consumed types of meat in Kenya among high income earners were chicken, fish, beef and goat, respectively. A recent survey on rabbit meat consumption among Kenyan households showed a steady increase in consumption especially in urban and peri-urban areas, where the meat is being promoted for its sustainable protein benefits [12]. The survey also found that the growth in rabbit meat consumption was partly driven by increase in its demand by health-conscious urban consumers. The study further revealed that the high-end hospitality industry, has insufficient supply to satisfy the demand, and most of their supply comes from imports from South Africa, Tanzania and Uganda.

Rabbit meat production and consumption has been promoted by FAO all over the world. The FAO has published guidelines on raising rabbits and encouraged people to consume its meat [10]. The Kenyan government in collaboration with the German International Development Agency (GTZ) had initiatives to promote rabbit meat production and spread awareness on the nutritional benefits of rabbit meat in the 1980s [18]. In addition, the Kenyan government set up the National Breeding Centre in Ngong Veterinary Farm where they organize workshops to educate farmers how to raise rabbits and even the nutritional benefits of rabbit meat to help them attract consumers [19].

Most of the previous research on rabbit meat have focused primarily on production aspects and less has been done on rabbit meat consumption trends [29]. In an era where people are becoming health conscious every day, the demand for nutritious food keeps on increasing. However, rabbit meat consumption is still low, especially in developing countries. This study therefore sought to assess the perceptions and identify the factors that influence households' decision to consume rabbit meat in Nakuru County, Kenya. Promoting rabbit meat consumption may contribute to the attainment of food security and improved nutrition, as envisaged in the second Sustainable Development Goal (SDG) of the United Nations and the Kenyan Vision 2030 [16, 31]. Thus, the findings of the study will be useful to policy makers in designing strategies to enhance the rabbitry enterprise.

2. Materials and methods

2.1. Study area

The study was done in Njoro Sub-County, Nakuru County, Kenya, which covers approximately 780 square kilometers (Figure 1). The region is characterized by a warm temperate climate with an average annual rainfall ranging from 950mm to 2000mm hence supports growing of legumes, hay and Napier grass. Njoro Sub-County is approximately 24 kilometers from Nakuru city. Agriculture is the main economic activity, with the population predominantly engaged in dairy cattle, horticulture, poultry, and rabbit farming. The sub-county is divided into six administrative wards and has been reported to have 700 rabbit farmers with a total of 7000 rabbits [22].

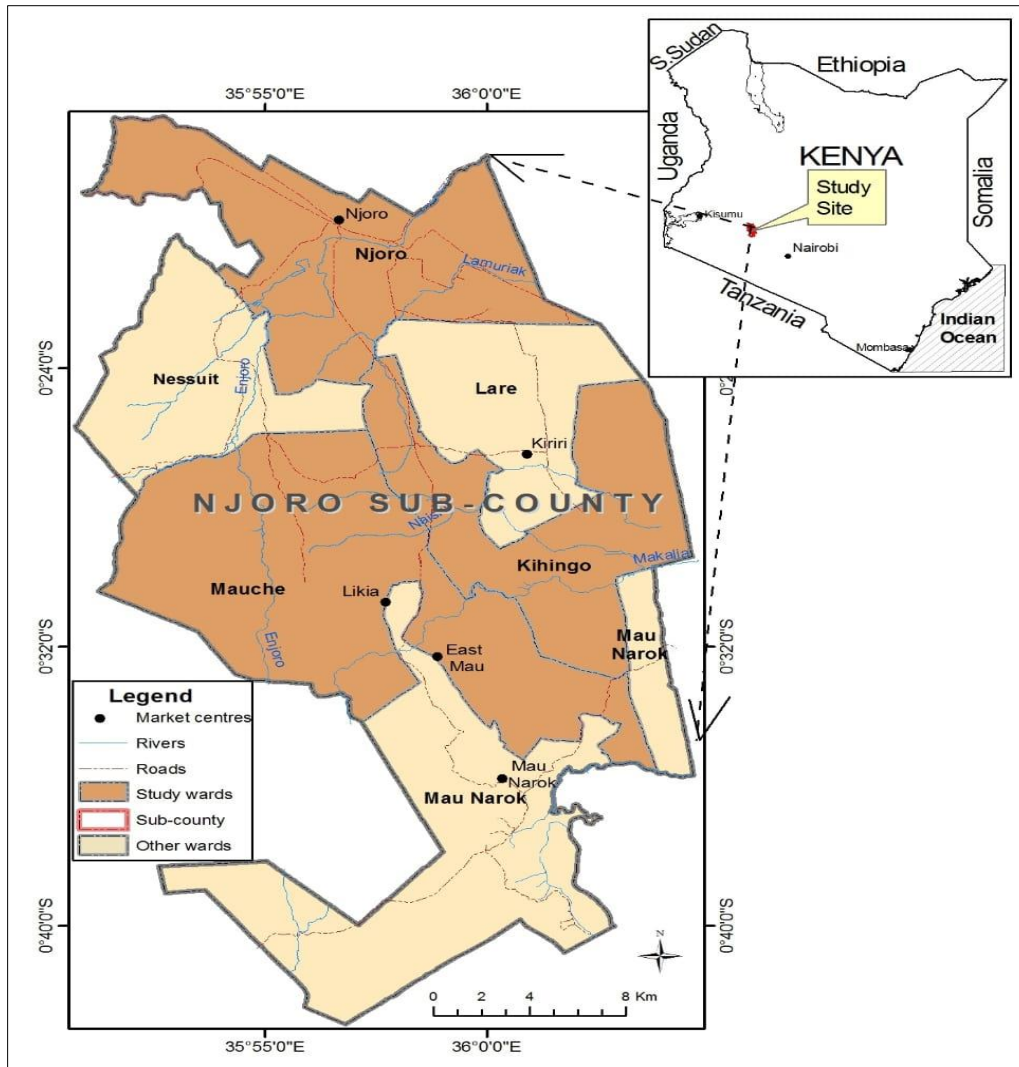


Figure 1 Map of Njoro Sub-County

2.2. Sampling

This study employed a descriptive survey design. A four-stage sampling method was used to select the respondents to be interviewed. In the first stage, Nakuru County was chosen purposively due to its accelerated population increase driven by urban migration and economic opportunities [15]. The second stage involved purposive selection of Njoro Sub-County due to its warm and temperate weather which supported the growth of grass such as Napier, hay, legumes that are suitable feeds for rabbits and also its close proximity to Nakuru city which is a potential market for rabbit meat [23]. Njoro division has six wards; Mau Narok, Mauche, Nessuit, Lare, Njoro and Kihingo. Using purposive sampling method, Njoro, Kihingo and Mauche wards were selected due to their nearness to Nakuru city and they cut across different ethnic groups and agro-ecological zones. In the third stage, simple random sampling was used to select villages out of the three chosen wards. Finally, in each village, households to be interviewed were selected using systematic random sampling.

The sample size was determined using the formula by Anderson [3] for sample size determination (equation 1 and 2). This formula is used if the population of the target individuals is unknown and is universally applicable.

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

where:

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.

$$n = \left(\frac{1.96}{0.05}\right)^2 \times 0.15(1 - 0.15) = 196 \text{ households} \dots\dots\dots (2)$$

Proportionate stratified sampling was employed to distribute the sample size within the wards. Njoro had the largest sample (138 households), followed by Mauche (36 households) and Kihingo (23 households). Household lists were provided by the Sub-County Agricultural Office, and participants were selected based on their willingness to participate and availability during the survey period.

Table 1 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

Stated preference method was used to assess perceptions among the households whereby the respondents were asked a series of questions such as their perceptions on the organoleptic features of rabbit meat; taste and smell, rabbit meat’s nutritional benefits, preparation duration, the influence of its physical appearance on consumption decision and its affordability and accessibility. The responses were measured using a five-point Likert scale. A Five-point Likert scale was used specified as: strongly agree=5; Agree=4; neutral=3; Disagree=2 and strongly disagree=1. A Likert mean score was generated to tell whether respondents have a negative or positive perception of the statements used in the Likert scale.

The formula to generate the mean score was as follows:

$$X_m = \sum \frac{FX}{N} \dots\dots\dots (3)$$

Where;

X_m = mean score

\sum = summation sign

F = frequency

N = no of respondents.

x = the assigned numeric value corresponding to each response category in the Likert scale.

Any mean score value greater than 3, meant the respondents have a positive perception towards rabbit meat while any value below 3 showed that respondents have negative perception towards rabbit meat assigned statement. A score value equal to 3 meant the respondents were indifferent.

For the rabbit meat perceptions as compared to other meats, any value greater than 3 means rabbit meat is perceived positively compared to other types of meat. A value equal to 3 means that the respondents perceived rabbit meat equal to the other conventional types of meat. If the value is less than 3 implies the respondents perceives rabbit meat negative compared to the other conventional types of meat.

Households’ perceptions of rabbit meat were analyzed using frequency and percentage distributions. Respondents were asked to compare rabbit meat attributes; taste, smell, physical appearance, cooking time, tenderness, nutritional value, price, and accessibility with those of other meat types. For each attribute, respondents were asked to indicate their preference by selecting the better option between rabbit meat and another type of meat. Indifference was also allowed if both options were considered equally good. The analysis also involved calculating the percentage preference for rabbit meat over each type of meat across all attributes. This quantification provided insights into how households rated rabbit meat relative to alternatives. The results were summarized in a table showing the frequency and percentage distribution of preferences for each attribute when compared against the other meat types.

To analyze perceptions by non-consumers, respondents who had never consumed rabbit meat were asked about factors that might limit their consumption. The frequency of each reason was calculated as a percentage of total responses among non-consumers.

The double hurdle model was applied to evaluate the factors influencing rabbit meat consumption among households. This model is suitable because it distinguishes between two sequential decisions: (1) the decision to consume rabbit meat (participation decision), and (2) the level or intensity of consumption among consumers (consumption decision). The model assumes that different factors may influence these two stages.

The first hurdle, which models the decision to consume rabbit meat, is specified as:

$$Y_i^* = \alpha x_i + v_i \dots\dots\dots (4)$$

$$\begin{pmatrix} Y_i = 1 & \text{if } Y_i^* > 0 \\ 0 & \text{otherwise} \end{pmatrix} \dots\dots\dots (5)$$

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

'x_i'-vector of explanatory variables hypothesized to influence the consumption decision.

'α'-vector of parameters to be estimated.

v_i- was assumed to be independent and normally distributed as (v_i ~N (0, 1)).

The second hurdle, which models the intensity of rabbit meat consumption, was given as:

$$W_i^* = \beta z_i + u_i \dots\dots\dots (6)$$

where

$$W_i = \beta z_i + u_i \text{ if } \begin{pmatrix} Y_i = 1, & \text{if } Y_i^* > 0 \\ 0 & \text{otherwise} \end{pmatrix} \dots\dots\dots (7)$$

W_i = Observed intensity of rabbit meat consumption.

Z_i = Vector of explanatory variables hypothesized to influence consumption intensity.

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

'u_i' was assumed to be independent and normally distributed, i.e., u_i ~N (0, σ²)

Table 2 below presents the variables used in the double hurdle model, their descriptions, and expected effects.

Table 2 Description of the variables used in the Double Hurdle model

Variable	Description	Expected Effect
Awareness	Awareness of rabbit meat’s nutritional benefits (binary: 1 = aware, 0 = not)	+
Gender	Gender of household head (binary: 1 = male, 0 = female)	+/-
Age	Age of household head (continuous)	-
Education	Education level of household head (ordinal: primary, secondary, tertiary)	+
Income	Monthly income of household (ordinal: low, medium, high)	+
Distance to Market	Distance to nearest rabbit meat market (continuous, in kilometres)	-
Household Size	Number of members in the household (continuous)	-
Taste Perception	Perceived taste of rabbit meat (Likert scale: 1 to 5)	+
Affordability	Perceived affordability of rabbit meat (Likert scale: 1 to 5)	+

The first hurdle (consumption decision) was estimated using a probit model, while the second hurdle (consumption intensity) employed a truncated regression model. Robust standard errors were used to correct for heteroskedasticity, and both models were estimated using the crrg command in STATA.

3. Results and discussion

3.1. Characteristics of the sample

A total of 186 respondents were interviewed, representing 95% of the target sample. Table 3 shows the descriptive characteristics of the sample. The larger proportion of the respondents were male 117(62.9%) while female respondents were 69 (37.1%). The mean age of the respondents was 47 years. Majority of the respondents had primary level as their highest level of education (41.4%), followed by those who attained various post-primary education (30.2%). Respondents who had attained university education were 12.9%, middle level college (10.8%) and only 3.8% had informal education.

In regards to religion, most of the respondents were Christians; Protestants (61.8%), Catholics (22%) and the minority were non-Christian (12.1%). Among the respondents, 72.6% were married and 27.4% were unmarried. Household size ranged from 1 person to 9 people, with an average of 4 people. The monthly income group with the biggest number of respondents was Ksh 0-19,999 (78.5%) while the income group with the least number of people was Ksh 40,000 and above (7.0%), the individuals within the income category of Ksh 20,000-39,999 were moderate in numbers (14.5%). Cumulatively, 93% of the respondents earned less than Ksh 40,000 per month.

Most of the respondents interviewed were full time farmers (68.3%) and the rest were casual workers, salaried employees or in off-farm self-employment. A substantial proportion of the respondents (42.5%) were members of social/farmer groups but the bigger proportion were not members in any social or farmer group (57.5%). Close to half (47%) of the respondents were keeping rabbits at the time of the survey.

Table 3 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 (100%)
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	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%
Main occupation		
Casual employment	32	17.2%
Farmers	127	68.3%
Salaried and self-employed	27	14.5%
Rabbit keeping		
Rabbit farmer	88	47.3%
Non-rabbit farmer	98	52.7%

Table 4 shows the consumer perception on rabbit meat based on taste, smell, nutrition, preparation time, physical appearance, affordability and accessibility. The respondents reported rabbit meat to be tasty (3.9), have good smell (3.6), be more nutritious (3.5), and require shorter period of time to cook it (3.8) compared to pork, chicken, beef, mutton and fish. However, respondents perceived rabbit meat to be more expensive (2.8) and less accessible (2.5) in the market compared to the common types of meat. Physical appearance of the rabbit carcass did not influence the decision of respondents to consume rabbit meat (2.5) and a large number of respondents interviewed considered nutrition (3.2) as the main reason why they consumed rabbit meat. These findings were similar to those by Lekota [17] who concluded that consumers in South Africa found rabbit meat to be easier to cook, more nutritious and tenderer compared to chicken, pork, beef and mutton. However, there was contradiction in regards to taste, whereby the respondents perceived rabbit meat to be less tasty compared to chicken, beef and mutton. This was in line with the findings of the study by Montero-Vicente [21] in Spain who reported that respondents considered rabbit meat (9.19%) and turkey (4.24%) to be the least tasty compared to chicken (14.88%), beef (35.54%) and pork (14.88%).

Table 4 Consumer perception on rabbit meat based key attributes

Rabbit meat attributes	Mean score	Interpretation
Taste	3.9	Rabbit meat tastes good
Smell	3.6	Rabbit meat smells good
Nutritional value	3.5	Rabbit meat is more nutritious.
Nutrition as the main attraction to consume rabbit meat.	3.2	Nutritional value is the main reason for consumption
Preparation/cooking time	3.8	Takes shorter 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 5 shows the preference of rabbit meat in comparison to the other conventional types of meat. Preference of rabbit meat over poultry among respondents interviewed was 40% on average in regards to taste, smell, physical appearance, cooking time, tenderness, nutritional value, affordability and accessibility. Less cooking time (48%) and tenderness (47%) of rabbit meat contributed the highest percentage while accessibility (20%) and affordability (38%) had the lowest percentages. This preference of rabbit meat over poultry did was mainly because of the shorter time it takes to cook and its tenderer quality, while rabbit meat was least preferred over poultry as a result of its inaccessibility and unaffordability.

Preference of rabbit meat over pork among the interviewed respondents was 29% on average. The rabbit meat was preferred over pork mainly due to its tenderness (34%) and superior nutritional value (33%). The least preferred attributes of rabbit were smell (20%) and affordability (26%). This finding suggested that consumer preference of rabbit meat over pork was because of its tenderness and nutritional value, while its lower preference over pork was because of its smell and less affordability.

Households' preference of rabbit meat over mutton was 36% on average. The households preferred rabbit meat over mutton due to less cooking time (45%), tenderness (42%), taste (42%) and nutritional value (42%). The attributes with the least preference on rabbit meat over mutton were accessibility (20%) and physical appearance (24%). The households that consumed rabbit meat considered it to take shorter time to cook, tenderer, tastier and more nutritious than mutton. Majority of the households found rabbit meat to be inaccessible and less physically appealing for consumption compared to mutton.

Rabbit meat preference over beef was 34% on average among the respondents interviewed. Majority of the respondents who preferred rabbit meat over beef preferred its tenderness (40%), and less cooking time (40%) and the least preferred attributes of rabbit meat over beef were accessibility (17%) and affordability (30%). This suggested that most of the households who consumed rabbit meat considered rabbit meat to be take less time to cook, more tender, less accessible and less affordable compared to beef.

Rabbit meat preference over fish was 27% on average among the interviewed households. The two most preferred attributes of rabbit meat over fish were physical appearance (33%) and smell (32%) while the attributes least preferred were nutritional value (24%) and tenderness (23%). This finding suggested that most of the households who preferred rabbit meat over fish perceived rabbit meat to have a better physical appeal and smell while only a few of the households interviewed perceived rabbit meat to be tenderer and more nutritious compared to fish.

Table 5 Households' perception of rabbit meat attributes in comparison to common types of meat

Rabbit meat attributes	Rabbit/ Poultry		Rabbit/ Pork		Rabbit/ Mutton		Rabbit/ Beef		Rabbit/ Fish	
	No.	%	No.	%	No.	%	No.	%	No.	%
Taste/flavour	76	41	57	31	79	42	73	39	51	27
Smell	75	40	37	20	64	34	65	35	60	32
Physical appearance	80	43	56	30	45	24	62	33	61	33
Less cooking time	90	48	60	32	83	45	75	40	47	25
Tenderness/texture	88	47	63	34	79	42	74	40	42	23
Nutritional value	75	40	61	33	78	42	69	37	45	24
Affordability	71	38	48	26	68	37	55	30	49	26
Accessibility	37	20	46	25	37	20	32	17	46	25
Average percentage		40		29		36		34		27

The results in table 6 shows the perceptions on rabbit meat consumption by non-consumers. According to the results, 20% of those who had never consumed rabbit meat highlighted that rabbit meat was hard to find and therefore limited their chances of consuming it. This result is in line with Hoffman *et al.* [13] who reported scarcity as the main reason why people never consumed rabbits in South Africa and a large number of those who had consumed rabbit meat accessed it through hunting. Furthermore, 20% of non-consumers interviewed in this study reported that their religious beliefs influenced their decision to not consume rabbit meat and would not consider to consume it in the future. This

finding is similar to South Africa's study by Nolwandle [25] who reported that 8.6% of the study sample considered consuming rabbit meat against their religion.

Some of the non-consumers reported not to have a particular reason why they did not consume and said they just did not like the meat (15%) while a further 15% of the interviewed non-consumers found the smell of rabbit meat to be unattractive to them and therefore disgusting. Traditional beliefs and culture were also among the reasons for non-consumption by 10% each. Physical appearance (5%) and unawareness about whether rabbits are consumed and their nutritional benefits (5%) had the smallest proportion of reasons for non-consumption.

Table 6 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 7 below presents the results of the double-hurdle model. The first hurdle (Tier 1) was to determine the factors influencing the initial decision for a respondent to consume rabbit meat. The second hurdle (Tier 2) analyzed the factors that influence consumption intensity in Njoro Sub-County.

According to the findings, age influences initial decision to consume rabbit meat by households negatively and this is significant at 1% significance level. As age increases by one year, the log-odds of households consuming rabbit meat decreases by 0.0155kg per capita. This result suggests that younger households are more likely to consume rabbit meat compared to older households. This may be attributed to the openness that young people have in trying new and trendy foods and also social media influences hence they are more exposed to information about rabbit meat accessibility and other positive attributes such as taste and nutritional value. This finding is in contrast with findings by Beal *et al.* [4] and Mailu *et al.* [18] who found no correlation between age and rabbit meat consumption. In the second hurdle, age also has a negative significant influence on rabbit meat consumption at 1% significance level whereby as age of household head increases by one year, consumption intensity decreased by 0.0232 kg per capita in log-odds. This finding was similar to the study by Abdullatif *et al.*, [1] that younger populations were more likely to adapt to dietary changes and consider rabbit meat for its nutritional and health benefits.

Awareness on the nutritional value of consuming rabbit meat by households influences the initial decision by households to consume rabbit meat positively at 1% significant level. When there is an increase in the level of awareness by one unit by a household, the log-odds of consumption increases by 0.005 kg per capita. This finding is similar to the results in a study by Bodnar and Horvath [5] in Spain, who reported an increase in production and consumption of rabbit meat as a result of promotional campaigns by health professionals and celebrity advertisements in newspapers and televisions, that raised consumer awareness on rabbit meat.

Tertiary education was found to have a negative significant influence on the initial decision to consume rabbit meat at the 10% significance level. According to the findings, the raw coefficient for tertiary education was -0.456, indicating that having a tertiary education is associated with a reduction in the log-odds of a household consuming rabbit meat, compared to households where the head had only a primary level of education. This does not directly translate into the exact probability or intensity of consumption. However, it suggests a negative association. This could be attributed to factors such as a preference for other more widely accepted types of meat, concerns about rabbit meat sourcing and handling, or accessibility challenges, particularly in urban areas where higher-educated individuals are more likely to reside. Conversely, households with primary education may be more rural-based, with better access to rabbit meat raised for subsistence purposes. These findings contrast with those of Mailu *et al.* [18], who reported that higher education levels positively influenced rabbit meat consumption in Kenya.

Taste was found to have a significant influence on the initial decision to consume rabbit meat at the 1% significance level. The raw coefficient for taste was 1.371, indicating that perceiving rabbit meat as tasty is associated with a 1.371 increase in the log-odds of consumption, holding other variables constant. This positive relationship suggests that taste plays a crucial role in the decision to consume rabbit meat. However, in the second hurdle, taste did not have a significant influence on the consumption intensity. These findings align with those of Cullere and Dallezotte [6], who identified taste as a critical factor in meat consumption decisions.

Distance to the market influenced initial decision by households to consume rabbit meat negatively at 5% significance level but influenced consumption per capita positively, at 1% significance level. Each additional kilometer decreased, the log-odds of consuming rabbit meat increase by 0.0057 kg per capita. The increase in distance may contribute to making rabbit meat more expensive due to the transport cost needed to the market, lowering the log-odds of households to consume rabbit meat. For consumption intensity, each additional kilometer was associated with an increase in log-odds of consumption by 0.1625 kg per capita. This may imply that the consumers who can afford higher transport cost to the market are likely to afford more rabbit meat than those living nearer to the market. This finding aligns with a study by Usman and Callo-Concha [32] who reported that increased travel distance to markets negatively impacted the diversity of consumed foods, as transportation costs reduced household purchasing power for varied food items.

Household size had a negative influence on consumption per capita among households at 1% significance level, but no significant effect on decision to consume rabbit meat. Intensity of consumption decreased by 0.5112 kg per capita in log-odds for every additional household member. This may be associated with affordability of rabbit meat. Household which are unable to afford rabbit meat regularly may consume less per capita on a monthly basis. These findings agree with the results of a study by Merlino *et al.* [20] who found that there was limited meat consumption in households with more members as a way to manage the cost.

Affordability significantly influences rabbit meat consumption intensity positively at 5% significant level, but had no significant association with consumption decision. Households that perceive rabbit meat to be affordable consume it more intensively by 0.6708kg more, per capita in log-odds compared to those who view it as unaffordable. A recent study by Ederer *et al.* [8] also highlighted that higher price discouraged consumption among lower-income groups due to limited purchasing power.

Knowing a rabbit keeper was found to have a significant influence on the initial decision to consume rabbit meat but no significant influence on the intensity of consumption. The raw coefficient for knowing a rabbit keeper was 0.578, indicating that households familiar with individuals who keep rabbits were associated with a 0.578 increase in the log-odds of consuming rabbit meat compared to households without such connections. This positive relationship suggests that knowing a rabbit keeper may enhance households' accessibility to rabbit meat and influence their decision to consume it. These findings align with those of Adanguidi [2], who reported that in Benin, respondents who were acquainted with rabbit farmers were more likely to consume rabbit meat. This is likely due to the ease of access and influence from social networks connected to rabbit farming.

Geographical location showed some significant influence on consumption intensity of rabbit meat at 5% significant level, but no significant influence on consumption decision. Households in Mauche Ward consumed rabbit meat at a lower intensity than those in Kihingo Ward by 0.768kg per capita. There was no significant difference observed between Njoro and Kihingo Wards in terms of consumption intensity. This result implies that location-related factors affecting rabbit meat consumption are likely more pronounced in Mauche than in Njoro and Kihingo. A study by Turner *et al.* [30] had similar findings that geographical factors such as distance, accessibility, and regional agricultural practices significantly influence food availability, affordability, and consumption intensity, particularly in low-resource settings. The consumption intensity in Mauche Ward could also be lower compared to Njoro and Kihingo due to lower rates of rabbit farming, hence making rabbit meat less affordable and accessible.

Table 7 Results on Double hurdle model analysis.

		Robust		
Variables	Coef.	Std. Err.	Z	P>z
Hurdle 1				
Nutrition 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 Location(wards):	-0.2763	0.2592	-1.07	0.286
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 Location(wards)	0.6708	0.2891	2.32	0.020**
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%.

4. Conclusion and recommendation

This study investigated the perceptions, and consumption determinants influencing rabbit meat consumption among households in Njoro Sub-County, Nakuru County, Kenya. The findings revealed that households with rabbit meat consumers found it tastier, highly nutritious and took shorter duration to cook compared to pork, chicken, beef, mutton and fish. However, they perceived rabbit meat to be more costly and less accessible compared to the other conventional types of meat. Physical appearance seemed to have an influence on how consumers perceived rabbit meat. For the households that were non-consumers, 20% highlighted that rabbit meat was hardly accessible in the market, limiting their chances of consuming it. The other reasons mentioned for non-consumption was religious beliefs (20%),

unattractive smell (15%), just did not like the meat (15%), traditional beliefs (10%), cultural reasons (10%), physical appearance (5%), and unawareness about consumption and nutritional benefits (5%).

The study further identified key factors significantly influencing rabbit meat consumption decisions and intensity. For the decision to consume, nutritional awareness, age, knowledge of rabbit keepers, distance to the market, and taste were pivotal. For consumption intensity, significant factors included age, household size, distance to market, affordability, and geographical location. These findings highlight both motivators and barriers that influence rabbit meat consumption behaviors.

To promote rabbit meat consumption, the study suggests several key recommendations based on perceptions and consumption determinants identified among both consumers and non-consumers, as well as findings from the double hurdle model. For current consumers, efforts should focus on improving market accessibility and addressing price concerns. Enhancing the availability of rabbit meat in local markets through partnerships between rabbit farmers and vendors can address issues of accessibility while price reductions can be achieved through subsidies or support for small-scale farmers by reducing the cost of rabbit commercial feeds, hence making rabbit meat more competitive and affordable compared to other meats. Additionally, awareness campaigns emphasizing rabbit meat's nutritional benefits would reinforce its value, particularly among health-conscious consumers. Encouraging culinary innovations and providing recipes that highlight rabbit meat's shorter cooking time can also enhance its appeal and frequency of consumption.

For non-consumers, marketers will need to initiate campaigns to spread awareness to the public on the health benefits of rabbit meat. Collaborating with local influencers, nutritionists, and community health workers could dispel misconceptions and highlight rabbit meat's unique advantages. In order to counter the negative cultural and traditional beliefs on rabbit meat consumption, involving community and religious leaders in educational efforts could provide respectful, fact-based insights on rabbit meat consumption. Standard processing and packaging practices should be implemented by marketers to improve rabbit meat presentation to attract more consumers.

Finally, findings from the double hurdle model highlight specific factors influencing both the initial decision to consume and consumption intensity. Nutritional awareness campaigns, particularly in youth-oriented spaces like schools and social media, could leverage younger households' openness to rabbit meat. Local networks of rabbit farmers who can engage their communities should be strengthened to improve awareness and access of rabbit meat. The marketers can reduce the logistics cost by bringing rabbit meat closer to remote consumers and providing bulk purchase options at discounted prices to enhance consumption intensity. In areas with lower consumption, like Mauche, targeted promotion campaigns and expanded distribution may help overcome regional, cultural and accessibility barriers. These targeted recommendations aim to address both consumption barriers and motivators to foster a supportive market environment for rabbit meat in Njoro Sub-County.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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