

## University students' perception of animal welfare and opinions on consumption of milk and dairy products

Pınar Şeker<sup>1</sup>, Hakan Güler<sup>2</sup>, Abdurrahman Köseman<sup>3\*</sup>, İbrahim Şeker<sup>4</sup>

### Research Article

Volume: 5, Issue: 3  
December 2021  
Pages: 149 –158

**1.** Ministry of Agriculture and Forestry, Elazığ Provincial Directorate of Agriculture and Forestry Food and Feed branch, Elazığ-Turkey. **2.** Ondokuz Mayıs University, Faculty of Veterinary Medicine, Department of Animal Husbandry Economics and Management, Samsun-Turkey. **3.** Malatya Turgut Özal University, Akçadağ Vocational School, Plant and Animal Production Department, Malatya-Turkey. **4.** Fırat University, Faculty of Veterinary Medicine, Department of Zootechny, Elazığ-Turkey. Şeker P. ORCID: 0000-0001-8059-5830, Güler H. ORCID: 0000-0002-4343-6758, Köseman A. ORCID: 0000-0001-6491-9962, Şeker İ. ORCID: 0000-0002-3114-6411.

### ABSTRACT

The aim of this study is to determine the opinions of university students on the consumption of milk and dairy products within the scope of animal welfare. The research was carried out with 361 randomly selected students from Samsun Ondokuz Mayıs University, Turkey, using a face-to-face questionnaire. In the study, the rate of students who think that, they do not have information about the presence and amount of cholesterol in milk and dairy products was 77.35%, milk and dairy products contain all the nutritional elements was 35.62%, UHT milk is not spoiled for a long time due to heat treatment was 28.90%, milk, cheese, yoghurt prices are normal were 63.34%, 40.41%, 68.31%, respectively, there was a welfare problem in farm animals was 56.00%. Also, the rate of students who want label information about milk and dairy products produced from animals raised under welfare conditions was 75.43%. The rates of students who can pay up to 10%, 11-25%, and more than 25% for milk and dairy products because they are suitable for animal welfare were determined as 64.74%, 26.14% and 9.12%, respectively. As a result, it was determined that university students' perceptions of animal welfare and their views on milk and dairy products consumption were generally at an acceptable level. However, more information and necessary training support should be provided to bring them to the desired level.

**Keywords:** animal welfare, dairy product, milk consumption, student perception.

### Article History

Received: 10.09.2021  
Accepted: 27.12.2021  
Available online:  
31.12.2021

DOI: <https://doi.org/10.30704/http-www-jivs-net.993653>

**To cite this article:** Şeker, P., Güler, H., Köseman, A., & Şeker, İ. (2021). University students' perception of animal welfare and opinions on consumption of milk and dairy products. *Journal of Istanbul Veterinary Sciences*, 5(3), 149-158.

**Abbreviated Title:** J. İstanbul Vet. Sci.

This article is presented online at the 5th International Academic Studies Conference, 15-17 March 2020.

### Introduction

Milk and dairy products have been widely consumed around the world for thousands of years and serve as an important food source. The proteins, fats, carbohydrates, vitamins and minerals in its content serve as a healthy complete food by containing all important nutrients (Vanga and Raghavan, 2018). Because of the potential of probiotic bacteria to colonize the intestinal tract and affect health, consuming fermented dairy products is beneficial for health (Kok and Hutkins, 2018). However, it is also

extremely important that they are obtained from husbandry practices where basic animal welfare conditions are met. It is a particularly important aspect, because animal welfare is an important element of sustainable development, including food consumption and human diet and can positively contribute to food quality (Sajdakowska et al., 2020).

During more recent years, the society's awareness of animal welfare and farming issues has grown. Improvements in farm animal welfare are ultimately

\*Corresponding Author: Abdurrahman Köseman  
E-mail: [abdurrahman.koseman@ozal.edu.tr](mailto:abdurrahman.koseman@ozal.edu.tr)

<http://dergipark.org.tr/http-www-jivs-net>



grounded in society, and as a consequence the literature on animal welfare has paid substantial attention to the views of citizens on animal welfare (Ingenbleek et al., 2013). In a study it was determined that Brazilian citizens had higher perception of animal welfare and sentience than French citizens. Concerning the Brazilian respondents, ordinary citizens and biologists seemed to have similar perceptions of animal welfare and emotions. In addition, the results show a relationship between the perception of animal welfare and sentience with gender and age, as women and older respondents tended to show higher concerns about animal welfare issues (Tamioso et al., 2018).

In a study conducted by Köseman and Şeker (2019), it was reported that despite the positive developments in recent years, farms in Turkey cannot be said to have optimal fattening conditions that take into account animal welfare in general. In their study, Harvey and Hubbard (2013) reported that consumers should purchase animal-friendly products in order to increase production suitable for animal welfare. Frey and Pirscher (2018) reported that there is a significant positive relationship between the willingness to pay extra for food to increase the welfare of farm animals and consumers' environmental awareness, dedication and interest in animal welfare.

It is known that education and income level are effective in food preferences (Erdoğan and Çiçek, 2015). In a study conducted in China, it was determined that insufficient milk intake is a worrying nutritional problem and income level is effective in this (Zhao et al., 2017). In another study, it was reported that having health awareness has an important effect on regular milk consumption, and education has an important place in food preferences (Hoque et al., 2018). Among animal foods, those produced in accordance with welfare conditions are more preferred (Sajdakowska et al., 2020). In another study which was conducted in 11 universities, the relationship between animal welfare and gender was revealed. Accordingly, in countries where females were more empowered, principally Sweden, Norway and Great Britain, females had much greater concern than males for animal welfare, whereas in other countries the responses of males and females were more similar (Phillips and McCulloch, 2005; Phillips et al., 2011).

By improving public knowledge, awareness and understanding of animal welfare in food production, we can elevate knowledge to align with current societal concerns, thus redefining socially acceptable methods of food production and improving the lives of billions of animals that are farmed for food annually (Cornish et al., 2016). The aim of this study was to determine the animal welfare perception on milk and dairy products consumption in the context of

university students.

The present study was conducted to the Ondokuz Mayıs University (OMU) in Turkey. The OMU is a large state university established in 1975 in Samsun province in Turkey. OMU is in the 1001+ group of The Times Higher Education (THE) 2020 World Universities ranking. In the 2019-2020 academic years, OMU had about 30000 students (Anonymous, 2020).

## Materials and Method

The material of this research was composed of the data obtained from the questionnaire conducted by face-to-face interviews with 379 students at OMU between 01 March 2019 and 31 May 2019. However, some incorrect questionnaires were excluded from the study and data from a total of 361 answers were included in the study. The questionnaire was applied to students who were chosen by random sampling method and volunteered for participation. The questionnaire was prepared based on previous work by Şeker et al. 2012.

The sample size formula (Üstün 2016):

$$n = \frac{N t^2 p q}{d^2 (N - 1) + t^2 p q}$$

In the formula; N = Number of individuals in the population, n = The number of individuals to be sampled, p = Frequency (probability) of the event to be examined, q = frequency of absence of the event to be examined (1-p), t = The theoretical value found in the t table at certain degrees of freedom and detected error level. d = It is represented as the  $\pm$  deviation required to be made according to the frequency of occurrence of the event. t: = 1.96.  $\alpha$  = 0.05 is the t value at  $\infty$  degrees of freedom.

**Statistical analyses:** Frequencies (number, %) were calculated for each question. The chi-square test was used for the comparisons between the gender groups regarding milk consumption habits and preferences (Akgül, 2005). Considering the results of this test, the Pearson chi-square test was used if the percentage of those less than 5 among the theoretical frequencies calculated for each eye were less than 20%, and the significance levels of the exact method were used if greater than 20%. The SPSS version 22.0 was used for the analyses and calculations (SPSS, 2015).

## Results and discussion

Data obtain students' opinions on milk and dairy products consumption have been presented in Table 1. According to the research, the rate of male students who think that the society is not encouraged enough to consume drinking milk and dairy products was 75.32%, and the rate of female students was 82.18% ( $p=0.112$ ) (Table 1).

**Table 1.** Students' opinions on milk and dairy products consumption

Questionnaire		Gender		Total (n: Total, %: Average)	p	
		Male	Female			
<b>Is the community encouraged enough to drink milk and dairy products consumption?</b>						
Yes	n	39	36	75	0.112	
	%	24.68	17.82	20.83		
No	n	119	166	285		
	%	75.32	82.18	79.17		
<b>What do you think is the most effective way to encourage the community to consume drinking milk and dairy products?</b>						
Written and visual media-communication tools	n	104	147	251		0.142
	%	67.10	74.24	71.10		
Seminars, meetings	n	51	51	102		
	%	32.90	25.76	28.90		
<b>What do you think of the school milk program?</b>						
Necessary	n	120	171	291	0.016	
	%	75.95	85.93	81.51		
Unnecessary	n	38	28	66		
	%	4.05	14.07	18.49		
<b>Do you know about the presence and amount of cholesterol in milk and dairy products?</b>						
Yes	n	36	40	76		0.457
	%	25.00	20.74	22.65		
No	n	108	152	260		
	%	75.00	78.76	77.35		
<b>At what age do you think milk should be consumed the most?</b>						
Infancy-childhood	n	47	39	86	0.110	
	%	30.32	19.50	24.22		
Youth	n	5	5	10		
	%	3.00	2.50	2.82		
In old age	n	1	2	3		
	%	0.87	1.00	0.85		
At all ages	n	102	154	256		
	%	65.81	77.00	72.11		
<b>Your knowledge about the primary nutritional values of drinking milk and dairy products?</b>						
Protein source	n	64	99	163		0.363
	%	42.38	49.50	46.44		
Gives energy	n	12	11	23		
	%	7.95	5.50	6.55		
Vitamin and mineral source	n	9	16	25		
	%	5.96	8.00	7.12		
Contains all the nutrients needed	n	57	68	125		
	%	37.75	34.00	35.62		
None	n	9	6	15		
	%	5.96	3.00	4.27		
<b>Your opinions about the reason why sterilized UHT milk can not spoil for a long time?</b>						
Heat treatment	n	50	52	102	0.002	
	%	32.47	26.13	28.90		
Containing preservatives	n	56	109	165		
	%	36.36	54.77	46.74		
I do not know	n	48	38	86		
	%	31.17	19.10	24.36		

In the study conducted by Şeker et al. (2012), it was reported that 86.3% of the participants thought the society was not encouraged enough about milk consumption. Improving the level of knowledge about nutrition related to milk can improve the intake of milk and dairy products (Huang et al., 2019).

According to the study, the rate of male students who thinks that the most effective way to encourage the consumption of milk and dairy products is through print and visual media-communication tools was 67.10%, while the rate of female students was 74.24%. Also, the rate of male students who thinks that the most effective way to encourage is seminars and meetings was 32.90%, while the rate of female students was 25.76% ( $p=0.142$ ) (Table 1).

In a study conducted at Gümüşhane University, 71.7% of the students stated that they found the advertising and propaganda activities to encourage the consumption of milk and dairy products insufficient (Şahinöz and Özdemir, 2017). Another study conducted at Celal Bayar University, 76.8% of the students stated that television, newspaper and radio and advertising / propaganda activities are the most important tools that encourage milk consumption (Karagözlü et al., 2005). Also, in the study conducted at Yüzüncü Yıl University; it has been reported that 12.1% of the students found the studies of the press and media organs sufficient in encouraging the consumption of milk and dairy products, while 60.8% found it insufficient (Durmaz et al., 2002). It is understood that print and visual media-communication tools play a very important role in promoting consumption of milk and dairy products.

According to the research, the rate of male students who think that the school milk program is necessary is 75.95%, and the rate of female students is 85.93% ( $p=0.016$ ) (Table 1). Şeker et al. (2012) reported that 84.6% of the participants found the school milk program very necessary. The findings obtained from the studies show that the school milk program is believed to be appropriate and necessary both to raise conscious generations about healthy nutrition and to popularize milk and dairy products from childhood. In a study conducted in South Korea, it was reported that the school milk program contributed to the increase in milk consumption and was beneficial for general nutrition (Lee et al., 2019).

According to the research, the rate of male students who think that they do not have information about the presence and amount of cholesterol in milk and dairy products was 75.00%, and the rate of female students was 78.76% ( $p=0.457$ ) (Table 1). According to the research conducted at Yüzüncü Yıl University, it was reported that 29.78% of the students thought that cholesterol was harmful,

19.89% of them thought that cholesterol was not harmful, and 50.83% of them did not have any information about cholesterol (Selçuk et al., 2003). Approximately 64% of patients perceived high cholesterol as 'very serious'. The factors most significantly associated with desire to improve cholesterol control were perceiving hyperlipidemia as 'very serious and self-efficacy for cholesterol control (Zullig et al., 2016). Access to accurate information should be ensured by implementing educational programs for the society, including university students.

According to the study, the rate of male students who think that milk and dairy products should be consumed mostly in infancy and childhood was 30.32% and the rate of female students was 19.50%, the rate of male students who thinks that should be consumed at all ages was 65.81%, and the rate of female students was 77.00%, the rate of male students who thinks that should be consumed in youth ages was 3.00%, and the rate of female students was 2.50%, and also the rate of male students who thinks that should be consumed in old age was 0.87%, and the rate of female students was 1.00% ( $p=0.110$ ) (Table 1). In a study conducted at Süleyman Demirel University, it was reported that 81.0% of the students thought that milk should be consumed at all ages (Şimşek and Açıkgöz, 2011). In both universities, the vast majority of university students participating in the survey indicated that milk and dairy products should be consumed at all ages and showed an appropriate perspective to scientific facts.

The intake of milk and dairy products in the elderly in China is still seriously insufficient. Liquid milk is the main type of milk intake. The awareness rate of "drinking milk and eating dairy products are beneficial to health" was 79.30% (Huang et al., 2019). The milk consumption of people in  $\geq 70$  years old was significantly higher than the people in 60- 69 years old (Liu et al., 2016). The most recent evidence suggested that intake of milk and dairy products was associated with reduced risk of childhood obesity. In adults, intake of dairy products was shown to improve body composition and facilitate weight loss during energy restriction (Kongerslev Thorning et al., 2016). For this reason, consumption of milk and dairy products is recommended for healthier eating habits in children and adolescents (Campmans-Kuijpers et al., 2016). Milk and dairy consumption should be encouraged at all ages.

According to the study, the rate of male students who thinks that the primary nutritional value of milk and dairy products is a source of protein was 42.38% and the rate of female students was 49.50%, the rate

of male students who thinks that source of vitamins and minerals was 5.96%, and the rate of female students was 7.12%, the rate of male students who thinks that source of energy was 7.95%, and the rate of female students was 5.50%, the rate of male students who thinks that milk and dairy products contain all the nutritional elements needed was 37.75%, and the rate of female students was 34.00%, and also the rate of male students who thinks that none of them was 5.96%, and the rate of female students was 3.00% ( $p=0.363$ ) (Table 1). Milk and dairy products provided 9.1% of the total energy supply. A high share (above 20%) in the supply of nutrients was noted in the case of calcium (54.7%), riboflavin (28.1%), vitamin B12 (26.1%), and phosphorus (24.6%). Supply at the level of 10–20% was observed for protein, saturated fatty acids, zinc, total fat, cholesterol, potassium, magnesium, and vitamin A. Of the amino acids, the share above 20% from dairy category was recorded in the case of 6 amino acids (proline, tyrosine, serine, lysine, valine, and leucine) and at the level of 10–20% for 10 amino acids (isoleucine, histidine, threonine, tryptophan, phenylalanine, methionine, glutamic acid, aspartic acid, alanine, and arginine) (Górska-Warsewicz et al., 2019).

In a study conducted at Yüzüncü Yıl University, the rate of students who thinks that milk is a source of protein was 19.11%, thinks that milk is a source of vitamins was 16.02%, thinks that milk is a source of energy was 8.30%, the rate of thinks that it contains all of them was 35.33% (Tarakçı et al., 2003). The importance of milk and dairy products in nutrition should be conveyed to all segments of society through education.

According to the study, the rate of male students who thinks that UHT milk is not spoiled for a long time due to heat treatment was 42.38% and the rate of female students was 49.50%, the rate of male students who think that UHT milk does not spoil due to its preservative content was 36.36%, and the rate of female students was 54.77%, and also the rate of male students who do not know why UHT milk does not spoil for a long time was 31.17%, and the rate of female students was 19.10% ( $p=0.002$ ) (Table 1). In a study conducted at Süleyman Demirel University, 41.6% of the students stated that long-life milks contain preservatives as the reason for their long-term durability, 36.8% as the reason for heat treatment, while 21.6% of them stated that they did not have any information about this subject (Şimşek and Açıkgöz, 2011). There is a lack of information for both university students on what UHT milk is and how it is obtained. Education programs that include

students should be applied to segments of society.

In the present study, students' opinions on milk and dairy products prices are given in Table 2.

According to the study, the rates of male students who thinks that milk, cheese, yoghurt, kefir, ayran and ice cream prices are cheap were 30.00%, 57.31%, 28.67%, 42.00%, 41.89%, and 21.48%, respectively, while the rates of female students were 16.24%, 53.61%, 14.43%, 43.01%, 40.41%, and 9.27%, respectively. Also, the rates of male students who thinks that prices are normal were 51.33%, 33.33%, 58.00%, 44.76%, 39.19%, and 50.33%, respectively, while the rates of female students were 72.77%, 45.88%, 76.29%, 51.81%, 50.78%, and 57.22%, respectively (Table 2). In a study conducted at Süleyman Demirel University, it was reported that 68.3% of the students determined the price of milk normal, and 23.2% determined it expensive (Şimşek and Açıkgöz, 2011). Addition, in a study conducted at Yüzüncü Yıl University, exactly half of the students evaluated the price of milk as expensive (Tarakçı et al., 2003), and in another study conducted at same University, the ratio of students who found the prices of cheese, yogurt, butter and ice cream expensive was 67.27%, 45.51%, 79.33% and 61.81%, respectively (Selçuk et al., 2003).

The fact that the input prices in animal husbandry are expensive causes the product price to be expensive. It also carries great risks. Therefore, to think that milk and dairy products are expensive is due to not knowing these facts. However, other products, which are much easier to produce and less costly, are sold more expensive than milk and dairy products. These facts need to be explained to the whole society, including students.

In the present study, students' opinions on animal welfare in the milk and dairy products consumption context are given in Table 3.

According to the research, the rate of male students who visited a place where animals is raised (farm, barn, fence, etc.) was 83.87%, and the rate of female students was 75.13% ( $p=0.046$ ) (Table 3). Compared to those who have never visited a place related to animal husbandry, the rate of visitors is quite high. However, another research has revealed that; allowing citizens to tour a dairy farm improved their performance in a knowledge-based quiz of dairy husbandry practices, but did not improve perceptions of dairy cattle welfare for most participants. The implication is that the livestock industries cannot expect one-way education efforts to resolve changes in animal welfare perceptions after touring a dairy farm societal concerns about animal welfare. Rather, engagement between the livestock industries and the

**Table 2.** Students' opinions on milk and dairy products prices

Questionnaire		Gender		Total (n: Total,%: Average)	p
		Male	Famale		
<b>Students' opinions on milk prices</b>					
Cheap	n	45	31	76	<b>0.000</b>
	%	30.00	16.24	22.29	
Expensive	n	28	21	49	
	%	18.67	10.99	14.37	
Normal	n	77	139	216	
	%	51.33	72.77	63.34	
<b>Students' opinions on cheese prices</b>					
Cheap	n	86	104	190	<b>0.000</b>
	%	57.34	53.61	55.23	
Expensive	n	14	1	15	
	%	9.33	0.51	4.36	
Normal	n	50	89	139	
	%	33.33	45.88	40.41	
<b>Students' opinions on yoghurt prices</b>					
Cheap	n	43	28	71	<b>0.001</b>
	%	28.67	14.43	20.64	
Expensive	n	20	18	38	
	%	13.33	9.28	11.05	
Normal	n	87	148	235	
	%	58.00	76.29	68.31	
<b>Students' opinions on kefir prices</b>					
Cheap	n	63	83	146	<b>0.026</b>
	%	42.00	43.01	42.56	
Expensive	n	20	10	30	
	%	13.33	5.18	8.75	
Normal	n	67	100	167	
	%	44.67	51.81	48.69	
<b>Students' opinions on buttermilk prices</b>					
Cheap	n	62	78	140	<b>0.011</b>
	%	41.89	40.41	41.06	
Expensive	n	28	17	45	
	%	18.92	8.81	13.19	
Normal	n	58	98	156	
	%	39.19	50.78	45.75	
<b>Students' opinions on ice cream prices</b>					
Cheap	n	32	18	50	<b>0.006</b>
	%	21.48	9.27	14.58	
Expensive	n	42	65	107	
	%	28.19	33.51	31.19	
Normal	n	75	111	186	
	%	50.33	57.22	54.23	

livestock industries and the public should be two-way such that industry stakeholders strive to hear, and respond to, concerns that result from increased transparency. This type of communication might allow industry stakeholders to better identify welfare concerns in society and to highlight shared values, providing a foundation to resolve more contentious issues (Ventura et al., 2016).

According to the study, the rate of male students who know what the concept of animal welfare means was 85.16% and the rate of female students was 91.28% (p=0.091) (Table 3). In a study in China, approximately two thirds of the respondents had never heard of animal welfare (You et al., 2014). In another study, a total of 15.2 % ordinary citizens Brazil responded that they have never heard of

animal welfare. As 43.5% ordinary citizens Brazil and 60.3% ordinary citizens France have heard of the subject superficially, and 42.3% ordinary citizens Brazil and 35.1% ordinary citizens France have heard of the subject more deeply (Tamioso et al., 2018). The findings reveal that college students have higher rates have heard about animal welfare in Turkey. However, although countries and populations included in the study are different, it appears that there is a general lack of information on animal welfare. Informative training activities should be carried out on this subject.

According to the study, the rate of male students who thinks that there was a welfare problem in farm animals was 56.21% and the rate of female students was 55.84%. Also, the ratio of male students who have no idea about this issue was 27.45% and that of female students was 39.59% ( $p=0.000$ ) (Table 3). It is estimated that the news about this issue is effective in students' thinking that there is an animal welfare problem. Although not at the desired rate, it is appreciated that at least some of the students have an opinion on this subject.

According to the this study, the rate of male students who thinks that the welfare problems that farm animals are most exposed to are the negativities in physical conditions was 22.44% and the rate of female students was 17.53%, the rate of male students who think that the negativity in the conditions of care and feeding was 13.46%, and the rate of female students was 7.73%, and also the rate of male students who think that diseases and negativities in treatment processes was 0.64%, and the rate of female students was 0.00%. In addition, according to the study, the rate of male students who thinks that the welfare problems that farm animals are most exposed to are the negativities in physical and care and feeding conditions was 24.36% and the rate of female students was 28.35%, the rate of male students who think that negativities in physical conditions and, diseases and negativities in treatment processes was 9.62%, and the rate of female students was 2.58%, the rate of male students who think that negativity in the conditions of care and feeding, and diseases and negativities in treatment processes was 1.92%, and the rate of female students was 1.03%, and also the rate of male students who think that all of them was 27.56%, and the rate of female students was 42.78% ( $p=0.004$ ) (Table 3). The findings reveal that university students think that physical conditions are mostly insufficient in terms of animal welfare. The findings show that

the insufficiency of care and nutritional conditions is less. The rate of those who think that lack of animal welfare is related to disease and treatment processes is extremely low. Findings show similarities in single and multiple preference order.

In a study, in farming context, most stakeholders (Vietnam, Malaysia Thailand China India and Bangladesh) placed the lack of food and water as the most serious animal welfare issues (Sinclair and Phillips, 2019). In another study also, revealed that on-farm prevention of thermal stress and air quality were not sufficiently included. All groups also agreed that animal behavior and animal health are the most effective animal-based indicators (Averós et al., 2013).

According to the research, the rate of male students who want label information about milk and dairy products produced from animals raised under welfare conditions was 71.24% and the rate of female students was 78.68%. Also, the ratio of male students who have no idea about this issue was 12.42% and that of female students was 14.72% ( $p=0.014$ ) (Table 3). There is a synergy between food safety and animal welfare. The importance of animal welfare in terms of food security is relevant increasing of animal products consumption (Demirel and Çak, 2016). A food label with the information that it is manufactured in accordance with animal welfare responds to the concerns of the community and consumer's request for ethical food purchase (Bozkurt and Koçak, 2017).

According to the study, the rate of male students who agreed to pay extra for milk and dairy products because suitable for animal welfare was 75.71% and the rate of female students was 81.77% ( $p=0.253$ ). The rates of male students who could pay up to 10%, 11-25%, and more than 25% were 60.14%, 30.07%, and 9.79%, respectively, while the rates of female students were 62.28%, 23.12%, and 8.60%, respectively ( $p=0.294$ ) (Table 3).

In a study in China, more than half of the respondents were willing, to pay more for high-welfare animal products, whereas 45.5% of the respondents were not willing to pay more (You et al., 2014). Another study show that the market is the most viable direction to improve farm animal welfare and willingness to pay for animal welfare the differences between European countries are considerable (Ingenbleek et al., 2013). It is important and valuable to have groups willing to pay more for animal products with high welfare.

**Table 3.** Students' opinions on animal welfare in the milk and dairy products consumption context

Questionnaire		Gender		Total (n: Total,%: Average)	p	
		Male	Female			
<b>Have you ever visited a place where animals are breeding (fence, pen, barn, etc.)?</b>						
Yes	n	130	148	278	<b>0.046</b>	
	%	83.87	75.13	77.87		
No	n	25	49	74		
	%	16.13	27.87	22.13		
<b>Do you know what the concept of animal welfare means?</b>						
Yes	n	132	178	310		<b>0.091</b>
	%	85.16	91.28	88.57		
No	n	23	17	40		
	%	14.84	8.72	11.43		
<b>Do you think is there farm animals welfare problems in Turkey?</b>						
Yes	n	86	110	196	<b>0.000</b>	
	%	56.21	55.84	56.00		
No	n	25	9	34		
	%	16.34	4.57	9.71		
No idea	n	42	78	120		
	%	27.45	39.59	34.29		
<b>Which of the welfare problems do you think farm animals suffer from?</b>						
Physical conditions	n	35	34	69	<b>0.004</b>	
	%	22.44	17.53	19.71		
Care and feeding conditions	n	21	15	36		
	%	13.46	7.73	10.29		
Diseases and treatment processes	n	1	0	1		
	%	0.64	0.00	0.29		
Physical conditions and care and feeding conditions	n	38	55	93		
	%	24.36	28.35	26.57		
Physical conditions and diseases and treatment processes	n	15	5	20		
	%	9.62	2.58	5.71		
Care and feeding conditions and diseases and treatment processes	n	3	2	5		
	%	1.92	1.03	1.43		
All	n	43	83	126		
	%	27.56	42.78	36.00		
<b>When purchasing milk and dairy products, would you like to have product labels that read "made from animals raised in animal welfare conditions"?</b>						
Yes	n	109	155	264	<b>0.014</b>	
	%	71.24	78.68	75.43		
No	n	25	13	38		
	%	16.34	6.60	10.86		
No idea	n	19	29	48		
	%	12.42	14.72	13.71		
<b>Would you consider paying extra for products made from animals raised in animal welfare conditions?</b>						
Yes	n	112	157	269	<b>0.253</b>	
	%	76.71	81.77	79.59		
No	n	34	35	69		
	%	23.29	18.23	20.41		
<b>How much will you agree to pay extra for the animal products you buy because they have been raised in animal welfare conditions?</b>						
Up to 10%	n	86	127	213	<b>0.294</b>	
	%	60.14	68.28	64.74		
11-25%	n	43	43	86		
	%	30.07	23.12	26.14		
More than 25%	n	14	16	30		
	%	9.79	8.60	9.12		



## Conclusion

In this study, it was determined that university students' perception of animal welfare and opinions on consumption of milk and dairy products were generally at an acceptable level. However, in the light of the findings more information and the necessary training support should be provided on the following issues. a) The consumption of milk and dairy products should be encouraged more. b) Accurate and sufficient information about the presence, amount and functions of cholesterol in milk and dairy products should be conveyed more. c) Milk and dairy products are not only used by children, young people or old people; it should be explained that these should be consumed at all ages. d) Milk and dairy products are not just sources of energy, protein or vitamins; it should be explained more that it is a healthy food source that includes all of them. e) What the pasteurized and UHT milk is and how it is obtained should be explained more. f) It should be explained that milk and different dairy products are not expensive at all in the context of the difficulties and high costs of the production process from farm to table. g) Correct and sufficient information about animal welfare should be explained more. h) The importance of finding information on the labels of milk and dairy products showing that they are produced from animals suitable for welfare conditions should be explained more. i) It should be explained more about the need to pay more for milk and dairy products produced from animals in welfare conditions. Mass media are also recommended to be used in order to raise awareness of consumption of milk and dairy products to a better point.

## References

- Akgül, A. (2005). *Tıbbi araştırmalarda istatistiksel analiz teknikleri*. 3 ed. Ankara, Turkey: Emek Ofset Ltd Şti.
- Anonymous. (2020, October 16). Ondokuz Mayıs Üniversitesi. Retrieved from <https://www.omu.edu.tr>.
- Averós, X., Aparicio, M. A., Ferrari, P., Guy, J. H., Hubbard, C., Schmid, O., Ilieski, V., & Spooler, H. A. M. (2013). The effect of steps to promote higher levels of farm animal welfare across the EU. Societal versus animal scientists' perceptions of animal welfare. *Animals*, 3, 786-807.
- Bozkurt, Z., & Koçak, K. (2017). Gıdalarda hayvan refahı etiketlemesi. *Kocatepe Veteriner Dergisi*, 10 (4), 337-349.
- Campmans-Kuijpers, M. J. E., Singh-Povel, C., Steijns, J., & Beulens, J. W. J. (2016). The association of dairy intake of children and adolescents with different food and nutrient intakes in the Netherlands. *BMC Pediatrics*, 16, 2.
- Cornish, A., Raubenheimer, D., & McGreevy, P. (2016). What we know about the public's level of concern for farm animal welfare in food production in developed countries. *Animals*, 6, 74.
- Demirel, A. F., & Çak, B. (2016). The importance of animal welfare applications in food safety in terms of the relevant legislation in Turkey and the European Union. *Van Veterinary Journal*, 27 (2), 111-116.
- Durmaz, H., Sağun, E., & Tarakçı, Z. (2002). Yükseköğrencilerinin içme sütü tüketim alışkanlıkları. *Van Veterinary Journal*, 13 (2), 69-73.
- Erdoğan, N., & Çiçek, H. (2015). Hayvansal gıdaların tüketim yapısı ve tüketici tercihlerinin belirlenmesi üzerine bir araştırma: üniversite personeli örneği. *Kocatepe Veteriner Dergisi*, 8 (1), 25-31.
- Górska-Warsewicz, H., Rejman, K., Laskowski, W., & Czacotko, M. (2019). Milk and dairy products and their nutritional contribution to the average polish diet. *Nutrients*, 11, 1771.
- Harvey, D., & Hubbard, C. (2013). The supply chain's role in improving animal welfare. *Animals*, 3, 767-785.
- Huang, F., Wang, H., Wang, Z., Zhang, J., Su, C., Du, W., Jiang, H., Jia, X., Ouyang, Y., Wang Y., Li L., & Zhang, B. (2019). Knowledge, behavior and consumption types of milk and dairy products among the Chinese aged 60 and above in 15 provinces (autonomous regions and municipalities) in 2015. *Wei Sheng Yan Jiu*, 48 (1), 9-15.
- Frey, U. J., & Pirscher, F. (2018). Willingness to pay and moral stance: The case of farm animal welfare in Germany. *PLoS One*, 13 (8), e0202193.
- Hoque, M. Z., Alam Md., N., & Nahid, K. A. (2018). Health consciousness and its effect on perceived knowledge, and belief in the purchase intent of liquid milk: Consumer insights from an emerging market. *Foods*, 7 (9), 150.
- Ingenbleek, P. T. M., Harvey, D., Ilieski, V., Immink, V. M., de Roest, K., & Schmid, O. (2013). The European market for animal-friendly products in a societal context. *Animals*, 3, 808-829.
- Karagözlü, N., Karagözlü, C., Karaca, S., & Eren, S. (2005). Üniversite öğrencilerinde süt ve ürünleri tüketim alışkanlıkları ve beslenme bilinçleri üzerine bir araştırma, Celal Bayar Üniversitesi Mühendislik Fakültesi örneği. *Celal Bayar Üniversitesi Fen Bilimleri Dergisi*, 101-108.
- Kok, C. R., & Hutkins, R. (2018). Yogurt and other fermented foods as sources of health-promoting bacteria. *Nutrition Reviews*, 76, 4-15.
- Kongerslev Thorning, T., Anne Raben, A., Tholstrup, T., Soedamah-Muthu, S. S., Givens, I., & Astrup, A. (2016). Milk and dairy products: Good or bad for human health? An assessment of the totality of scientific evidence. *Journal of Food and Nutrition Research*, 60, 32527.
- Köseman, A., & Şeker İ. (2019). Influence of husbandry conditions on animal welfare at cattle farms in Turkey. *Animal Science Papers and Reports*, 37 (2), 137-147.
- Lee, J. H., Kim, W. K., & Kim, S. H. (2019). Participation in the school milk program contributes to increased milk consumption and dietary nutrient intake by middle school students in South Korea. *Nutrients*, 11 (10), 2386.
- Liu, Z., Pang, S., Li, Y., Man, Q., Li, L., & Zhang, J. (2016). Consumption status of dairy products in Chinese aged 60 and above in 2010-2012. *Wei Sheng Yan Jiu*, 45 (5), 708-713.

- Phillips, C. J. C., & McCulloch, S. (2005). Student attitudes on animal sentience and use of animals in society. *Journal of Biological Education*, 40, 1, 17-24.
- Phillips, C., Izmirli, S., Aldavood, J., Alonso, M., Choe, B., Hanlon, A., Handziska, A., Illmann, G., Keeling, L., Kennedy, M., Lee, G., Lund, V., Mejdell, C., Pelagic, V., & Rehn, T. (2011). An international comparison of female and male students' attitudes to the use of animals. *Animals (Basel)*, 1 (1), 7-26.
- Sajdakowska, M., Gebiski, J., Guzek, D., Gutkowska, K., & Zakowska-Biemans, S. (2020). Dairy products quality from a consumer point of view: Study among Polish adults. *Nutrients*, 12, 1503.
- Selçuk, Ş., Tarakçı, Z., Şahin, K., & Coşkun, H. (2003). Yüzüncü Yıl Üniversitesi lisans öğrencilerinin süt ürünleri tüketim alışkanlıkları. *Yüzüncü Yıl Üniversitesi Tarım Bilimleri Dergisi*, 13 (1), 23-31.
- Sinclair, M., & Phillips, C. J. C. (2019). Asian livestock industry leaders' perceptions of the importance of and solutions for animal welfare issues. *Animals*, 9, 319.
- SPSS. (2015). SPSS 22.0. Statistical Package in Social Sciences for Windows. Chicago, USA.
- Şahinöz, S., & Özdemir, M. (2017). Üniversite öğrencilerinin süt ve süt ürünleri tüketim alışkanlıkları ve etkileyen faktörler. *Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi*, 6 (4), 106-112.
- Şeker, İ., Şeker, P., Şahin, M., Özen, V. S., Akdeniz, A., Erkmen, O., Kışlalıoğlu, İ., Sargın, G., & Doğu, G. B. (2012). Elazığ ili merkez ilçede tüketicilerin süt tüketim alışkanlıkları ve bu alışkanlıkları etkileyen faktörlerin belirlenmesi. *Fırat Üniversitesi Sağlık Bilimleri Veteriner Dergisi*, 26 (3), 131-143.
- Şimşek, B., & Açıkgöz, İ. (2011). Süleyman Demirel Üniversitesi öğrencilerinin içme sütü tüketim alışkanlıklarının belirlenmesi. *Yüzüncü Yıl Üniversitesi Tarım Bilimleri Dergisi*, 21 (1), 12-18.
- Tamioso, P. R., Rucinke, D. S., Miele, M., Boissy, A., & Molento, C. F. M. (2018). Perception of animal sentience by Brazilian and French citizens: The case of sheep welfare and sentience. *PLoS ONE* 13 (7), e0200425.
- Tarakçı, Z., Selçuk, Ş., Şahin, K., & Coşkun, H. (2003). Üniversite öğrencilerinin içme sütü tüketim alışkanlıkları üzerine bir araştırma. *Yüzüncü Yıl Üniversitesi Tarım Bilimleri Dergisi*, 13 (1), 15-21.
- Üstün, B. (2020 October, 5). Örneklemeye yöntemleri. Retrieved from [https://www.phdernegi.org/wpcontent/uploads/2016/03/%C3%B6rnekleme\\_yontemleri.pdf](https://www.phdernegi.org/wpcontent/uploads/2016/03/%C3%B6rnekleme_yontemleri.pdf).
- Vanga, S. K., & Raghavan, V. (2018). How well do plant based alternatives fare nutritionally compared to cow's milk? *Journal of Food Science and Technology*, 55 (1), 10-20.
- Ventura, B. A., von Keyserlingk, M. A. G., Wittman, H., & Weary, D. M. (2016). What difference does a visit make? Changes in animal welfare perceptions after interested citizens tour a dairy farm. *PLoS ONE*, 11 (5), e0154733.
- You, X., Li, Y., Zhang, M., Yan, H., & Zhao, R. (2014). A survey of Chinese citizens' perceptions on farm animal welfare. *PLoS ONE*, 9 (10), e109177.
- Zhao, A., Man-Yau Szeto, I., Wang, Y., Li, C., Pan, M., Li, T., Wang, P., & Zhang, Y. (2017). Knowledge, attitude, and practice (KAP) of dairy products in Chinese urban population and the effects on dairy intake quality. *Nutrients*, 9, 668.
- Zullig, L. L., Sanders, L. L., Thomas, S., Brown, J. N., Danus, S., McCant, F., & Bosworth, H. B. (2016). Health beliefs and desire to improve cholesterol levels among patients with hyperlipidemia. *Patient Education and Counseling*, 99 (5), 830-5.