Perceptions and attitudes of communities on socio-economic importance of camels and consumption of camel milk and camel milk products in Kgalagadi District, Botswana

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Abstract

Camels were introduced to Botswana in the early twentieth century as a means of transport for the Botswana Police Service in the Kgalagadi District. This service was discontinued in the early 1980s and the camels were handed over to communities in the district for ecotourism activities. Since their introduction in Botswana, camels were regarded as government property and were never taken as alternative livelihood option that can alleviate poverty by providing milk and other products as is the case in other countries. This study explores the prospects of utilization of camel milk and milk products by assessing perceptions and attitudes of communities on the socio-economic importance of camels, consumption preferences for camel milk and value-added milk products. A combination of qualitative and quantitative methods was used to address the objectives of the research. This included a focus group discussion and a structured questionnaire that were used to determine the perceptions and attitudes of participants towards camels, camel milk and camel milk products. The strengths and opportunities associated with production of camel milk and milk products were higher than the weakness and threats; the respondents appreciated camel milk and milk products as weighed against their socio-cultural practices. The majority of the respondents would consume camel milk and milk products though not on a daily basis. There is no socio-cultural factor that hinders the use of camel milk and camel milk products and raising camels in the Kgalagadi District; the respondents had a positive attitude towards camels, camel milk and milk products.

Keywords: Kgalagadi; Botswana; camel milk; perception; attitudes; dromedary camels; socio-cultural factors

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Introduction

Camels are well-adapted to dry and hot environments, and among domesticated animals, they have the physical and physiological capacity to cope with the impeding climate change. The majority of the land area of Botswana has an arid climate and is, therefore, ideally suited to camel production. Available evidence (Wilson, 2014) has shown that camels were introduced to Botswana at the beginning of the twentieth century, mainly, from the Cape of Good Hope now called Cape Town. The camels of the Cape of Good Hope were imported initially from the Canary Islands in the late 19th century and later from Egypt and Karachi which was an Indian territory at the time (Wilson, 2009, 2013). Until they were replaced by the use of vehicles, the camels were used by the Botswana Police Service for regular patrols in the sandy Kgalagadi District and for postal delivery services between Tshane and Tsabong. The police service continued to use camels on patrols up to the early 1980s and retained them as government property until 2001 when they were handed over to the local communities with the intention of developing an ecotourism industry based on camel safaris (Wilson, 2014).

Accordingly, the Tsabong Ecotourism Camel Park was established in 2005, and it is where the camels are currently kept. This is an enclosed park located at Maleshe in southern Kgalagadi and managed by the Tsamama Community Trust comprising of three communities: Tsabong, Maubelo and Maleshe villages in partnership with Botswana Tourism Organization (BTO) (Moeng, 2011; Kgaudi et al., 2018). Through this partnership, the Tsabong Camel Park is being promoted and managed as an environmentally friendly tourism venture (ecotourism) that not only safeguards the ecology of the area, but also benefits the local communities through generation of income.

Camels were precious animals that could be utilized by the communities to diversify their income sources, which at the time were largely based on hunting, limited crop production and livestock (cattle and small stock) rearing. However, lack of a strategy and adequate planning on the future utilization of camels have rendered them to be not so useful to the communities. The camels in Kgalagadi North, unlike those in Kgalagadi South (Tsabong), are currently being kept at a ranch near Inalegolo Village under the care of KOINAPU Community Trust (UNDP, 2017), but their status is not visible like those in Tsabong Camel Park. Some camels in Kgalagadi North have been found roaming in

the bush, and there is a fear that they have gone feral (Kang Police Station, personal communication).

Despite the long history of introduction of camels into Botswana, they have not been integrated into the livestock food production system of the country because, for a long time, they were government property that was used solely by the Botswana Police Service. As a result, the general public in Botswana is not aware of the potential livelihood benefits that can be derived from camels (Seifu et al., 2019). The Tsabong camel herd is currently used only for tourism (riding within the park) and for entertainment purposes. As such, the herd is underutilized and performs below its potential (Seifu et al., 2018; Seifu et al., 2019). However, the main reason for keeping camels elsewhere in the world is for food production, especially milk production. Thus, camels have a great potential to contribute to climate-resilient sustainable development, food security. national economic growth and poverty alleviation if appropriate policy interventions are developed to improve their productivity in Botswana.

Although the potential of camels for food production is understandable, before embarking on a project aimed at using camels for milk production, it is imperative to determine the perceptions and attitudes of the local communities towards camels and camel products. Such information would help to design appropriate research and development strategies aimed at improving the productivity of the camels in the country. The results from such studies would highlight the possibilities for the expansion of camel husbandry to other parts of the country and promotion of the camel sub-sector as a whole.

Therefore, this study was designed to explore local perceptions and attitudes of communities on the socio-economic importance of camels and consumption preferences for camel milk and value-added camel milk products.

Methodology

Study areas

The study was conducted in two sub-districts in Kgalagadi District, namely Kgalagadi South and Kgalagadi North in western Botswana. These were purposively selected as they are the only regions where camels are found in Botswana. The study population included three villages in Southern Kgalagadi, namely Maubelo, Maleshe and Tsabong and four villages in northern Kgalagadi, namely Hukuntsi, Lokgwabe, Lehututu and Tshane, and these villages were purposively selected. Kgalagadi District is one of the ten administrative districts in Botswana (Statistics Botswana, 2015; Figures 1a and 1b) located at 24.7550° S and 21.8569° E (https://latitude.to/map/bw/botswana/regions/k galagadi-district, accessed on 25-07-2020). It shares borders with Gantsi District in the north, Kweneng and Southern District in the east, South Africa in the south and south-east and Namibia in the west (Ministry of Local Government, 2003). The climate is arid to semiarid, with annual rainfall ranging from 250 mm in the north to 150 mm in the south of the District (Ministry of Local Government, 2003). Kgalagadi usually experiences hot temperatures during the summer and cold winter months (Crawford, 2016). Summer temperatures range from 18°C to 32 °C in January, but the temperature can climb as high as 42 °C; in the winter, the temperature averages 21 °C (July), but can dip down to 5 °C 2016). The (Crawford, vegetation is characterised by grass and shrub savannah, which covers most of the District with sand dunes in the extreme south. The species of the genera Senegalia and Vachellia (formerly classified under the genus Acacia) are predominant in the District.

Data collection and sampling strategy

An exploratory and descriptive research design was used to collect data about

the socio-economic indicators of camel milk and value-added camel milk products.



Figure 1a. Map of Botswana showing Kgalagadi District (Source: Kgosikoma, 2020)



Figure 1b: Map of Kgalagadi District showing study areas (designed by Kgosikoma, 2020)

Both qualitative and quantitative research approaches were used to address the objectives of the research. A focus group discussion (FGD) was used to collect in-depth qualitative data on how respondents perceive camels, camel milk and value-added camel dairy products. The general themes in the FGD were on the historical knowledge of camels in the area; how they were used, the possible milking prospects and the preferred value-added camel milk products.

During the focus group discussion, a SWOT (Strengths, Weaknesses, Opportunities

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and Threats) analysis was used to determine the possibility of marketing and investment in camel milk, as well as camel milk products and to identify the factors related to production of camel milk and camel milk products. A SWOT analysis is a planning tool that identifies the factors that are most likely to influence the success of a project (Pickton and Wright, 1998).

In addition, a structured questionnaire, consisting of demographic characteristics, general questions that required 'Yes' or 'No' responses and, mainly, Four Point Likert Scale questions (anchored on Strongly Agree, Agree, Disagree Disagree) was and Strongly developed to determine the perceptions and attitudes of participants towards camel milk and camel milk products. The following factors were investigated: socio-cultural factors, motivation to consume camel milk, factors associated with milk quality as well as factors that could lead to increased milk production from camels. Information was also generated on the socio-cultural aspects of camel milk and camel milk products. The questionnaire was pre-tested for validity and reliability, and the final survey was administered using face-toface interview method to ensure a high response rate.

A simple random sampling technique was used to select respondents from the three villages in Kgalagadi South and the four villages in Kgalagadi North. A proportionate sampling technique was used in order to determine the sample size from each selected village in the Kgalagadi South and North sub-District based on their total population.

In Kgalagadi South sub-District, a total of 200 questionnaires were administered from 18-22 March 2019 in the three villages, namely Tsabong, Maubelo and Maleshe. The Focus Group Discussion was held during the same period at Tsabong Village Kgotla (Kgotla is a public meeting, community council or traditional law court of a Botswana village) with participants from Tsabong and Maubelo. The villages were purposively identified as the communities from these villages frequently interacted with camels at the time, they were used by the Botswana Police Service. A total of 12 key-informants were purposively selected by village leadership based on their experience and knowledge about camels.

In Kgalagadi North sub-District, the FGD and survey administration through faceto-face interviews were conducted from 20-23 September 2019. A total of 165 questionnaires were administered in the four villages, namely Hukuntsi, Tshane, Lokgwabe and Lehututu. The FGD was held at Hukuntsi Village Kgotla with participants from all the four villages. A total of 16 key-informants were purposively selected by village leadership based on their experience and knowledge about camels for the FGD.

The survey respondents were briefed about the purpose of the study and informed consent was obtained prior to the interview. The information generated through the FGD and questionnaires was analyzed and the results are subsequently presented. Data generated through the questionnaires was analysed using descriptive statistics.

Results

Demographic characteristics of the participants

Cumulatively, the majority of the survey respondents were in the age groups, ranging from 21 to 60 years and the proportion of female participants was much higher than that of males (Table 1). The

majority of the participants have attended formal school, i.e., they have completed either primary, junior secondary or high schools and some attended tertiary education.

Perceptions about camels and camel milk

The most important aspects of the FGD were on the views of the participants about the utilization of camel milk, which they indicated to have used. Their views were that camel milk has healing properties, it tastes delicious and is more preferred than cow milk.

According to the key-informants from Tsabong, camels are believed to have arrived in Botswana in the 1900s from the then German West Africa (Namibia), and they were routed through South Africa via a place called Witdraai. Whereas, according to the participants of FGD at Hukuntsi, camels were believed to have arrived in Botswana around the 1930s as a property of the Government of Botswana. When camels arrived in the country, the communities developed different beliefs, myths and perceptions about them because they did not form part of their cultural repertoires.

Table 1. Demographic characteristics of participants from Kgalagadi South and Kgalagadi North sub-Districts.

Profile of respondents	Kgalagadi South Kgalagadi North	
-	(% response, $n = 200$)	(% response, $n = 165$)
Age (years)		
≤ 20	1.5	3.0
21-30	25.0	11.5
31-40	17.5	26.7
41-50	26.5	20.6
51-60	16.0	17.0
61-70	9.5	15.8
> 70	4.0	5.5
Gender		
Male	37.5	36.4
Female	62.5	63.6
Marital Status		
Single	76.3	65.5
Married	16.3	24.2
Widowed	6.4	9.7
Divorced	0	0.6
Level of Education		
Never been to school	18.8	21.8
PSLE	23.8	20.4
JC	38.8	33.9
COSC/BGCSE	17.5	17.6
Tertiary	1.2	6.1

PSLE = Primary School Leaving Examination, JC = Junior Certificate, COSC = Cambridge Overseas School Certificate, BGCSE = Botswana General Certificate of Secondary Education, n = total number of respondents.

The camels from Kgalagadi North were kept at Tshane Police Station. They were used for police patrols between villages as well as undertake any official duties that required the use of camels as there were no vehicles during those days. The camels were used for postal delivery services around Kgalagadi areas especially between Tshane and Tsabong Police Stations. The Police used them for antipoaching activities, control of traditional brews, which were considered illegal during the time, and enforce law and order against crimes that were common in these areas. There was a sense of belief among the participants that the main reasons for the success of police in apprehending illegal brewers and poachers were attributed to the ability of camels to exactly locate the house where criminal activities could take place. Another common view among the communities was that camels were regarded as animals that lions were scared of and, as a result, the police used them for protection against lions during night camping while on duty in the field.

According to the participants, camels could survive drought and could stay for about 14-30 days without drinking water. The informants also reported that camels are capable of traveling very long distances and also withstand very high temperatures. Respondents also indicated that an average camel can carry heavy loads of up to 200 kg and still maintain its traveling speed.

According to the participants, camels under Tsamama Trust are used for ecotourism in southern Kgalagadi where people ride them around the park and also take wedding pictures to generate income for the trust. The community equate the value of a camel to that of a vehicle because, originally, camels were used for transportation. Some participants estimate the value of a camel to be equivalent to four oxen while others estimate its value to range between P5000.00 and P8000.00 (Estimated exchange rate 1.00 US Dollar = Pula 12.00). Participants from Kgalagadi South reported that the price of one mature camel could range from P19000 to P32000 in 1994 and they believed that currently, the price of a single camel may have increased to between P40000 - P62000.

The people of Hukuntsi, Lokgwabe, Lehututu and Tshane in Kgalagadi North, expressed their desire to keep camels for income generation. The interviewees believe that the Kgalagadi Region is viewed as one of the best suited areas for camel production because it is sandy and arid in nature. Unlike in Kgalagadi South, the participants from Kgalagadi North indicated that they never tasted camel milk in their lifetime. According to the participants, camels are believed to yield about 6-8 litres of milk per day and per animal. They also indicated that by-products such as yoghurt, condensed milk, cheese, fresh milk, madila, butter, dairy juice, lotions and soap may be made from camel milk. The people of Tsabong and Maleshe from Kgalagadi South also expressed their interests to embark on camel farming because they believe that camels can bring economic diversity and improve their livelihoods. According to participants from Kgalagadi South, camels in Botswana can produce one liter of milk per day per animal. However, they stated that in countries, such as Israel, one camel can produce 20 litres of milk per day while in Kenya, a camel can produce 10-15 litres of milk per day under good management. This suggests that the participants are convinced about the possibility of increasing camel milk production through good management and improved feeding.

When asked about market opportunities for camel products, the respondents were unanimous in the view that schools, health facilities, tourists, export market, prisons, retailers and wholesalers can be the potential market outlets for camel milk and milk products in Botswana. They also suggested that women, camel farmers and cooperatives can participate in marketing camel milk and camel milk products.

According to the participants, in the past, people in Kgalagadi District were scared of camels and they were also not aware of their benefits. However, they mentioned that nowadays, people started to realize the benefits of camels, especially their potential for food (milk and meat) production. Participants from Tsabong indicated that when camels get old, they are slaughtered, and people eat their meat. They also indicated that nowadays, people in Tsabong and the surrounding areas are buying camel milk from the Tsabong Ecotourism Camel Park for consumption. According to the interviewees, the demand for camel milk is increasing in the study area, especially, due to the belief by the community that it has medicinal values for different human ailments.

The respondents further mentioned that people in the region have also started to realize that camels are docile, harmless and intelligent animals that can easily be trained and raised like any other livestock. The participants also indicated that in addition to their potential for food production, camels are used to attract tourists to the region. They are also used to take pictures during wedding ceremonies and people ride camels for entertainment.

SWOT analysis

According to the results, one surprizing strength was that the views of the paricipants about the medicinal values of camel milk and its longer shelf-life than milk from other domestic animals. Moreover, the experience of respondents showed that camel milk has a niche market due to its percieved medicinal value. They believe that camel milk boosts their immune system and is used to treat asthma, autism, diabetes, and that it helps with allergies and mitigate autoimmune diseases. Camels are hardy and resilient animals that can cope with the changing climate as well as the hot and arid environment of the Kgalagadi Region is best suited for rearing them. Besides, they are less prone to diseases than other livestock species.

The opportunities include the possibility of diversifying national milk production by using camels as a source of milk and employment creation by embarking on camel farming. There is less competition and high demand for camel milk and camel milk products. The fact that camels are already available in the region is also an opportunity since it does not require introduction of camels from abroad.

In contrast to the strengths, however, the participants mentioned that high initial capital requirement to start camel farming, and difficulty to handle camels because of their physical features were among weaknesses of having camels. Camels have an unpleasant smell associated with their urine which splashes on their rear limbs. This acrid smell was perceived by participants to deter many people from drinking camel milk. The fact that camels have over the years been the exclusive property of the government and that some value systems were developed about them has made it impossible to market them to the wider communities in the region as a potential resource of livelihoods.

The major threat was lack of awareness by the public about the potential benefits of camels and their products. There was the belief that male camels have aggressive behaviour during the breeding season, which could make it difficult to handle them. Due to the fact that it was unusual to milk camels before they were handed out to the community trust, there is a high potential for resistance to accept the milk and milk products. Less familiarity of consumers with camel products is also reported as a potential threat. The threats and weaknesses can be dealt with through education and research to change the mindset of the people. Hands-on training on camel husbandry and provision of financial incentives to encourage the community members to start camel business may also help to address the weaknesses reported and promote the camel industry.

Socio-cultural factors related to camel milk and camel milk products

Quantitative analysis from the questionnaires substantiate the need to explore the commercialization of camel milk and camel milk products. The results showed that there is no socio-cultural factor (belief) that hinders the use of camel milk and camel milk products and raising camels in the Kgalagadi South and North sub-Districts. This shows that the respondents had a positive attitude towards camels and camel milk and milk products. Respondents mentioned that they did not agree with the idea that camels have been part of the livestock they owned (mean =3.15, SD = 0.92) (Table 3). Respondents further reported that they never thought of drinking camel milk

(mean =2.76, SD = 1.05) because people in the community would laugh at them for drinking camel milk (mean =3.32, SD = 1.09). Respondents also disagreed with the perception that camel milk is usually taken by resource poor individuals (mean = 3.14, SD = 1.07). None of the respondents mentioned that their family members would ridicule them for taking camel milk (mean = 3.39, SD = 1.00). This is an indication that they perceived camel milk and milk products positively. All other statements are in agreement with social expectations.

Table 2. SWOT analysis of factors related to production of camel milk and camel milk products as reported by respondents from Kgalagadi South and Kgalagadi North Districts.

Strength	Weakness
• Availability of niche (unique) market	• Camel's physical feature
Camels are versatile	• Unpleasant smell coming from the camel.
Tolerance to diseases	• Management of camel stock
• Medicinal value of the milk - treat high	High initial investment cost
blood pressure, dry cough (flu),	• Less awareness (lack of knowledge) about
asthma/bronchitis, boost immune system,	the husbandry practices
relieve stress, aphrodisiac; the fat from the	
hump is used for massaging	
Hardy animal	
• Improve nutrition and health	
• Long shelf-life of milk	
Opportunities	Threats
 Less competition 	• Less familiarity with the product
• High demand for the milk and milk	• Taboos associated with camel
products	 Dangerous during breeding period
 Employment creation 	• Resistance to change by communities to
• Already available (localized) in the region	accept camel milk and milk products
 Increase milk production in Botswana 	
Adaptation to climate change	
Poverty eradication	

Factors that motivate consumption of camel milk and milk products

Consumption of camel milk in the study area is still very low because camels are newly introduced in the livelihood systems of the communities. Camels are mainly used for ecotourism activities and their milking is a secondary economic activity. As a result, camel milk is not widely consumed in the area. However, respondents from both Kgalagadi North and Kgalagad South in Table 4 generally agreed that they will be motivated to consume/buy camel milk and camel milk products in the region because camel milk may have high nutritional value, the perceived medicinal properties, and proper packaging of camel milk and milk products. The respondents further indicated that they will be more inspired to consume/buy camel milk and milk products because of its perceived popularity as a new product in the market. Generally, respondents agreed that camel milk will be proffered and consumed by the community provided that people are not allergic to it. The respondents believe that if available, pasteurized camel milk would have more demand and be more frequently consumed than other camel milk products.

Table 3. Attitudes of respondents on the socio-cultural aspects of camel milk and camel milk products
from Kgalagadi South ($n = 200$) and Kgalagadi North Districts ($n = 165$).

Factors	Kgalagadi South	Kgalagadi North
	$(Mean \pm SD)$	$(Mean \pm SD)$
Camels have been part of livestock we owned	3.15 ± 0.92	3.25 ± 1.09
Milk from camels have never formed part of our diet	2.08 ± 1.12	1.33 ± 1.00
I have never taken fresh milk from camel as edible	1.76 ± 1.05	1.33 ± 0.87
I will never drink camel milk	2.71 ± 1.06	2.47 ± 1.26
Consumption of camel milk is believed to cause bad luck	3.53 ± 0.86	3.33 ± 0.78
People in the community will laugh at me if I drink camel milk	3.32 ± 1.09	3.46 ± 0.77
Camel milk is usually taken by people who are poor	3.41 ± 1.07	$3.39\pm.77$
Members of my family would ridicule me for taking camel milk	3.39 ± 1.00	3.49 ± 0.73
Young people in the community are likely to consume camel milk	2.21 ± 1.07	2.16 ± 1.08
The educated people in the community are likely to consume camel	1.92 ± 0.91	1.81 ± 1.03
milk		
The rich (well off) members of the community will consume camel	1.71 ± 0.65	2.03 ± 1.02
milk		
Camel milk and milk products should be sold to hotels and	1.74 ± 0.76	1.42 ± 0.59
restaurants		

Legend: (1) Strongly Agree, (2) Agree, (3) Disagree and (4) Strongly Disagree, SD = Standard deviation, n = total number of respondents.

Table 4. Factors that are likely to motivate consumption of camel milk and milk products as reported
by respondents from Kgalagadi South ($n = 200$) and Kgalagadi North ($n = 165$) Districts.

F	KS	KN
Factors	(Mean \pm SD)	$(Mean \pm SD)$
Camel milk may have high nutritive value	1.61 ± 0.77	1.76 ± 0.90
Camel suckling calves never contact diseases which is an indicator for its medicinal value	2.24 ± 1.08	2.49 ± 0.76
The milk may have medicinal properties that force people to consume it	$1.82\pm.95$	1.69 ± 0.90
The milk and its products may be popular because they will be new in the market	1.66 ± 0.81	1.60 ± 0.76
Proper packaging of milk and milk products will attract buyers	1.45 ± 0.50	1.48 ± 0.56
Camel milk will be consumed if people are not allergic to it	1.60 ± 0.64	1.41 ± 0.56

Legend: (1) Strongly Agree, (2) Agree, (3) Disagree and (4) Strongly Disagree, SD = Standard deviation, KS = Kgalagadi South, KN = Kgalagadi North, n = total number of respondents.

The majority of respondents (80%) felt that they would "rarely" consume raw camel

milk (Figure 2). That is, the respondents would *rarely* consume raw camel milk on a daily

basis. All other options were below 10%. With regard to pasteurised camel milk, about 71.3% of the respondents indicated that they would consume pasteurised camel milk on a daily basis. The respondents indicated that they would "rarely" consume the following camel milk products: yoghurt (62.5%), cheese (55%), traditional sour milk (73.8%) and commercial sour milk (43.8%).

The results show that the majority of respondents (80%) from Kgalagadi South would rarely consume camel milk and camel milk products. Pasteurised milk was an exception in that it would be consumed on a daily basis by 71% of the respondents. Yoghurt, cheese, traditional sour milk and commercial sour milk are all value-added commodities whose price would determine their level of consumption. The results showed that with regard to consumption of raw milk, none of the respondents (29.7%) from Kgalagadi North would drink raw camel milk (Figure 3). The rest of respondents would rarely (29.7%) consume camel milk, 18.8% would consume it daily, 6.1% would consume it once a week and 15.8% indicated that they would consume it more than once a week. Generally, the majority of respondents said that they would consume raw camel milk at varying intervals. As far as the consumption of pasteurised milk is concerned, only 24.2% of respondents would not drink pasteurised milk, while 21.2% would rarely consume milk, 24.8% would consume pasteurised *milk* daily, 6.1% on weekly basis and 23.6% would take it more than once a week. Thus, only a small percentage (24.2%) of the respondents would not take pasteurised milk while the majority would take it at different time intervals.





A similar trend was observed in the consumption of yoghurt where 31.5% of the respondents mentioned that they would not consume yoghurt while 40.6% would rarely consume it, 11.5% would consume it daily, 7.9% would consume it once a week and 8.5% would consume it more than once a week.

Regarding cheese, only 38.2% of the respondents indicated that they would not consume cheese from camel milk. Some 37% indicated that they would rarely consume cheese, 10.9% would consume it on a daily basis, 4.8 % would consume it once a week while 8.5% would consume it more than once a

week. As for sour milk, 29.7% of the respondents stated that they would not consume sour milk, 38.2% would rarely consume sour milk, 13.9% would consume it on a daily basis while 5.5% and 12.7% would consume it once a week and in more than once a week, respectively.

The results from Kgalagadi North depict a trend where more than 60% of respondents indicate the likelihood of consuming camel milk and milk products at different time intervals. However, in most cases, respondents would rarely consume raw milk and milk products. Respondents indicated that they would consume pasteurised milk daily followed by more than once a week.

Perceived prices for camel milk and camel milk products

The respondents from Kgalagadi North sub-District indicated the price that they would be willing to pay for camel milk and various camel milk products when they are available (Table 5). According to the response from the respondents, camel milk and camel milk products were highly valued in terms of their perceived price in the market. Respondents from Kgalagadi South had the view that camel milk can be priced higher than cow milk with the exception of donkey milk, which they felt could fetch a higher price in the market. According to the respondents from Kgalagadi South sub-District, half-a-litre (500 ml) of raw camel milk is currently sold for 15.00 Pula at the Tsabong Ecotourism Camel Park. Through pasteurization and value addition, camel milk would fetch a higher price and generate more income for the producers. This would eventually help to expand production and marketing of camel milk and camel milk products in the region in the future.

The reported price for all camel milk products is higher than the current market price for cow milk and milk products (Table 5). This shows that camel milk and camel milk products will have high demand by consumers if made available in the market.





The reported higher prices for camel milk and camel milk products could be

attributed to the high nutritional values and medicinal properties of camel milk as perceived by the participants. The positive attitudes of the communities towards camels/camel milk and the high demand for camel milk/camel milk products in the study area suggests the need to improve the productivity of the camels and increase camel milk production in the area.

Table 5. Perceived prices for camel	milk and camel milk products as reported	ed by respondents from
Kgalagadi North sub-District.		

Product	Volume/Amount	Camel milk	Cow milk*
		price (BWP)	price (BWP)
Fresh milk	1 L	20	10
Sour milk	500 mL	20	12
Cheese	100 g	15	9.5
Butter	500 g	30	19
Yoghurt	100 g	8	6
Condensed milk	150 g	50	30
Lotions	150 mL	150	-
Soap	150 g	200	-
Dairy juice	1 L	15	16
Powdered milk	750 g	300	75

*The current cow milk market price is used for comparison with the reported perceived prices of camel milk; L = Litre; BWP = Botswana Pula (exchange rate of 1.00 US Dollar = Pula 12.00).

Discussion

The consumption of camel milk and milk products is new phenomenon in Botswana, especially in the Kgalagadi District where they are found. Seifu et al. (2018) reported that camels in the Tsabong Ecotourism Camel Park were used for riding by tourists and camel back safari was the main tourism activity provided by the Park. They further stated that camel riding, trekking, wedding ceremonies, photographs taken by visitors and entrance fees were the main income sources of the Park and income from milk production was secondary. The main reason being that camels were a government property solely used for transport and never considered for milk production at the time until they were handed over to the communities who explored their potential for milk production (Kgautlhe, 2019). While this is

the case in Botswana, Clarke (2016) reported that the consumption of camel milk and its products have a long history spanning over six thousand years. Among the major producers of camel milk in Africa are Somalia, Kenya and Mali (FAO, 2020) who have nomadic communities that usually rely on camel milk as staple food while searching for good pastures. Pasha et al. (2013) have reported that the average daily milk yield of camels in Pakistan varied from 3-8 litres. This level of milk production depended on the breed of camel, parity, stage of lactation, season of the year, and availability of browse and water resources. Depending on the number of camels reared and good pasture, the amount of milk produced can be sufficient to sustain a family.

The results revealed that communities appreciate camel milk and consider it as having health benefits and other qualities such as versatility and disease tolerance. The health benefits and other qualities have been widely reported (Seifu, 2007; Noor et al., 2013; Gitonga, 2017; Abrhaley and Leta, 2018) to support the various ailments, curative and nutritive qualities percieved by respondents. These benefits place camel milk relatively better than milk and milk products from other livestock. They also motivate propensity of respondents to buy camel milk and milk products.

The high demand for camel milk reported by the participants in the present study is in line with the findings of Kgautlhe (2019) who reported that camel milk has a high demand by the communities in Kgalagad District due to its high nutritional and medicinal values to the point where the Tsabong Ecotourism Camel Park was not able to meet the demand. According to Kgautlhe (2019), the main reason why customers buy camel milk is primarily for its health benefits.

It is necessary to explore the sociocultural variables that may influence the marketing and consumption patterns of camel milk and milk products in these communities. Noor et.al. (2013) observed that fresh camel milk was not easily sold in urban areas unlike the processed milk, which was sold at higher prices because of the affluent customer preferences for hygienic qualities and were ready to pay for a better-quality milk. Sociocultural factors assist in predicting the "... views, attitudes and modes of behaviour ... " of people in any given culture (Büsche, 1989:79), especially in response to marketing of emerging products, such as camel milk and milk products. In addition, age, level of education and income are some of the determinants of affluence and have a bearing on the attitude and behaviour of individuals towards purchasing a commodity (Wang and Tong, 2017).

The price of camel milk and milk products were percieved to be high compared to cattle milk and milk products. These comparatively high perceived prices are influenced by intrinsic medicinal values, and the fact that camel milk is a relatively new product in Botswana and, especially, in the communities where data were collected. MacFadden (2019) reported that in a community in Florida (United States) the price for raw camel milk was US\$ 12.00 per pint (equivalence to 473 ml), which was influenced by its scarcity, high demand and that it was a new product in the market.

Conclusions

The main conclusion that can be drawn is that adoption of camel milk and camel milk products as part of the diet of the people in the Kgalagadi South and North areas is highly likely. The present findings confirm that camel milk and camel milk products seem to be highly valued in terms of perceived market price, medicinal values and social benefits.

Generally, the results of this study strengthen the idea that:

- there is a high likelihood of adoption of camel milk and camel milk products as part of the diet of people in the Kgalagadi District,
- camel milk and camel milk products seem to be highly valued in terms of their nutritional value, perceived medicinal properties and the appreciation of the perceived social benefits derived from camel milk,
- there is no socio-cultural factor (belief) that would hinder the use of camel milk and camel milk products and raising camels in the Kgalagadi District, i.e., the communities have a positive attitude towards camels and camel milk/milk products, and

• the people of Hukuntsi, Lokgwabe, Lehututu and Tshane in Kgalagadi North District expressed their desire to keep camels for income generation.

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Conflicts of Interest

The authors declare that they have no conflict of interest.

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