

## Generation Z consume animal-free milk? A Türkiye experience

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### ABSTRACT

This study aims to examine the perceptions of young people between the ages of 18-22 in Türkiye, studying at universities and representing Generation Z regarding the consumption of animal-free milk and to determine whether there will be a consumer base for animal-free milk in Türkiye in the coming years. For this purpose, 620 students were informed to participate in the research, but data were collected from 215 individuals. A face-to-face interview was conducted with the individual. 32.55% of the participants stated that they could consume animal-free milk. 27 (30%) of 90 female participants and 42 (33.6%) of 125 male participants stated that they could consume animal-free milk. Participants stated that they would not consume animal-free milk because they were concerned that animal-free milk is unhealthy, unnatural, insufficient in terms of nutritional value, unsafe, negatively affecting animal husbandry, and posing a problem in terms of belief. As a result, it has been seen that the Z-generation individuals living in Türkiye have the potential to consume animal-free milk. Suppose the participants' concerns are clarified, and their familiarity with this product is increased. In that case, it is predicted that there will be a more severe increase in the animal-free milk consumption potential future in Türkiye.

**Keywords:** Animal-free milk, Artificial milk, Generation Z

## Introduction

Proteins are the biggest basic building blocks of the human body after water. Proteins, which have many vital functions in the physiology and metabolism of living things, are found in foods of plant and animal origin (Ebcim et al., 2021). Milk proteins are the primary component in animal milk, which have various biological activities such as easy uptake and digestion, high nutrition, immunity enhancement and antioxidation (Zhengfu et al., 2021). In recent years, with the increasing human population and changing consumer trends, there has been an increase in various research and biotechnological studies on alternative protein sources. Today, products such as microbial proteins, alternative plants, insects, algae, fungi, in vitro or artificial meat, animal-free vegan cheese and biofermentation are emphasised and recommended as alternative protein sources (Ünver Alçay et al., 2018).

It is stated that consumer preference for non-animal foods has recently increased due to the increasing interest in health and animal welfare (Short et al., 2021). Especially in conventional milk production, it is reported that there is a trend towards alternative dairy products due to concerns such as animal welfare (treatment of farm animals), environmental impact (pollution, land use and greenhouse gas emissions) and human health (increased antibiotic resistance and exposure to zoonotic diseases) (Clay et al., 2020; Falkeisen et al., 2022). Companies that produce animal-free milk have been established to meet this consumer trend.

Animal-free milk was first produced by California-based company Perfect Day. Later, Legen Dairy Foods and Real Vegan Cheese companies made animal-free milk with the same method (Mendly-Zambo et al., 2021). The animal-free milk production method of these companies is based on fermentation. Perfect Day reported the company's way of producing animal-free milk as follows: Bovine DNA encoding the production of casein and whey proteins (alpha-lactalbumin and beta-lactoglobulin) is inserted into the plasmid DNA of yeast cells. This yeast is added to a mixture of water and plant-based sugar. Here, yeast ferments sugar to produce milk proteins. Then, filtering removes the yeasts from the environment, and the final product is obtained by combining them with certain proportions of plant-derived oils, minerals, sugar and clean water (Pandya, 2014). This product is claimed to have a longer shelf life than regular milk. It will be a safer food because it does not contain hormones, antibiotics and lactose, and artificial milk will be mass-produced and commercialised soon (Perfect Day, 2019).

Since age is one of the main factors affecting people's food choices, it is important to determine the food preferences of

age groups (Grasso et al., 2019). Generation Z, which represents a specific age group, refers to people born in the digital age between the late 1990s and early 2000s. In 2020, approximately 30% of the world's population (2 billion) comprised the Z generation (Zuo et al., 2022). It is predicted that Generation Z will play an important role in the economic, political and social change of countries in the future, as well as affect the preferability of food, purchasing ability and consumption of food (Bogueva & Marinova 2020; Su et al., 2019). Generation Z especially prefer foods that make a good impression, reliable and transparent food(s) sources, branded products that meet expected standards, and foods that are globally trending on social media (Szakály et al., 2018). Therefore, it is important to determine the food preference of the Z generation and to develop products according to the needs of this generation.

This study aims to examine the perceptions of young people between the ages of 18-22 in Türkiye, studying at universities and representing Generation Z regarding the consumption of animal-free milk and to determine whether there will be a consumer base for animal-free milk in Türkiye in the coming years.

## Materials and Methods

### *Working Group*

The study group of this research consists of individuals aged 18-22 and representing the Z generation, studying at Harran University in the autumn semester of the 2021-2022 academic year. Participants were briefed about animal-free milk before the questions were asked. First, the definition of animal-free milk is made, and then comprehensive information about the production technology of animal-free milk is given. Within the scope of the study, 620 students were reached, but some did not accept to participate since the study's data collection was based on volunteerism. Due to this limitation, the data of 215 participants, 90 (41.86%) women and 125 (58.13%) men, who voluntarily participated in the study, were analysed.

### *Research Pattern*

This research is a survey study in which different question patterns are used. Our research consists of open-ended and closed-ended survey questions. Quantitative descriptive statistics were used for closed-ended questions, and qualitative

descriptive analysis was used for open-ended questions. Büyükoztürk & Demirel (2018) stated that open-ended survey studies are included in qualitative patterns.

### **Data Collection Tool**

Firstly, permission was obtained from the participants who answered our questionnaire for the study, and the interviews were recorded. They preferred a discussion in this way aimed to be prepared for the interview in line with the study plan and to provide a sincere and natural response to the questions about the study in a natural environment (Karasar, 2008). Since the age criterion we determined for our research is important, it was chosen from young people between 18-22. First of all, questions about demographic information were prepared for the participants within the scope of the study, and two closed-ended questions were asked “yes” and “no” about whether they would consume animal-free milk or not within the scope of the study. Following this, open-ended questions were asked to reveal the reasons according to the answers given by the participants to the closed-ended questions. The researchers prepared the questions.

### **Data Analysis**

After the interviews were completed, the data analysis process was started. First, the data were adapted to the SPSS 24 package program to analyse the answers to the closed-ended questions. Then, a percentage frequency analysis was performed. Audio recordings were converted into text for the study of open-ended questions. Afterwards, these interviews were transferred to the Maxqda 20 Package Program, and the analysis steps were started. Out of 215 participants, 114 participants made detailed explanations about whether they would consume animal-free milk, and the data of these participants were included in the qualitative analysis. The obtained data were first read once to ensure the data's intelligibility. Then, coding was done with the second reading. After coding, themes and sub-themes were created by combining the relevant codes.

## **Results and Discussion**

Data were collected from 215 individuals, 90 (41.86%) female and 125 (58.13%) male participants. All of the participants are 18-22 age group university students. With the analysis of the data obtained from the participants, it is understood that the statements of the participants are shaped around two

main themes. The first theme's reasons for preferring animal-free milk, and the second theme's reasons for not consuming animal-free milk.

### **Animal-Free Milk Consumption Preferences**

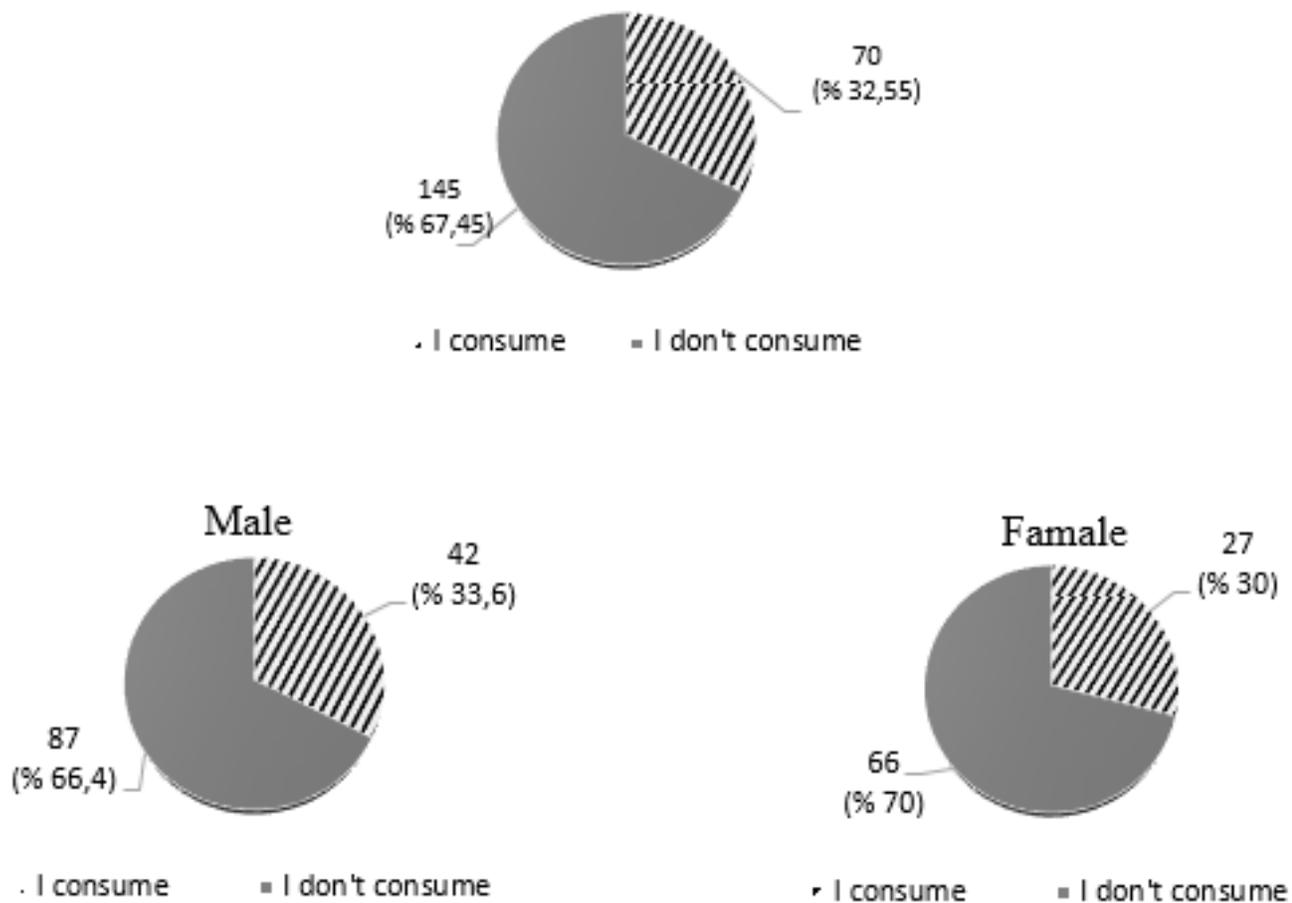
The question of whether they would consume animal-free milk was asked to 215 individuals participating in the study, along with its justification. While 70 (32.55%) people who participated in the research stated that they could consume animal-free milk, 145 (67.45%) people said that they would not consume animal-free milk. 27 (30%) female participants and 42 (33.6%) male participants stated that they could consume animal-free milk (Figure 1). The findings regarding the reasons for both consumption and non-consumption of these people are presented below.

### **Reasons for Consuming Animal-Free Milk**

This section presents the sub-themes of the emerging theme regarding the reasons for consuming animal-free milk. When Figure 2 is examined, it is seen that the participants mentioned some themes related to consuming animal-free milk. A few statements related to these themes are shown below.

- If it meets my nutritional needs, I consume it (Participant(P)42)
- I consume to prevent global warming caused by cows (P84)
- I would wonder and consume. If it is proven to be healthy, I will consume it constantly (P103)
- I consume to protect animals (P114)
- I consume if the nutritional values are the same to protect the environment (P 154)
- I will consume if the price is appropriate (P177)
- I consume for economic and ecological reasons (P198)

The question we posed to the participants regarding animal-free milk ranked first in the statements the participants gave: “I would consume animal-free milk if it is proven to be healthy”, 16.8% (24 individuals). In addition, when we look at the other reasons for consumption respectively, they stated that they would consume it if it meets my daily nutritional needs 9.8% (14 individuals), out of curiosity 8.4% (12 individuals), to protect the environment 7% (10 individuals), if the price is affordable 4.9% (7 individuals), to protect animals 4.2% (6 individuals), if I have to 2.8% (4 individuals).



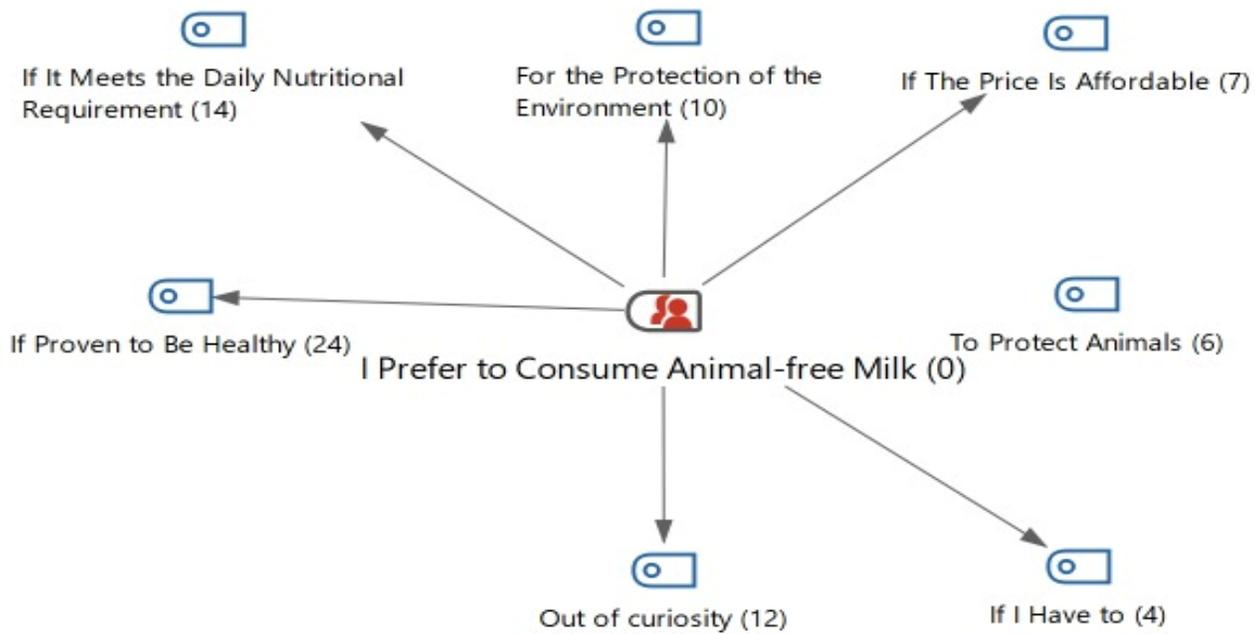
**Figure 1.** Animal-free milk consumption preference rates of the participants

### *Reasons for Not Consuming Animal-Free Milk*

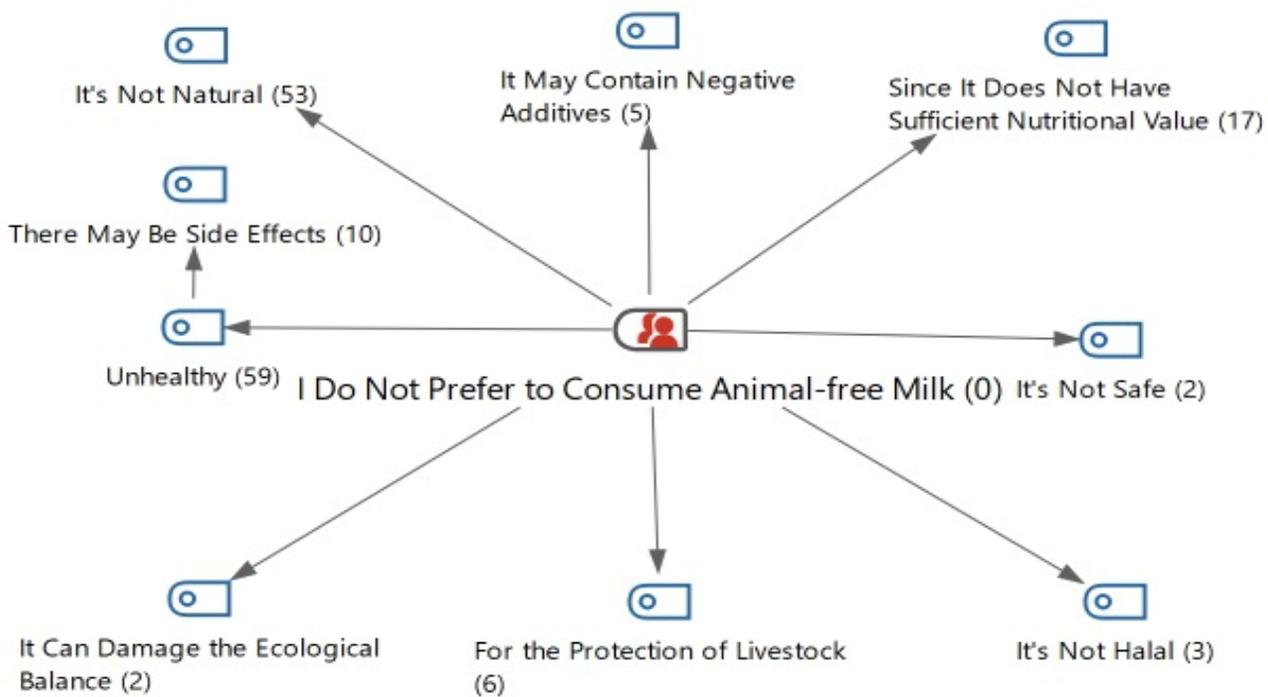
This section presents the sub-themes of the emerging theme regarding the reasons for not consuming animal-free milk. Figure 3 shows the sub-themes obtained in the research based on the question asked to the participants regarding the reasons for not consuming animal-free milk. Some statements regarding participant attitudes are presented below:

- Because I think it is harmful to health (P16)
- I think its nutritional value will be very low (P53)
- I prefer natural foods (P128)
- I think it is harmful to health. I am against its consumption as it will adversely affect animal husbandry (P181)
- I do not think it is halal (P184)
- I do not trust and consume because it is not natural, and I do not have enough knowledge about its production (P187)
- My concern is that it will harm my body in the future (P223)

In the question we asked the participants regarding the reasons for not consuming animal-free milk, it is seen that the participants stated that they do not prefer to consume animal-free milk, with the highest answer because it is unhealthy 85.5% (59 individuals) and may have side effects related to this theme 14.5% (10 individuals). Considering the statements they gave respectively, they stated that they would not consume animal-free milk for reasons such as it is not natural 76.8% (53 individuals), it does not have sufficient nutritional value 24.6% (17 individuals), in order not to negatively affect animal husbandry 8.7% (6 individuals), it may contain negative additives 7.2% (5 individuals), it is not halal 4.3% (3 individuals), it may harm the ecological environment 2.9% (2 individuals) and not safe 2.9% (2 individuals).



**Figure 2.** Sub-themes of the emerging theme about the reasons for consuming animal-free milk



**Figure 3.** Sub-themes of the emerging theme about the reasons for not consuming animal-free milk

This research contains the first information about consumer acceptance of the al-free milk product, produced by the fermentation method in Türkiye. Data on animal-free consumer acceptance in other countries are also limited. According to the results of this study, 70 (32.55%) of the 215 individuals who participated in the survey stated that they could consume animal-free milk, wh. In comparison, (67.45%) stated that they would not consume animal-free milk. Similar to our work, Zollman Thomas & Bryant (2021) surveyed 5,054 individuals from Brazil, Germany, India, the United Kingdom, and the United States to determine the acceptability of dairy products derived from fermentation. They stated that 78.8% of the participants would try such a product, and 70.5% would buy it. They reported that Brazil has the highest percentage of consumers willing to consume and buy, while the USA has the lowest. In a study conducted by The Grocer in the United Kingdom in 2018 that investigated the primary consumer responses to animal-free milk, 28% of the participants stated that they were willing to buy animal-free milk, while 40% of the participants reported that they completely refused to buy non-animal milk (Grocer, 2018). The variation in consumption preferences according to the results of the studies can be explained by the way the questionnaire questions are expressed, the age or maturity of the participants and the variation in the number of participants. In addition, consumer acceptance of animal-free milk in Türkiye is lower than in countries such as Brazil, Germany, India and the USA is thought to be due to the lack of familiarity with the right to animal-free milk technology. It is stated that familiarity with food technologies strongly indicates the desire to consume foods produced in new ways (Bryant & Barnett 2018). Therefore, as the knowledge of animal-free milk production technology increases in Türkiye, it is predicted that the desire to consume will probably increase in parallel.

Age and gender are major factors affecting food choices (Grasso et al., 2019). Studies show younger participants are more willing to consume animal-free milk than older participants. In the survey conducted by Zollman Thomas & Bryant (2021), it was reported that young people in countries in Brazil, Germany, India, the United Kingdom and the USA were more inclined to consume animal-free milk. A survey by The Grocer 2018 observed that young consumers are more open to incoming animal-free milk than older consumers (Grocer, 2018). While only 19% of people over 55 agree to consume animal-free milk, 44% of people between 18 and 24 reported that they approve of its consumption. In our study, the acceptance of animal-free milk consumption varied depending on gender. 30% of female participants and 33.6% of male participants stated that they could consume animal-free milk couldIt

is seen that men are more inclined to consume animal-free milk.

One of the most critical concerns about animal-free milk consumption is the concern that animal-free milk is not natural, safe and healthy (Broad et al., 2022). In a survey conducted by Grocer in 2018, it was reported that 50% of the participants were worried that animal-free milk is not natural, 43% were concerned that it would have side effects in the future, and 37% feared it might contain dangerous chemicals. The current study shows that 85.5% of the participants who do not prefer animal-free milk consumption are concerned about being unhealthy, 76.8% being unnatural, and 14.5% containing additives. Interestingly, it is seen that 16.8% of the participants who said they would consume animal-free milk answered that it is proven to be healthy. Therefore, the findings of the study are compatible with the literature. Unsurprisingly, the participants did not find this new product, animal-free milk, healthy and natural. The fact that it is a new product produced with biotechnological methods worries people. Since this product is not widely consumed for a long time, its side effects are also known. So these reasons raise concerns. In addition, people are more inclined to consume organic and natural products. There is a belief that if a product is organic, it is healthier (Carfora et al., 2019). Therefore, it is unsurprising that a product produced in the laboratory using biotechnological methods is suspicious.

The strongest arguments for choosing animal-free milk include animal welfare, the adverse effects of animals on the environment, climate change concerns and the potential health risks of animal foods (Broad et al., 2022). The results of the present study also support this opinion. Of the participants who said they would consume animal-free milk, 4.2% stated that they would consume animal-free milk to protect animals and 7% to protect the environment. On the contrary, it is seen that 2.9% of the participants who say that they do not consume animal-free milk think that animal-free milk harms the ecological environment. In addition, it is seen that 8.7% of the participants who say that they do not consume animal-free milk answer not to consume in order not to affect animal husbandry adversely. However, it is seen that the rates are low in both groups. The reason for this is thought to be due to the indifference of the participants to environmental protection. It has been determined that people who believe that it will harm animal husbandry have received training on animal husbandry. Therefore, it was concluded that individuals interested in agriculture and animal husbandry are against animal-free milk.

According to the results of the study, it is seen that 24.6% of the participants who say they do not consume animal-free milk think that they do not consume animal-free milk because it does not have sufficient nutritional value. It is seen that 9.8% of the participants who say they consume animal-free milk think they will consume it if it meets their daily dietary needs. Therefore, it is believed that animal-free milk should be carefully controlled and documented in terms of nutritional value, and its content should be shared with the public.

According to the results of the study, it was seen that the price of animal-free milk was among the reasons for the preference of the participants. It is seen that 4.9% of the participants who say they will consume animal-free milk answer that if the price is appropriate, they will finish it. It is thought that the fact that the participants are young and students who are just starting to be economically independent affects their orientation to alternative and cheap products.

It is reported that young individuals in the Z-generation prefer globally trending foods on social media (Su et al., 2019). In the study, it is seen that 8.4% of the participants who said they would consume animal-free milk answered that they would consume animal-free milk because I was curious. Animal-free milk is thought to be a new product and is on social media's agenda, arousing the participants' curiosity.

Biotech applications such as animal-free milk raise numerous ethical, philosophical, and religious questions. Because of the uncertainties in cellular biotechnological applications, religious authorities are still discussing and sceptical of these issues (Loike, 2018). In the current study, 4.3% of the participants who say that they do not consume animal-free milk, even if it is low, state that they will not consume it because they think it is not halal.

## Conclusion

As a result, it has been seen that the Z-generation individuals living in Türkiye have the potential to consume animal-free milk. We think the low consumption rate compared to the rates reported in other countries is because the participants are worried about many points and unfamiliar with animal-free milk production technology. The participants' main concern regarding the consumption of animal-free milk is that they do not find it healthy and cannot be a natural product. Therefore, efforts should be made to eliminate consumers' concerns about animal-free milk and inform consumers about this product before commercially putting animal-free milk on the market in Türkiye. Suppose the participants' concerns are clarified, and their familiarity with this product is increased.

In that case, we foresee that there will be a more severe increase in the animal-free milk consumption potential of the Z generation, which will represent the Turkish population in the future.

## Compliance with Ethical Standards

**Conflict of interests:** The author declares that for this article, they have no actual, potential, or perceived conflict of interest.

**Ethics committee approval:** Ethics committee certificate numbered 02.01.2023-194043 was obtained from Harran University Social and Human Sciences Ethics Committee for this study.

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