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Farmers' perception and willingness to consume goat milk and goat milk products: A case study of the central Eastern Cape, South Africa

Emrobowansan M. Idamokoro[1,2*], Busisiwe Gunya[1,2] and Michael Aliber[2]

Abstract

The aim of the study was to assess small-scale farmers' attitude and willingness to consume goat milk and its products. A structured questionnaire was used to collect data from 151 household farmers by using a 15% random sampling technique. Data were analysed using descriptive frequencies and chi-square tests to check for any association between the variables and farmers' willingness to consume goat milk and its products. The results showed that a large share (41.78%) of the respondents do not consume goat milk. Taste (20.83%), cultural bias (8.33%), strong smell and natural dislike (64.58%) were some reasons why farmers do not consume goat milk. Some proportions (38.10%) of farmers were not aware of any nutritional benefits of goat milk. However, when these benefits were explained to them, a high percentage (93.10%) of these farmers indicated their willingness to consume goat milk and/or its products based on its nutritional benefits. Age, gender and educational status had a significant influence ($P \leq 0.05$) on farmers' willingness to consume goat milk and its products. The nutritional importance of goat milk and its products should be strongly promoted to improve the human diet in the study area.

Keywords: Goat milk, Human diet, Healthy diet, Consumer knowledge, Goat milk product

Introduction

It has been projected that by the year 2020, the demand for animal products in developing countries (in the global market) will increase by 2.8% as a result of the rapid growth in human population, urbanization and income growth, which may potentially generate markets for livestock products (Delgado et al. 1999). Considering the human population growth trend, the emerging sub-sector in South Africa including goat production may benefit from this prospect. Most rural areas in developing countries raise indigenous goats on a large scale for meat, milk and skin among others (Bolacali et al. 2017).

Milk is one of nature's most complete foods in terms of humans' diverse nutritional requirements. Goat milk is especially nutritious in that it contains essential nutrients, including protein, carbohydrate, fat, minerals and vitamins. In some countries, goat milk and goat milk products form a part of economic revenue as they are processed into yoghurt, butter, cheese, ice cream and other dairy products of high nutritional value for human consumption (Hayaloglu and Karagul-Yuceer 2011; Milani and Wendorff 2011). In addition, *kefir*, a local milk product made from goat milk is used as a functional food which is beneficial for human health (Thohari et al. 2012). Milk and milk products from indigenous goats offer multiple nutritional benefits to food-insecure households in the Eastern Cape Province, which has large numbers of goats; however, the nutritional benefits of goat milk and its products are not widely appreciated or acted upon. The practice of using goat milk and goat milk products as part of the family diet is not very common in most parts of South Africa.

* Correspondence: mondayidamokoro@gmail.com; eidamokoro@ufh.ac.za
[1]Department of Livestock and Pasture Science, Agricultural and Rural Development Research Institute, University of Fort Hare, Private Bag X1314, Alice 5700, South Africa
[2]Agricultural and Rural Development Research Institute, University of Fort Hare, Private Bag X1314, Alice 5700, South Africa

This is despite the fact that most rural households are more likely to own goats than cattle.

In 2017, the researchers embarked on a small project with the view to create awareness on the importance of utilizing goat milk as a source of human food. Most regions in the Eastern Cape Province of South Africa experience higher poverty rates than the national average (Dimant 2014); hence the need to source other alternative foods that can add to human daily diet. One way to achieve this is to assess and evaluate the potential utilization of goat milk and goat milk products as food for small-holder farmers and by extension for the larger populace in the region under consideration.

Study area

There are two quite distinct types of rural areas in South Africa relating to its colonial past. On the one hand are the large-scale commercial farming areas and on the other hand are areas that used to be referred to as 'reserves', or 'bantustans' or 'homelands' and now generally referred to as former homelands. By contrast to commercial farming areas, the former homelands are densely populated and poor.

The Eastern Cape is one of South Africa's nine provinces, and most of its rural areas are located in the former homelands of Transkei and Ciskei. As of 2016, there were about 3.2 million goats in the Eastern Cape, about 41% of all goats in the country (STATS SA 2017). Of these 3.2 million goats, 1.8 million (57%) were located in the province's former homeland areas, and owned by about 150,000 households (STATS SA 2017). However, despite the very large number of goats in the former homelands of the Eastern Cape, the casual observation is that households derive little or no benefit from goat milk, meaning that a potentially important resource is being overlooked, in particular. It could be projected that the use of goats for milk and making milk products could potentially be used to improve the diets and livelihoods of resource-poor households (NAMC 2005). Many people in the former homelands of the Eastern Cape make locally fermented yoghurt known as *amasi* from cows' milk. According to Greyling et al. (2004), goats can be utilized to produce milk for rural households in South Africa when cow milk is limited; this is because not all small-scale farmers can afford to raise cattle.

Indeed, about 40% of the households in the former homelands of the Eastern Cape who raise goats do not have any cattle. Therefore, the aim of this study was to assess small-scale farmers' attitudes and willingness to consume goat milk and dairy products made from goat milk. In addition, the study also seeks to assess factors associated with farmers' attitude and/or willingness to consume goat milk and its products. The study was conducted in the central Eastern Cape Province of South Africa, in particular in Raymond Mhlaba Local Municipality (formerly Nkonkobe), where livestock farming is a major practice of rural dwellers. The seven villages that participated in the study were Mbisana, Njwaxa, Gqadushe, Kwasakhi, Sakhi, Machibini and Nduveni. The study area lies at an altitude of 522 m above sea level with GPS coordinates of 26° 55′ 43.169′′ E and 32° 52′ 29.514′′ S. It receives a mean annual rainfall of 500 mm, and the highest mean temperature is recorded in January (22 °C) and lowest in July (9 °C). The vegetation of the area is composed of pastures, trees and shrubs that have over the years supported livestock husbandry (Fig. 1).

Materials and method

Data collection

Data were collected using a 15% random sampling method from household farmers in the seven villages. A total of 151 goat farmers were interviewed. Identification of farmers was done through a probability sampling method, and the technique that was adopted was a simple random sampling. Farmers were interviewed through a structured questionnaire and were asked questions regarding the demographic characteristics of their households, their ownership of goats and other livestock and their reasons for keeping livestock. Farmers were also asked questions about their attitudes towards the consumption of goat milk and their awareness of the nutritional qualities of goat milk and goat milk products that could be derived from their goats. Questions were administered in the local (IsiXhosa) and English languages for clarity of communication to the respondents.

Data analysis

Data collected from the study were analysed using STATA 15/SE software packages. A chi-square test ($P \leq 0.05$) was implemented to test whether there is any association between the observed variables and household farmers' attitude/willingness to consume goat milk and dairy products made from goat milk such as *amasi* (locally made fermented yoghurt), cheese and flavoured yoghurt.

Results

Farmers' demographic information

Among those that were interviewed, the majority (59.95%) were male farmers compared to female farmers (43.05%). The majority of the farmers had an educational background of below grade 12 (66.89%) with few of them (3.31%) having a tertiary education (Table 1). Proportionally, a higher number (52.98%) of the farmers were above the age of 60 years old, while 55.63% of the respondents were married. Conversely, the proportion of single parents, divorcees and widowed farmers were 28.48%, 1.99% and 13.91%, respectively. Christianity is the most commonly practised religion by the farmers,

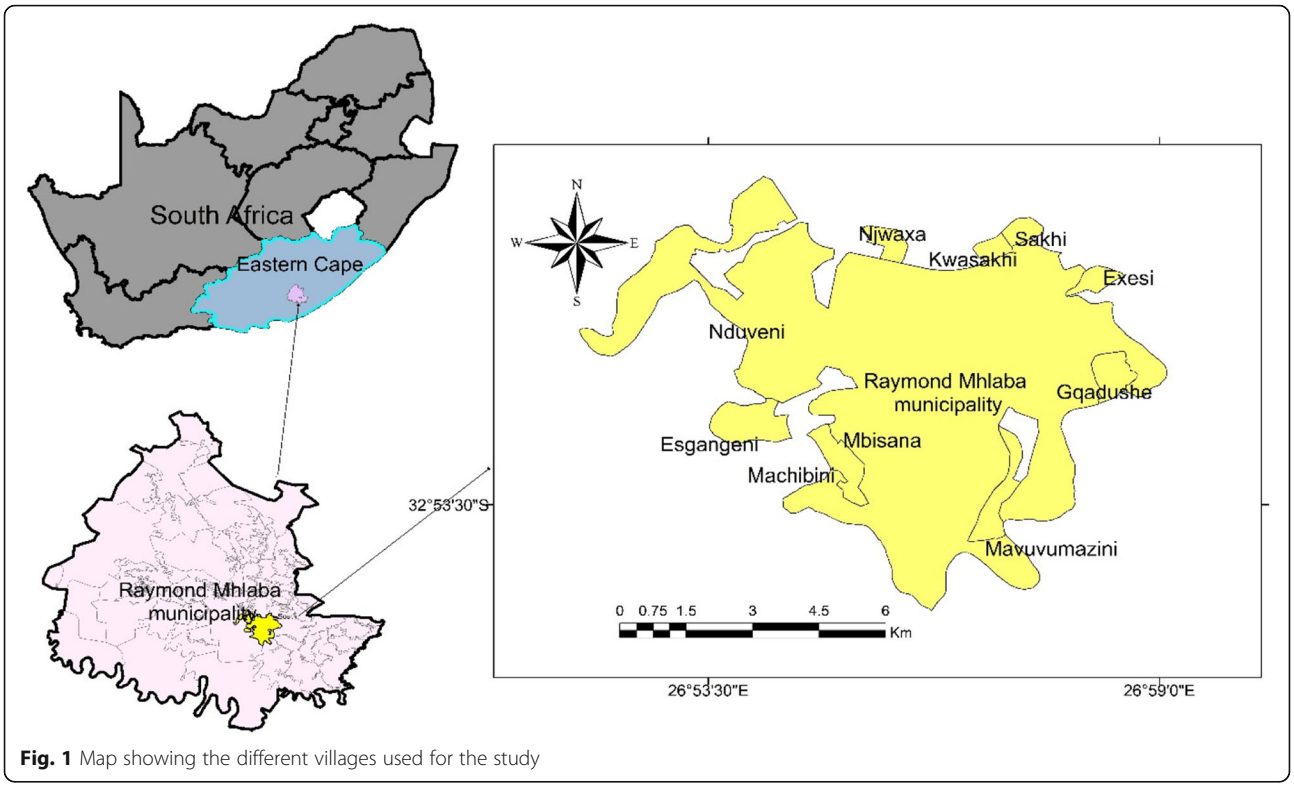

Fig. 1 Map showing the different villages used for the study

and the proportion (56.29%) of the household size of the farmers is between 1 and 5 children per household. The major source of income for most (80.13%) of the respondents was social grants and pensions (Table 1).

Farmers' perceptions of/and willingness to consuming goat milk

The results showed that the majority (94.70%) of the household farmers consume milk as part of their family diet (Table 2). However, most (45.52%) of the milk consumed by the farmers are purchased from shops and not from their individual livestock (Table 2). Furthermore, most of the farmers (76.52%) consume cow milk rather than goat or sheep milk. Likewise, large proportions (41.78%) of the respondents do not consume goat milk (Table 2). Among the reasons why farmers do not consume goat milk include taste (20.83%), cultural dislike (8.33%) and others which include the strong smell of milk and natural dislike of goat milk (64.58%). About 61.90% of the respondents were aware of the nutritional benefits of consuming goat milk; but a large proportion (38.10%) were not aware of the nutritional benefits of the milk. Among the respondents that are not aware of the nutritional benefits of goat milk, large proportion (93.10%) of them showed their willingness to consume the milk as part of their daily diet based on the information (received from the interviewers) about the nutritional benefits of goat milk (Table 2).

Factors associated with farmers' willingness to consume goat milk or its products

Results from Table 3 showed that age, gender and educational status were among the factors that had a significant ($P \leq 0.05$) influence on farmers' willingness to consume goat milk. Farmers above the age of 60 years showed more interest in consuming goat milk when compared to other age groups (Table 3). More males consume goat milk than their female counterparts. Likewise, Table 3 showed that more respondents who had an educational level below grade 12 consume more goat milk than those in the other levels of education.

There was no significant influence on the studied variables (age, gender, and educational status among others) and farmers' willingness to consume *amasi* (locally made fermented cow's milk yoghurt) as shown in Table 4. Furthermore, only gender had a significant influence ($P \leq 0.05$) on farmers' willingness to consume flavoured yoghurt, with more females willing to consume the product than their male counterparts (Table 5). In addition, only gender had a significant influence on farmers' willingness to consume cheese made from goat milk with a high percentage of males showing their willingness to consume the product compared to females (Table 6).

Discussion

To our knowledge, this study appears to be the first to report on the perceptions and willingness of farmers to

Table 1 Demographic information of rural farmers and households that participated in the survey where they were asked, 'if they will be willing to consume goat milk and their products'

Demographics	Variables	Proportion (%)
Gender	Male	59.95
	Female	43.05
Educational level	Did not go to school	12.58
	Below grade 12	66.89
	Grade 12	14.57
	Beyond grade 12	2.65
	Tertiary education	3.31
Age (years)	< 21	–
	22–40	16.56
	41–60	30.46
	> 60	52.98
Marital status	Single	28.48
	Married	55.63
	Divorce	1.99
	Widowed	13.91
Religion	Christianity	77.03
	Traditional worshipper	19.59
	Others	3.38
Household size	1–5	56.29
	6–10	37.09
	11–15	5.30
	> 15	1.32
Source of income	Salaries/wages	9.27
	Business	7.28
	Farming	3.31
	Grants/pensions	80.13

consume goat milk in the area of study. More males participated than females in the survey, and this is in line with the findings of Chah et al. (2013). A possible reason for the unbalanced gender interest in goat farming may be due to the time and energy involved in livestock farming; as a result, most women find it difficult to commit themselves to it (Oluwatayo and Oluwatayo 2012). Furthermore, according to the study by Ayodele et al. (2009), most women are often involved in a lot of domestic activities which could contribute to their little or lack of interest in livestock farming.

Most of the farmers interviewed in the present study were above 60 years of age, and they have their major source of income in the form of social grants or pensions from the government. In another study by Scholtz et al. (2008), it was reported that rural-urban migration of young people in search of greener pastures contributes to the higher proportion of rural farmers in the age group of over of 60 years old. Additionally, Tada et al. (2012) observed in their study that youths usually relocate to urban areas to pursue their tertiary aspirations and secure more lucrative jobs, thereby abandoning the idea of farming altogether.

Milk, especially cow's milk, is commonly consumed in many countries. However, the consumption of goat milk is still not widely accepted in some parts of the world (Phoya et al. 2003) including South Africa, despite its high nutritional benefits. From the present study, most farmers consume cow milk rather than goat milk. This is similar to the findings of Utami (2014). Earlier studies indicate that consumers' behaviour and knowledge towards consuming goat milk and its products differ according to several factors including gender, age, environment, income and educational level among others (Bongard et al. 2012; Guney and Ocak 2013; Tuan et al. 2013).

Some of the reasons why farmers do not consume goat milk as observed from the current study include taste, cultural bias and natural dislike of the milk. This is in line with the findings of Guney and Ocak (2013) who also reported that personal dislike, taste and strong smell were part of the reasons why farmers do not consume goat milk in Turkey. Research has shown that the hydrolysis of fat catalysed by lipase enzymes in goat milk is the main problem that causes organoleptic defect leading to the strong smell and taste of goat milk and its products (Park 2001; Martinez et al. 2011). This attribute may contribute to the low acceptability of goat milk. However, contrary to our findings, Guney and Ocak (2013) in their study indicated that lack of availability of goat milk is a possible reason for the low consumption of goat milk. Conversely, it is noteworthwhile that goats are generally seen as 'a poor man's cow' in several parts of South Africa; hence, most people in the area of study have little or no interest in goat milk or its products.

A relatively large percentage of the respondents were not aware of the nutritional benefits of goat milk, observed from the current study. This was similar to the findings by Guney and Ocak (2013). However, in a related study by Adewumi et al. (2015), it was reported that rural farmers in Nigeria are aware of the nutritional benefits of goat milk, and thus, a large percentage of these farmers consume the milk and its products. Furthermore, a large proportion of respondents in the present study who became aware (as a result of this research) of the nutritional benefits of goat milk indicated their willingness to consume the milk as part of their diet, regardless of their previous prejudice of the milk. This is in agreement with the study by Haenlein (2004) who reported similar observations in their findings.

Age, gender and educational level were among the factors that influenced farmers' willingness to consume goat milk, observed in the present study. Farmers above

Table 2 Descriptive features of households response to questions regarding their perceptions and willingness to consuming goat milk

Theme	Response	Proportion (%)
Do you use milk as part of your family diet?	Yes	94.70
	No	5.30
Where do you purchase milk that you consume?	From shops alone	45.52
	From owned livestock alone	13.79
	From shops and owned livestock	40.69
Which preferred owned livestock do you consume milk?	Sheep alone	1.52
	Cow alone	76.52
	Goat alone	9.09
	Goat and sheep	1.52
	Goat and cow	9.85
	Goat, sheep and cow	1.52
Do you consume goat milk?	Yes	58.22
	No	41.78
Reason for not consuming goat milk?	Taste	20.83
	Cultural bias	8.33
	Odour	6.25
	Others, e.g. natural dislike, strong smell	64.58
How do you utilize goat milk in your family diet?	Tea alone	23.66
	Mielie meal alone	9.68
	Coffee alone	1.08
	Tea and mielie meal	23.66
	Tea and coffee	4.30
	Mielie meal and coffee	1.08
	Tea, mielie meal and coffee	33.33
	Sour milk (*amasi*)	3.23
Are you aware of any nutritional benefit of goat milk and its products?	Yes	61.90
	No	38.10
Will you be willing to consume goat milk and its product (as part of your diet) because of its nutritional benefits?	Yes	93.10
	No	6.90

the age of 60 years showed more interest in consuming goat milk when compared to the other age groups in the current study. The reason for this could be because most of these aged farmers were raised in farms from their young age during the colonial era and goat milk was part of the food they consumed when growing up. Another possible reason could be the fact that most of the respondents may not have the financial capability to buy cow's milk as they mostly depended on monthly social grants from the government for their sustenance; hence, they utilize the milk they get from their goats. However, in a similar study, age and educational level were not factors that influenced farmers' willingness to consume goat milk (Adewumi et al. 2015). The difference in respondents' attitude towards goat milk consumption further buttresses the fact that the area of study could influence people's decision about goat milk consumption (Guney and Ocak 2013; Tuan et al. 2013).

Respondents that had below grade 12 education consume more goat milk than those with higher levels of education. This finding is in line with the study by Utami (2014) who reported that consumers with higher level (tertiary) of education do not show interest in consuming goat milk, but will rather prefer cow's milk. The reason why respondents with education below grade 12 consume more goat milk may not be clearly understood. However, from casual observations, this may be connected with the fact that the majority of the people in this group (below grade 12) solely depend on farming for their livelihood and are more likely to use products (e.g. milk, meat) derived from their livestock as compared to those with higher levels (tertiary) of education

Table 3 Chi-square test result of factors that influence farmers' willingness to consume goat milk

Factor variables	Group	Proportion (%)	Sig.
Age	Less than 21 years	–	
	22–40	11.76	
	41–59	27.06	
	˃ 60	61.18	*
Gender	Male	62.35	
	Female	37.65	*
Educational status	Do not attend school	14.12	
	˂ Grade 12	72.92	
	Grade 12	10.59	
	˃ Grade 12	–	
	Tertiary institution	2.35	*
Marital status	Single	22.35	
	Married	61.18	
	Divorced	2.35	
	Widowed	14.12	NS
Religion	Christianity	81.93	
	Traditional worship	14.46	
	Others	3.61	NS

Significant at $*P \leq 0.05$, but NS not significant at $P > 0.05$

Table 4 Chi-square test result of factors that influence small-scale farmers' willingness to consume local yoghurt *amasi* produced from goat milk

Factor variables	Group	Proportion (%)	Sig.
Age	Less than 21 years	–	
	22–40	18.32	
	41–59	29.01	
	˃ 60	52.67	NS
Gender	Male	58.78	
	Female	41.22	NS
Educational status	Do not attend school	12.21	
	˂ Grade 12	69.47	
	Grade 12	12.21	
	˃ Grade 12	3.05	
	Tertiary institution	3.05	NS
Marital status	Single	28.24	
	Married	56.49	
	Divorced	1.53	
	Widowed	13.74	NS
Religion	Christianity	76.74	NS
	Traditional worship	19.38	
	Others	3.88	

Significant at $*P \leq 0.05$, but NS not significant at $P > 0.05$

Table 5 Chi-square test result of factors that influence small-scale farmers' willingness to consume flavored yoghurt made from goat milk

Factor variables	Group	Proportion (%)	Sig.
Age	Less than 21 years	–	
	22–40	23.53	
	41–59	29.41	
	˃ 60	47.06	NS
Gender	Male	35.29	
	Female	64.71	*
Educational status	Do not attend school	5.88	
	˂ Grade 12	52.94	
	Grade 12	35.29	
	˃ Grade 12	–	
	Tertiary institution	5.88	NS
Marital status	Single	35.29	
	Married	47.06	
	Divorced	5.88	
	Widowed	11.76	NS
Religion	Christianity	76.47	
	Traditional worship	23.53	
	Others	–	NS

Significant at $*P \leq 0.05$, but NS not significant at $P > 0.05$

Table 6 Chi-square test result of factors that influence small-scale farmers' willingness to consume cheese made from goat milk

Factor variables	Group	Proportion (%)	Sig.
Age	Less than 21 years	–	
	22–40	15.32	
	41–59	29.84	
	˃ 60	54.84	NS
Gender	Male	62.90	
	Female	37.10	*
Educational status	Do not attend school	13.71	
	˂ Grade 12	66.94	
	Grade 12	14.52	
	˃ Grade 12	2.42	
	Tertiary institution	2.42	NS
Marital status	Single	26.61	
	Married	58.87	
	Divorced	1.61	
	Widowed	12.90	NS
Religion	Christianity	74.80	
	Traditional worship	21.14	
	Others	4.07	NS

Significant at $*P \leq 0.05$, but NS not significant at $P > 0.05$

who may have other sources of income needed to purchase cow's milk from the shops.

More males consume goat milk compared to their female counterparts, as revealed from the current study. This could be linked to the fact that more males are generally involved in managing goats (in terms of milking) in rural settings compared to their female counterparts (Oluwatayo and Oluwatayo 2012; Ayodele et al. 2009). This will connected to the fact that goats are generally known to be stubborn in nature and could be more handled easier by males than females. The gender influence on the willingness to consume flavoured yoghurt (which is high in female farmers) and cheese (which is high in male farmers) made from goat milk may not be clearly understood. However, this may be linked with the perceived gender preference (in terms of taste and texture) for these different dairy products.

Conclusion

The study revealed that though a large percentage of farmers do not consume goat milk and its products due to various reasons including lack of knowledge of its nutritional benefits, its taste, cultural bias, and strong smell among other reasons, many of them are willing to do so based on their informed awareness (resulting from the current study) of its nutritional benefits. The nutritional importance of goat milk and its products should be encouraged as a potential food resource among small-scale farmers in the rural areas of the central Eastern Cape Province of South Africa.

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Availability of data and materials

Kindly contact the author for data requests.

Authors' contributions

EMI, BG and MA conceptualized and design the work. EMI and BG collected the data. EMI analysed the data. EMI and BG visualized the results. EMI wrote the paper. EMI, BG and MA proofread the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

Ethical principles were taken into consideration during the study to adhere to the national and international standards governing research of this nature with regards to the use of research tools.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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