

Consumer preferences towards goat milk and goat milk products: a mini review

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Abstract

This review article focuses on recent findings on consumer preferences regarding goat milk and its products. Consumer preferences are not a new occurrence that has enticed academics to perform countless studies. Unfortunately, most previous studies in Malaysia's community were not conducted from a social science perspective. Therefore, this study reviewed several past studies that investigated Malaysian consumer preferences for goat milk and its products. The review employed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach. Research articles included in the review were obtained from major journal databases (i.e., Scopus, Science Direct, and Web of Science) which yielded twenty-six publications. Findings have formulated four main themes: socio-demographic perspective, goat milk preferences, barriers to goat milk consumption among the consumers, and the most consumer choice for goat milk and its product based on the thematic analyses. Moreover, the results found that most of the studies analysed health and nutritional benefits as the most important reasons for the potential consumption of goat milk. Furthermore, gender, age, and religion can influence different levels of acceptance towards goat milk. The study also revealed that price, lack of knowledge, taste, lack of availability, non-habit culture, and smell can influence consumers' consumption of goat milk and its products.

1. Introduction

Human population growth, increasing urbanization, and income among the world's communities by 2020 have led to an increase in demand for animal products such as livestock products. In line with the growth of the world population, the production of goat and goat milk is growing and is a valuable economic commodity for most countries. For a long time, milk and dairy products have been regarded as essential components of the human diet, regardless of the age of the consumers in both developing and developed countries around the world (Yayar, 2012; Pal *et al.*, 2017). Milk is a vital protein source and includes nearly all of the elements required by the human body, including calcium, phosphorus, vitamin B2, and vitamin B12. Milk is also a good source of calcium, phosphorus, and vitamin B12. Milk intake occurs daily in communities of all ages. Many benefits have been found through the intake of milk to the body,

such as milk can help strengthen bones, protein content needed for tissue growth and brain development, help for normal vision from the content of vitamin A and can help the absorption of calcium from the content of vitamin D.

However, the demand for goat's milk and goat's dairy products has expanded significantly in Malaysia in recent years, despite an increase in cow's milk in the population. The growing number of Muslims in Malaysia who consume goat milk as a sunnah meal and unique ideas about goat milk's health and theopathic benefits (Nasir *et al.*, 2018; Kamarubahrin, 2019). Goat milk is a prophetic food with much nutritional worth, and it has generally been embraced by both Muslim and non-Muslim groups (Kok-Siew *et al.*, 2016). Goat's milk can be used to make a variety of goods, including butter, ice cream, cheese, buttermilk, condensed milk, yoghurt, and flavoured milk, all of which can entice customers to buy

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items that are good for their health (Costa *et al.*, 2017; Guney and Sangun, 2019).

The gradual introduction of dairy goats into Malaysia has placed a strong emphasis on product development driven by consumers' needs. For this reason, breeders or enterprises must understand consumer preferences regarding their attitudes toward goat milk to ensure that their products are thriving on the market. It was determined whether customer preferences toward the qualities of goat's milk and goat's milk products inspired consumers to use goat's milk and goat's milk-based products after surveying attitudes toward those attributes. A study by Kamarubahrin (2019) mentioned that his study is not specifically more detailed about why consumers accept and reject goat milk. Another study stated that some consumers reject goat's milk because of neophobia, like refusing to drink or avoiding and accepting new foods in their lives (Kok-Siew *et al.*, 2016). This attitude is partly attributed to the strong smell of goat milk and its flavour, which makes it difficult for customers to accept goat milk.

According to other studies, Malaysian consumers prefer raw milk to pasteurized milk because they are more confident that raw milk is more nutritious (Khalid and Mahrer, 2020; Zakaria *et al.*, 2020). Given that various factors influence consumer preference, breeders need to know more about the factors that influence consumers to decide before buying goat milk. The current systematic review is created in response to the following research question: What factors influence consumer preferences for goat milk and its products? The investigation's primary focus is on consumer preferences. Aside from that, this section covers the procedures that the researcher used to address the research question presented by the current study. This project will conduct a systematic review and synthesis of the literature to identify, select, and assess significant research on consumer barriers to goat milk consumption to develop recommendations for future research. Finally, the final portion provides an introduction to goat milk and its products, growing increasingly popular among customers today.

2. Materials and methods

2.1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses

PRISMA stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses, a complete published guideline for reporting in systematic reviews. Authors require publication guidelines to help them analyse and examine the quality and depth by providing them with a relevant and significant edge. Authors can

create systematic reviews from many areas of information using PRISMA for various audiences, including respondents, researchers and policymakers (Gurevitch *et al.*, 2018). SLR stands for systematic literature review, and it is a strategy for identifying, evaluating and synthesizing the present state of specific research issues in specialist literature. Systematic reviews are becoming more significant in social science research since they help underline the importance of systematically locating and gathering all accessible material on a specific topic or theme (Sima *et al.*, 2020). Furthermore, PRISMA checks an extensive database of scientific literature at a set period, allowing for a precise search of phrases related to consumer preferences for goat milk and its products. Aside from that, PRISMA allows for coded information about future social science reviews.

2.2 Resources

The current study's review methods were conducted using three critical databases, namely Scopus, Web of Science, and Science Direct because these databases are robust and cover a more comprehensive range of topics. However, it should be highlighted that no database, including Scopus, and Web of Science, is complete or accurate. As a result, the current study did manual searches on another well-known source, such as Science Direct, because the database is a trustworthy repository of journals connected to consumer behaviour research.

2.3 Systematic review process for selecting the articles

2.3.1 Identification

A systematic literature review was performed using some keywords to obtain extensive study data, based on the procedure described by Henchion *et al.* (2017). Search strategy through three stages in the use of Boolean search strategy to identify potential studies for this survey study. The first part of the Boolean terminology focuses on factors relevant to user research. The second part defines the scope of the products in question, such as products produced based on goat's milk which is relevant for this study. In contrast, the third part of the query placed the search focus on synonymous words relevant to this study. The terms 'cow', 'sheep,' and 'buffalo' were removed in the search process because this study only focuses on the goat industry. Finally, the following Boolean queries have been used:

(Consumer OR buyer OR citizen) and (attitudes OR preferences OR intention OR choice OR desire OR option OR belief OR perspective OR philosophy OR reaction OR opinion OR motive) AND (goat milk OR goat OR milk OR dairy).

Besides, to reduce the risk of losing relevant studies,

the same search terms are applied to journals that publish studies related to goat milk and goat milk-based products and three databases. The search started on October 1, 2021, and completed the process on April 10, 2022, published in English. The year restriction is included for ten years, starting from 2012 to 2022, to accommodate a limitation in the study of consumer preferences for goat milk and its products that is currently the study. After determining all relevant terms, we created search strings in the Scopus, Web of Science, and Science Direct databases (Table 1). Moreover, because Science Direct database searches do not support independent cards, and the number of Boolean connectors per general query search field is restricted to eight, the search time is divided into three parts using distinct phrases.

2.4 Screening

This first stage of screening aimed to eliminate duplicate items from consideration. All records that fulfil the inclusion requirements are first gathered to eliminate the same documents. The study then filtered the remaining record titles for duplicates and the study manually removed them to eliminate papers from unrelated research topics and review articles. The first criterion was the type of literature, with the researcher deciding to focus entirely on journals (research articles and review articles). Consequently, all publications in book series, books, chapters in books, and conference proceedings were excluded from consideration due to this study. Besides, it is also worth noting that the review only looked at items written in English, and we set the timeline for ten years (2012-2022). We chose publications from social science, dairy, and agriculture to maximize the likelihood of finding relevant articles. These criteria excluded a total of 418 articles (Table 2).

2.5 Eligibility

Next, we prepared the following phase, eligibility, and the 36 articles accessed. Another important aspect is that we systematically reviewed the titles, abstracts, and primary contents of all articles at this phase to ensure

that they fit the inclusion criteria and were appropriate for use in the current study to fulfil all of the research objectives. As a result, ten publications were removed since they were found not related to the research and did not fulfil inclusion criteria. Sensory studies are only included when psychographic or other aspects, in addition to sensory qualities, are being investigated. Finally, we assessed the remaining 26 papers' abstracts and entire text to determine their credentials based on their research purposes. Figure 1 depicts the PRISMA search strategy-based study selection process—a complete list of included articles. The PRISMA checklist is described in Figure 1.

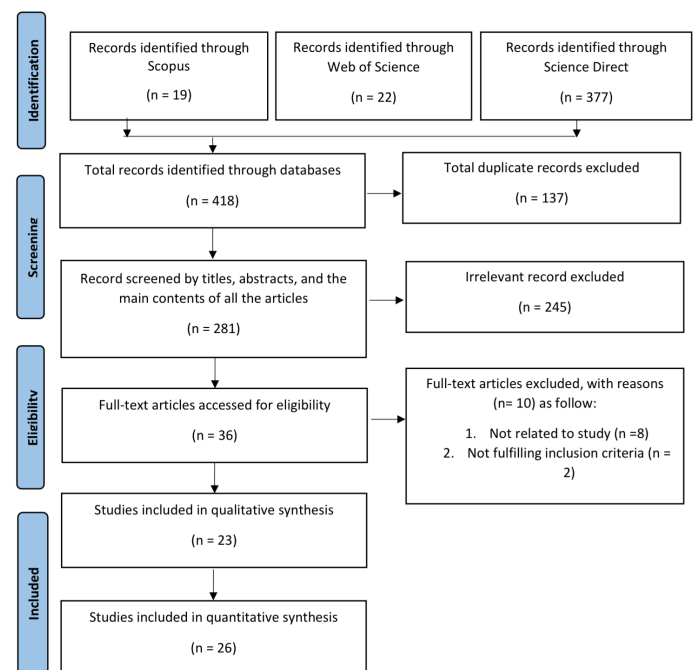


Figure 1. PRISMA flowchart and search strategy (adapted from Salleh *et al.*, 2019)

2.6 Data abstraction and analysis

The researcher determined that this study did an integrative review, an evaluation that analyses and synthesizes diverse research designs (qualitative and quantitative approaches) and all forms of data in one

Table 1. The search strings.

| Database search string | |
|------------------------|--|
| Scopus | (Consumer OR buyer OR citizen) AND (attitudes OR preferences OR intention OR choice OR desire OR option OR belief OR perspective OR philosophy OR reaction OR opinion OR motive) AND (goat milk OR goat OR milk OR dairy) |
| Web of Science | (Consumer OR buyer OR citizen) AND (attitudes OR preferences OR intention OR choice OR desire OR option OR belief OR perspective OR philosophy OR reaction OR opinion OR motive) AND (goat milk OR goat OR milk OR dairy) |
| Science Direct | 1. (Consumer OR buyer) AND (attitudes OR preferences OR intention OR choice) AND (goat OR milk OR dairy) 2. (Consumer OR buyer) AND (desire OR option OR belief OR perspective) AND (goat OR milk OR dairy) 3. (Consumer OR buyer) AND (philosophy OR reaction OR opinion OR motive) AND (goat OR milk OR dairy) |

Table 2. The inclusion and exclusion criteria

| Criterion | Eligibility | Exclusion |
|-----------------|---|--|
| Literature type | Journal (research articles and review articles) | Book series, book, chapter in book and conference proceeding |
| Language | English | Non-English |
| Timeline | Between 2012 and 2022 | < 2012 |
| Subject area | Social Science, Food Science Technology, Agriculture Dairy Animal Science, and Agriculture Biological Science | Other than Social Science, Food Science Technology, Agriculture Dairy Animal Science, and Agriculture Biological Science |

place. Based on the findings of this inquiry, the author employed a variety of strategies to construct appropriate themes and subthemes. The collecting of data is the first step in developing a new piece. As part of this procedure, the writers meticulously analysed a group of 26 articles to obtain statements or data that answered the study questions raised. Afterwards, in the second step, the authors employed a coding method to create meaningful groups depending on the nature of the data. This process converts raw data into usable data by identifying themes, concepts, or ideas that are more connected and related to one another. Ultimately, the approach yielded four primary themes: socio-demographic perspective, goat milk preferences, barriers to goat milk consumption among the consumers, and the most consumer choice for goat milk and its product. Following that, the authors restarted the process in each of the produced topics by developing ideas related to one another, eventually resulting in a total of eight sub-themes. All of the designed themes and sub-themes were adjusted accordingly to ensure coherence.

3. Results

3.1 General findings and background of the studies included in the review

The analysis results revealed three themes and eight sub-themes that were relevant to the study objectives. As seen in Table 3, the three themes are consumers' preferences for goat milk (8 sub-themes), barriers to goat milk consumption and goat milk and its products.

3.2 Main findings

The discussion in this section is organized into three primary themes: the consumers' preferences for goat milk, which determine the socio-demographic perspective and goat milk preferences, barriers to goat milk consumption among the consumers, and goat milk and its product consumption. Furthermore, the discussion for this study was based on previous studies. There were two studies focusing on Brazilian consumers (Costa *et al.*, 2014; Barros *et al.*, 2016), two studies examined Indonesian consumers (Siregar *et al.*, 2020; Agustina *et al.*, 2021), six past research focused on Malaysian consumers (Boniface and Umberger, 2012; Kok-Siew *et al.*, 2016; Costa *et al.*, 2017; Kamarubahrin *et al.*, 2019;

Kamarubahrin, 2019; Zakaria *et al.*, 2020) and three past research concentrated on Turkey consumer (Yayar, 2012; Guney, 2018; Guney and Sangun, 2019). Other than that, each study on European consumers (Popescu, 2013), France consumers (Ngoulma, 2015), Indian consumers (Pal *et al.*, 2017), Iran consumers (Rabiei *et al.*, 2021), Italy consumers (Massaglia *et al.*, 2019), Kenya consumers (Jerop *et al.*, 2014), Mexico consumers (Ramirez-Rivera *et al.*, 2017), Serbia consumers (Paskas *et al.*, 2020), Slovakia consumers (Kubicova *et al.*, 2019), Sri Lanka consumers (Perera *et al.*, 2020), Pakistan consumers (Mehmood *et al.*, 2018), Morocco consumers (Zine-eddine *et al.*, 2021) and South African consumers (Idamokoro *et al.*, 2019) were also considered for inclusion in the evaluation (Figure 2).

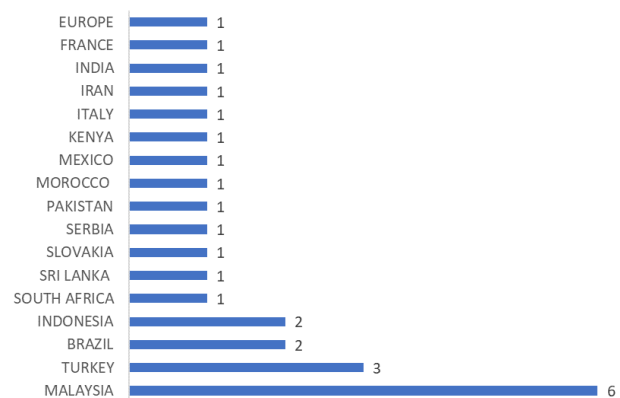


Figure 2. Countries where the studies were conducted.

In the context of the current study, three articles were published in 2021 (Zine-eddine *et al.*, 2021; Agustina *et al.*, 2021; Rabiei *et al.*, 2021), four articles were published in 2020 (Paskas *et al.*, 2020; Siregar *et al.*, 2020; Zakaria *et al.*, 2020; Perera *et al.*, 2020), and six articles were published in 2019 (Guney and Sangun, 2019; Kamarubahrin *et al.*, 2019; Kubicova *et al.*, 2019; Idamokoro *et al.*, 2019; Massaglia *et al.*, 2019; Kamarubahrin, 2019). Next, two articles were published in 2018 (Mehmood *et al.*, 2018; Guney, 2018), followed by three articles published in 2017 (Costa *et al.*, 2017; Pal *et al.*, 2017; Ramirez-Rivera *et al.*, 2017). Apart from that, two articles published in 2016 (Kok-Siew *et al.*, 2016; Barros *et al.*, 2016), another article published in 2015 (Ngoulma, 2015), two articles in 2014 (Costa *et al.*, 2014; Jerop *et al.*, 2014), another article published in 2013 (Popescu, 2013) and two articles published in the

Table 3. The main themes and the sub themes.

| Authors | Socio-Demographic Perspective | | | | | | | | | | Goat Milk Preferences | | | | | | | | | | Barriers to Goat Milk Consumption | | | | | | | | | | Consumer Choice for Goat Milk | | | | |
|------------------------------|-------------------------------|---|---|----|----|---|---|---|---|---|-----------------------|----|----|----|----|----|-----|----|-----|----|-----------------------------------|----|---|---|----|---|--|--|--|--|-------------------------------|--|--|--|--|
| | A | E | E | HI | HS | G | H | N | T | R | P | LP | GT | HP | NT | NH | LOI | LA | LOA | SP | GM | RM | C | Y | OT | | | | | | | | | | |
| Yayar (2012) | / | | | | / | | | | / | | | | | | | | | | | | | / | | | | | | | | | | | | | |
| Boniface and Umberger (2012) | / | | | | / | | | / | | / | | | | | | | | | | | | | | | | | | | | | | | | | |
| Costa et al. (2014) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Jerop et al. (2014) | / | | | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | | | | | | | | | |
| Popescu (2013) | | | | | / | | | / | | / | | / | | | | | | | | | | / | | | | | | | | | | | | | |
| Ngoulma (2015) | | | | | / | | | / | | / | | / | | | | | | | | | | / | | | | | | | | | | | | | |
| Kok-Siew et al. (2016) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Costa et al. (2017) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Barros et al. (2016) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Pal et al. (2017) | | | | | / | | | / | | / | | / | | | | | | | | | | / | | | | | | | | | | | | | |
| Ramirez-Rivera et al. (2017) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Mehmood et al. (2018) | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | | | | | | | | | |
| Guney (2018) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Guney and Sangun (2019) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Kamarubahrin et al. (2019) | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | | | | | | | | | |
| Kubicova et al. (2019) | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | | | | | | | | | |
| Idamokoro et al. (2019) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Massaglia et al. (2019) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Kamarubahrin (2019) | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | | | | | | | | | |
| Paskas et al. (2020) | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | | | | | | | | | |
| Siregar et al. (2020) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Zakaria et al. (2020) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Perera et al. (2020) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Zine-eddine et al. (2021) | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | | | | | | | | | |
| Agustina et al. (2021) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |
| Rabiei et al. (2021) | | | | | / | | | / | | / | | / | | | | | | | | | | | | | | | | | | | | | | | |

| Socio-demographic perspective | Goat milk preferences | Barriers to goat milk consumption among consumers | Consumer choice for goat milk and its product |
|-------------------------------|------------------------------|---|---|
| A = Age | H = Health | GT = "goaty" taste | GM = Goat Milk |
| E = Education | N = Nutrition | HP = High price | RM = Raw Milk |
| HI = Household Income | T = Taste | NT = Never tested/ Unfamiliarity | C = Cheese |
| HS = Household Size | R = Religiosity | NH = Non-habit/ Culture bias | Y = Yoghurt |
| G = Gender | P = Price | LOI = Lack of information | OT = Others |
| | LP = Labelling and Packaging | LA = Lack awareness | |
| | | LOA = Lack of availability | |
| | | SP = Seasonal production | |

year 2012 (Yayar, 2012; Boniface and Umberger, 2012) (Figure 3).

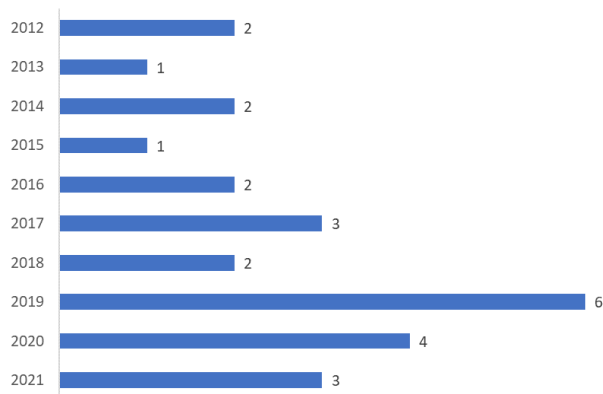


Figure 3. Year of publication

3.3 Consumers' preferences for goat milk

3.3.1 Socio-demographics

Individual purchasing attitudes and behaviours depend on the impact of demographics (Stampa, 2020). Various sociodemographic characteristics influence a customer's choice of one product over another. In all previous studies, sociodemographic features are often used in evaluating questionnaires, influencing consumer attitudes and behaviours. Sociodemographic variables are age, gender, social class, parental status, household income, household size, education level, religious affiliation, marital status, employment status and ethnicity (Nolke *et al.*, 2015). Several studies have found that various sociodemographic characteristics influence food choice habits, and each survey study has a different number of variables on consumer attitudes and behaviour. Age affects an individual's consumption attitude towards goat's milk. According to a study conducted in 2014, various elements that influence goat milk consumption were explored, and researchers discovered that younger customers are more favourable to consuming goat milk than older consumers (Jerop *et al.*, 2014; Kamarubahrin, 2019). However, results from another study revealed young population does not consume goat milk and dairy products because it is not their habit (Paskas *et al.*, 2020; Zine-eddine *et al.*, 2021). Besides, high education level influences the acceptance and selection of individuals for milk consumption. Individuals with a high level of education are more optimistic about receiving goat milk because they have increased awareness of milk's safety and hygienic condition (Yayar, 2012; Boniface and Umberger, 2012; Mehmood *et al.*, 2017; Kamarubahrin, 2019).

Economic characteristics such as household income, family size, and goat milk intake had favourable effects on the dairy price for goat milk consumption. According to a previous study, the consumption of goat milk and its products was connected to household income and

household size. Many studies have found that customers with a high income are more likely to spend more on milk than those with a lower income (Jerop *et al.*, 2014; Mehmood *et al.*, 2017; Guney, 2018; Kamarubahrin *et al.*, 2019; Kubicova *et al.*, 2019). Milk consumption has increased due to the increasing popularity of dairy products, which has been driven by changes in consumer demographics and income development. Despite this, because of the high cost of milk, household income might sometimes hinder the consumption of dairy products. While milk consumption depends on the household size, most of them come from small families who have below four persons in the household (Yayar, 2012; Boniface and Umberger, 2012; Mehmood *et al.*, 2018). However, the greater household size also impacts milk consumption; the parents are more willing to pay for raw milk because they are concerned about nutritional adequacy in the household (Perera *et al.*, 2020). In addition, several researchers have found a link between gender and goat milk consumption, which is interesting. As an illustration, Jerop *et al.* (2014) study mentioned that male consumers prefer to drink goat milk rather than female consumers. However, the result shows no significant difference in age, gender, residence, and monthly gross income toward the consumption of goat milk. Furthermore, consumers' preferences can also be affected by religion. This is evidenced by a study by Kamarubahrin *et al.* (2019) which discovered that the intake of goat milk among Muslim populations has increased because they believe goat milk is one of the prophetic foods.

3.3.2 Goat milk preferences

Food preferences are the crucial determinants of food choice, which have a multifaceted and complex decision for the individual (Glabska, 2021). Consumers will learn about their food choices based on their previous experiences and observations of their cultures or surroundings. Besides, the food preferences of individuals interact with their genetics and environment, which lead to different foods for different people (Breen *et al.*, 2006). There is a wide range of preferences among goat milk consumers.

3.3.3 Health

Some consumers prefer to consume goat milk because of their lifestyle changes to consume healthier food and this attitude is a new concept in recent years. Consumption of goat milk is influenced by several aspects, including health, nutritional value and high digestibility compared to other milk kinds (Popescu, 2013; Guney, 2019; Guney and Sangun, 2019; Kamarubahrin *et al.*, 2019). There were numerous scientific research demonstrated the health benefits of

goat milk and its products for humans. Day by day, consumers have increased awareness of food that can impact their health (Yangilar, 2013). Their decisions tend to become more cognizant of their health and to move in a direction that promotes health and wellness. According to Xu *et al.* (2010), the consumption of goat milk has influenced health. In addition, the milk goat also helps to reduce lactose tolerance symptoms and helps reduce the risk of a particular disease. Goat milk's protein composition creates a softer curd during digestion, which may help with digestive health and quality of life, which tends consumers to consume goat milk (Guney, 2018). Besides, most of the participants (62.6%) are interested in drinking goat milk after knowing its health benefits (Zine-eddine *et al.*, 2021). According to the findings of Jerop *et al.* (2014), the traditional consumer also believes that goat milk can be a therapeutic drink and help cure or prevent the disease. Next, goat milk is also suitable for infants' health and convalescent people (Pal *et al.*, 2017). Nonetheless, the opposite result in a study with younger consumers having low awareness about goat milk they do not have stronger preferences for health than older consumers (Paskas *et al.*, 2020). Goat milk offers a lot of health-promoting benefits and helps increase goat milk consumption. In line with the statement, most of the participants (62.6%) in the research have intense to consume goat milk after knowing the health benefits.

3.3.4 Nutrition

Goat milk is a nutrient-dense beverage rich in vital elements such as protein, fat, minerals, carbs, and vitamins, among others. The excellent nutritional value of goat milk has increased consumer interest, which has resulted in increased consumption (Boniface and Umberger, 2012; Kubicova *et al.*, 2019). It is consistent with the study findings conducted by Costa *et al.* (2014), which found similar observations. Compared to cow milk, goat milk contains fewer fat globules and a higher concentration of short and medium-chain SFA, making it more easily digested and absorbable by consumers. According to a study conducted by Jerop *et al.* (2014), children who are lactose intolerant and suffer from gastrointestinal pain, bloating, diarrhoea and face rashes alter their goat's milk drinking habits. Goat milk has several beneficial compounds that are similar to those found in human milk (such as nucleotides, free amino acids and polyamines), making it an attractive alternative for the production of infant feeding formulae. Guney (2019) reported that the first compelling reason for customers to consume goat milk is the nutritional value and ease of digestion it provides them. Elsewhere, other researchers reported results that were similar to the findings of this study (Guney and Sangun, 2019;

Kamarubahrin *et al.*, 2019; Kamarubahrin, 2019). Goat milk has gained popularity due to its nutritional value, medical significance and practical applications (Popescu, 2013; Pal *et al.*, 2017). Consumers' willingness to eat goat milk, on the other hand, is not influenced by the nutritional benefits. According to a study conducted by Idamokoro *et al.* (2019), most of those who participated were unaware of the nutritional benefits of goat's milk.

3.3.5 Taste

Taste is a major factor that influences the consumers' decision-making process, and it also affects the purchasing intention among the consumers. Consumers' preferences in acquiring goat milk are significantly influenced by taste (Kamarubahrin, 2019). Because goat milk has unique organoleptic features, such as an intense aroma, a strong flavour, a salty taste, or a somewhat sweet taste, it is used less frequently in the human diet. Goat milk and dairy products will continue to gain popularity due to their distinct flavour and the consumers' desire to acquire them in the future (Popescu, 2013; Kamarubahrin *et al.*, 2019). Most people do not consume goat milk yoghurt because they have grown accustomed to the distinct "goaty" flavour (Costa *et al.*, 2014; Jerop *et al.*, 2014; Paskas *et al.*, 2020). According to the research findings, consumers are not likely to consume goat milk due to the flavour of the milk (Guney and Sangun, 2019; Idamokoro *et al.*, 2019; Zine-eddine *et al.*, 2021). Milk flavour dislike is also one of the factors that barrier children and adolescents from consuming milk (Rabiei *et al.*, 2021). Besides, the consumer prefers to consume processed milk products like condensed milk and milk powder over whole milk because the taste is sweet (Agustina *et al.*, 2021). The study also mentioned a significant negative to the original taste of goat milk which the consumer more likely to consume chocolate and vanilla flavours. Research by Wanjekeche *et al.* (2016) documents goat milk becoming slightly sweet with a salty tint taste like cow milk if the farmers well-handled the goat milk during the milking process. The same study endorses the claim that most respondents thought goat's milk tasted slightly sweeter than cow's milk (Jerop *et al.*, 2014). Besides, research by Siregar *et al.* (2020) mentioned that consumers accept goat milk crackers because of their taste, crunchiness, and aroma. In a study on consumer preferences for goat milk, the taste of goat milk influences the consumption in which consumers prefer to drink chocolate powdered goat milk because it tastes better and does not have any goat aroma (Agustina *et al.*, 2021). In addition, raw goat milk has a greater acceptance than pasteurized milk because the colour is light (whitish colour) and has a high thickness due to the high viscosity with the well-dispersed small fat particles

(Zakaria *et al.*, 2020). Therefore, the 'taste of food' and consumer preferences are crucial and critical factors affecting consumer purchase decisions.

3.3.6 Religiosity

Religion has been considered an essential element influencing consumer purchasing decisions (Forghani *et al.*, 2019), and it may serve to bond consumers to a lifestyle that dictates purchasing behaviour (Bukhari *et al.*, 2020). Religiosity significantly impacts consumer actions and attitudes regarding purchasing foods (Weaver and Agle, 2002). As a religion, Islam provides a comprehensive way of life and governs Muslim customers' behaviour to achieve happiness in life and the afterlife, according to the Quran (Swimberghe *et al.*, 2011). Religious perspectives such as halal foods are the perfect core basis for determining food intake choices for Muslims who continuously follow religious instructions, as these regulations address the Islamic principles of food consumption (Asri and Aziz, 2019). In addition to adhering to the five pillars of Islam, Muslims are required to adhere to the standard dietary guidelines to improve their health (Kamarubahrin *et al.*, 2019). Among the prophetic foods, goat's milk is one that the Prophet Muhammad (PBUH) is most likely to have consumed daily (Umar *et al.*, 2017). A study by Kamarubahrin *et al.* (2019) documented those Muslim consumers intend to drink goat milk because it is one of the sunnah foods. In Malaysia, both Muslims and non-Muslims accept sunnah food products as their healthy lifestyle (Kok-Siew *et al.*, 2018). The Malay lifestyles and eating choices are influenced by Islamic principles, both intrinsically and extrinsically.

3.3.7 Price

Price significantly affects consumer buying behaviour (Huo *et al.*, 2021). According to a finding by Kotler and Keller (2016), consumers' perception of price explains product information, and it has a deep meaning for their purchasing preferences. For example, consumers will purchase more for the lower-priced product and less for the high price (Sadiq *et al.*, 2020). Consumers will determine what they want to get something by purchasing goods or services that they pay for in advance (Al-Mamun and Rahman, 2014). The cost of goat milk and its products is one of the most important considerations for consumers when deciding whether or not to consume or acquire them (Guney, 2019; Kamarubahrin *et al.*, 2019; Kubicova *et al.*, 2019). According to the findings, the price of livestock-derived commodities such as goat milk cheese is proportional to the demand for these foods (Barros *et al.*, 2016; Komarek *et al.*, 2021). Furthermore, the price of goat milk is greater than the price of other dairy milk, and this

is an essential element for consumers to consider when deciding whether or not to purchase goat milk. Goat milk consumers are willing to pay extra for the product because they believe the price is reasonable for the quality, which is high in nutritional benefits for the consumers' overall well-being (Paskas *et al.*, 2020; Agustina *et al.*, 2021). The opposite finding in a study is that consumers do not choose goat milk for their consumption because of the high price (Jerop *et al.*, 2014; Mehmood *et al.*, 2018; Guney, 2019; Zine-eddine *et al.*, 2021; Rabiei *et al.*, 2021). The rise in goat milk's price does not entice consumers to pay more (Ngoulma, 2015; Kamarubahrin, 2019). A similar conclusion was reached in the study by Guney and Sangun (2019), which found that branding negatively impacted goat milk consumption since branded products are more expensive on the market. In addition, consumers prefer to consume raw milk rather than pasteurized milk because of price concerns which raw milk is cheaper than pasteurized and processed milk (Yayar, 2012; Mehmood *et al.*, 2018; Perera *et al.*, 2020).

3.3.8 Labelling and packaging

Customer purchasing decisions are influenced by various factors, with the packaging being one of the most important and impactful (Ahmed *et al.*, 2014). Using excellent packaging to attract customers to a particular brand, improve its image, and increase consumer perception of the product are critical goals. Others (Ampuero and Vila, 2006) focus on specific variables of packaging and their impact on consumer purchasing behaviour, and others (Butkeviciene *et al.*, 2008) try to explore all conceivable aspects of packaging and their impact on consumer purchasing behaviour (Underwood *et al.*, 2001). After seeing a well-labelled product, people purchase a larger quantity of that product, and labelling influences consumer buying behaviour (Saeed *et al.*, 2013). A study has found that packaging or labelling and product information such as nutrition facts and processing technology are factors that influence consumer food choice (Torres-Moreno *et al.*, 2012). In addition, the salt content of the milk used in cheese manufacturing, the presence of probiotics, further information about the technique utilized, and the pricing of the products are the most critical packaging or label factors for consumers when purchasing goat milk cheese (Barros *et al.*, 2016). According to their research, Kubicova *et al.* (2019) discovered that nutrition, nutritional data, country of origin, the manufacturer, package size, and packaging are the elements that impact customers' decisions to purchase milk and dairy products in their study, which was published in the journal nutrition. A data label indicates when the consumer last achieved the projected peak quality at the packaging

facility. According to Guney (2018), the expiration dates of goat milk and goat milk products are the most relevant criteria for determining whether to purchase them. Customers will inspect the expiry date, place of purchase, fat rate label, package, processing methods, and others such as freshness of milk (colour and aroma), shelf-life, and brand, according to the same research conclusion from Guney and Sangun (2019). As reported in the same study, most customers prefer to purchase goat milk in glass packaging from street sellers or supermarkets. In Malaysia, most of the population is Malay and Muslim people are concerned about whether a product or service has a Halal Certificate. Consumers' decisions to purchase dairy products are influenced by Halal certification, quality certification, and information provided on the label, among others (Boniface and Umberger, 2012).

3.3.9 Barriers to goat milk consumptions

Various interconnected elements and cognitive assessments influence consumers' food choices (Shepherds, 2001). The findings from Hayaloglu *et al.* (2013), mentioned that the critical quality criteria for goat's milk are its distinct aroma and flavour characteristics. According to another study, goat milk odour and taste deter the consumers from drinking, which affects its low acceptability (Paskas *et al.*, 2020). Besides, the same research also mentioned that "goaty" flavour and seasonal milk production could be barriers to consuming and purchasing dairy products. In a current study by Jerop *et al.* (2014), consumers agreed with the statement that goat milk has an odour and becomes a barrier to goat milk consumption. Specifically, the study found that goat milk yoghurt was less popular than cow milk yoghurt due to the unpleasant "goaty" taste (Masamba and Ali, 2013). Due to their unfamiliarity with the "goaty" flavour, most respondents expressed a lack of interest in goat milk yoghurt (Costa *et al.*, 2014). Furthermore, the pungent odour of goat milk may deter some consumers from accepting it (Idamokoro *et al.*, 2019). The findings in the same study which consumers do not consume goat milk because of a lack of knowledge about nutrition benefits, taste, and cultural bias.

Furthermore, the higher price of goat milk, never tested, non-habit, lack of information about therapeutic values, the belief that goat milk does not have a longer shelf life, and low availability can also be barriers to its consumption (Jerop *et al.*, 2014; Zine-eddine *et al.*, 2021). The same findings as in the previous study by Mehmood *et al.* (2018), in which the high price of goat milk, lack of awareness about the nutritional benefits, taste, cultural bias, and a strong odour influenced a

majority of the consumers do not consume goat milk. According to research conducted in 2018 by Guney, the most effective barriers to consumers consuming goat milk and goat milk products are the high cost, lack of habit, and lack of availability. A number of the exact parameters identified by Paskas *et al.* (2020) in their investigations impact consumer awareness and acceptability of goat milk. When it comes to milk intake, different populations have varied tendencies. Besides, according to Rabiei *et al.* (2021), the most significant obstacles to children and adolescents drinking milk include a dislike for milk intake, a dislike for milk flavour, a high cost of milk, a lack of accessibility, and a lack of knowledge about the milk and dairy benefits. Adult milk consumption is hindered by socioeconomic status, a lack of subsidized milk in the country, obesity anxiety and misinformation regarding milk and weight gain, and a lack of purchasing power. On the other hand, the neophobia variable significantly impacts Malaysian consumers' inclination to acquire goat milk (Kok-Siew *et al.*, 2016).

3.3.10 Consumer choices for goat milk and its product

In recent years, the demand for goat milk and related products has expanded in several nations worldwide. It has the potential to be a nutritional and functional product that provides benefits to customers. Goat milk will continue to be an important meal for rural communities in underdeveloped countries while processing goat milk will become a priority in industrialized countries due to the increasing demand for dairy products in the developed world (Popescu, 2013). People change from cow milk to goat milk due to allergies (Costa *et al.*, 2013), and they are willing to spend more on goat milk and its products (Ngoulma, 2015). Goat milk is used to make various dairy products, including yoghurt, butter, cheese, cream, butter oil, ice cream, condensed milk, dried whole milk flavoured milk, and other cheeses and cheese-based goods (Pal *et al.*, 2017). Goat milk cheeses are famous worldwide, and growing goat milk supply and demand in several nations have been linked to it in recent years (Queiroga *et al.*, 2013; Barros *et al.*, 2016; Guney and Sangun, 2019, Paskas *et al.*, 2020). Consumers prefer to purchase cheese than milk, butter, and yoghurt (Ramirez-Rivera *et al.*, 2017; Kubicova *et al.*, 2019). This is due to the cheese's softer and adhesive qualities, the presence of goat aroma, and the fat aftertaste (Ramirez-Rivera *et al.*, 2017). Consumer acceptability of goat milk is based on commodity-related product attributes and the viewpoints of various sales channels (Massaglia *et al.*, 2019). For example, consumers who purchase at large-scale retailers prefer soft cheese goat milk, while consumers who

purchase at specialized shops prefer aged cheese, and semi-hard cheese is more likely for the consumer who buys directly from the farmers.

Meanwhile, according to a study by Costa *et al.* (2017), goat milk yoghurt has lower acceptance when relative to cow milk yoghurt because it is not well received by non-habitual customers, *cupuassu pulp* is a possible ingredient for improving the sensory and texture characteristics of goat milk yoghurt. Different people have different tastes. Besides, male farmers are more likely to consume goat milk cheese, while female farmers prefer goat milk flavoured yoghurt (Idamokoro *et al.*, 2019). In addition, some consumers prefer to purchase unpacked or raw milk rather than packed or fresh milk (Yayar, 2012; Mehmood *et al.*, 2017; Paskas *et al.*, 2020; Perera *et al.*, 2020). Unpackaged or fresh milk is less expensive than packaged or pasteurized milk, and it can be delivered to the customer's door without incurring additional costs from the farmers. The high consumption of raw goat milk is due to the sweetness of goat milk compared to cow milk, more lightness (whitish hue), and increased thickness due to the high viscosity, and they believe that it is beneficial to their children (Jerop *et al.*, 2014; Zakaria *et al.*, 2020). In Malaysia, consumers are motivated to consume raw milk because they believe that raw milk has holistic health benefits and taste, can be immune-related disease prevention, do not believe pasteurized milk is safe and support the local dairy farms (Khalid and Mahrur, 2020). According to a study by Siregar *et al.* (2020), consumers accept goat's milk crackers because of the colour, taste, crunchiness, and aroma of the milk crackers. In a study in 2021 by Agustina *et al.*, the consumers who prefer goat milk features are prepared to spend more for powdered milk since it comes in a broader range of flavours, including chocolate flavours. Chocolate powdered milk is popular among consumers because it tastes better without the goat fragrance. According to the same survey, customers prefer powdered milk to pasteurized milk because powdered milk has a longer shelf life.

4. Conclusion

This review gives insights into research findings on the most relevant factors influencing consumer responses to goat milk and its products. Goat milk consumers have a diverse range of preferences because of their varied backgrounds and habits, and this diversity makes the product desirable to a wide variety of people. In contrast to other factors, consumer preferences for goat milk and its products in a particular market have hardly been explicitly analyzed in recent years. Many consumers are unaware of the benefits of goat milk and its products, and related nutritional knowledge is low due to the non-

habits of their culture. Additional findings show that most consumers prefer to consume goat milk due to its benefits for their bodies; they believe it can be a therapeutic drink for them and help cure diseases. Furthermore, consumer preferences vary between product groups, with price or taste often being more critical. High purchase intentions and an increased willingness to pay are found, e.g., for goat cheese products, raw milk products, and flavoured milk. Our results confirm that gender, age, and religion are essential in explaining different acceptance patterns of goat milk. Most studies indicate that male consumers are more willing to consume goat milk and cheese, while female consumers are more likely to consume goat milk-flavoured yoghurt. Willingness to drink goat milk decreases with age, as young consumers have low awareness of it and do not have strong health preferences over older consumers. Additionally, according to the religious perspective, Muslim consumers intend to drink goat milk because it is one of the sunnah foods. However, Muslims and non-Muslims are interested in goat milk because it suits their health.

Instead of all the acceptance, our findings also support some barriers for the consumer to consume goat milk, such as high price, lack of awareness about the nutritional benefits, "goaty" taste, low availability, non-habitual culture, and a strong odour. In addition, labelling and packaging of goat milk are essential, as consumers' decisions to purchase dairy products are influenced by Halal certification, quality certification, and label information. Overall, this study sheds further light on the factors influencing goat milk consumption and purchase among consumers. The findings of this study may assist breeders in anticipating changes in consumer attitudes, preferences, or demand in their area. Effective administration and marketing tactics are how consumers may accept goat milk and help dispel their concerns about its nutritional and health benefits. There is still a scarcity of research on consumers' preferences based on accurate market data on sales in various buying venues.

Conflict of interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.

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