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Animal Welfare Perception of Sheep Farmers and Consumers: The Case of Samsun

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ABSTRACT

Animal welfare perception of farmers and consumers have been evaluated both by farmers and consumers level in Samsun province, Turkey. Face to face surveys with 151 sheep farmers and 150 consumers were carried out to collect information on welfare concerns and perceptions to determine how they viewed the effect of management, handling and control on production practices. The likert type scale was used to evaluate the factors that consumers and farmers perceive as well as the factors that were effective in ensuring animal welfare. In addition, factor analysis was conducted with 62 propositions to in order to determine the animal welfare perception for both focus groups. The averages of the components established as a result of the factor analysis and the association between the socio-demographic features of farmers and consumers and their perception levels were tested using chi-square. Finally, 5 factors with an eigenvalue greater than one were determined; (a) perception of shelter conditions, (b) perception of transportation and physical health, (c) perception of mental health, (d) perception of nutritional conditions, and (e) perception of animal handling in animal welfare. Animal welfare, shelter conditions, transportation, and physical and mental health perception levels significantly drop as the scale of sheep farms increase Farmers (75.5%) and consumers (76%) have heard of the concept of animal welfare before. Both groups had a positive attitude toward animal welfare. There was no statistically significant difference in opinions of animal transportation and physical health between both groups. However, it has been determined that the breeders' perceptions of shelter conditions, mental health, nutritional conditions and animal handling were at a higher level. It was vital to provide animal welfare training as well as capacity development activities for farmers in order to enhance awareness on animal welfare and its relevance. Authors conclude that awareness on animal welfare should be provided for all type of citizens' dynamics.

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INTRODUCTION

It was thought that ovine breeding comes after cattle breeding in meat and milk production. However, it is known that ovine breeding was more advantageous than bovine breeding in terms of live weight gain, feed efficiency rate and short production time according to the consumed feed rate (Aytekin et al., 2015). On the other hand, when the subject was evaluated in terms of feed expense, which constitutes 70% of the production cost and was one of the important factors of the increase in the price of red meat, it was seen that the orientation to small cattle breeding, which was largely based on pasture, creates important opportunities in terms of resource use efficiency. Small cattle breeding should be evaluated in terms of milk production as well as meat production.

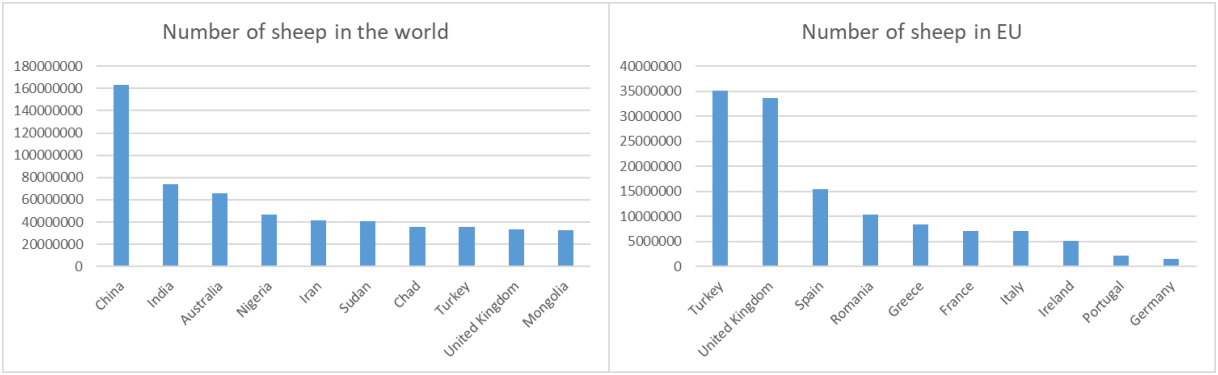

Figure 1. World Sheep Stock (2019) (FAOSTAT, 2020)

Historically being a sheep production country; Turkey, ranks 8th in the world with 2.8% and 5th in the EU with its sheep population (Figure 1). As of 2020, there were 42 million sheep in Turkey and Samsun province constitutes an important source of livelihood of the people in the Black Sea region with 233 thousand head of sheep (TUIK, 2020). In Samsun, as in the rest of the globe, sheep breeding has evolved into an agricultural activity, with the sector expanding mainly to population growth and becoming more intense, raising concerns about "animal welfare." Animals were used by humans for a variety of functions, including textile and food production, aiding disabled people, protection, flock management, research, religious rituals, sports, entertainment, and social support. Different connections have been built between people and animals as a result of these various uses of animals, as well as distinct forms of interactions (Bokkers, 2006). Consumers' interest in animal welfare concerns has risen in many countries in recent years, owing to an increase in the quantity of information accessible on animal husbandry, living conditions, transportation, and slaughter (Eastwood, 1995; Blokhuis et al., 2003). Animal welfare was a dynamic and significant problem for both producers and consumers when approached holistically. In the producers' opinion, in addition to the necessity of considering the health, comfort, and environmental conditions of animals during extensive production,

issues such as ensuring safe food from farm to fork, and traceability of every stage of the production period were critical.

Despite the fact that scientific research on animal welfare began in the 2000s, animal welfare concepts, ethical, animal health, welfare methods, and international animal welfare standards were addressed. (Fraser and Duncan, 1998; Ellendorff et al., 2000; De´sire´et al., 2002; Bavyel, 2004; EFSA, 2004; Masiga, 2005). In the following years, animal welfare was continued to be examined in terms of ethics (Dawkins, 2008), The welfare issue has been studied in the transport phase, where the most problems in animal welfare were experienced (Aradom, 2013; Asmare, 2014; Bulitta, 2015). The perspectives of the producer and the consumer, the two most important stakeholders playing a role in the improvement of animal welfare, on animal welfare were also examined (Bennett, 1996; Quintili, 2004; Verbeke, 2009; Heise and Theuvsen, 2017; Vigors, 2018; Bozzo et al., 2019; Alonso et al., 2020; Rubini et al., 2021).

Scientific research on animal welfare in Turkey; started with animal rights (Savaş et al., 2009), animal welfare criteria (Ünal et al., 2008; Genç and Elmaz, 2009; Altınçekiç and Koyuncu, 2010). In the following years, the role of breeders and human behavior in the field of animal welfare (Altınçekiç and Koyuncu, 2012; Akbaş, 2013; Bozkurt et al., 2013), the effect of stress (Pehlivan and Dellal, 2014), subjects such as interaction with global climate change (Koyuncu and Akgün, 2018), the process in Turkey (Dereli Fidan, 2012; Özen, 2017) were studied. Conceptual animal welfare in Turkey; cattle (Karslıoğlu Kara and Koyuncu, 2011a; Karslıoğlu Kara and Koyuncu, 2011b; Koçak et al., 2015; Koçak, 2016) and calves (Şanlı, 2009; Bozkurt et al., 2019) were examined separately in animal husbandry. There are also studies examining the animal welfare perception and behavior of producers in ovine breeding (Kılıç et al., 2013; Bozkurt, 2019; Meşe and Karakuş, 2019). Studies measuring consumer behavior in animal welfare have been limited to cattle and poultry farming (Şeker et al., 2011; Turan, 2018). In addition, no study has been found that measures and compares the perceptions of both producers and consumers on animal welfare in the same livestock type. In this respect, this research was capable of filling an important knowledge gap in the literature.

Improving animal welfare was a shared responsibility for many stakeholders in the food chain (farmers, food industry, intermediaries, consumers, the public, researchers and non-governmental organizations). It was intended that, in addition to the stakeholders taking on this responsibility, the perspective and understanding of animal welfare should be established. However, there was little information regarding the animal welfare perceptions of the stakeholders and few studies about the society perception in relation to sheep welfare (Davis and Cheeke, 1998; Heleski et al., 2004; Goddart et al., 2006; Kılıç et al., 2013) Therefore, the study aimed to describe and compare the perception of animal welfare, more particularly in sheep farmers, and ordinary citizens from Samsun. Two basic questions will be answered

in this study. The first of these questions was, does the perception of animal welfare by farmers change in terms of farm size? Do farmers' and consumers' perceptions of animal welfare differ from each other? Thus, the following hypotheses were planned to test:

Hypothesis 1: Is there a statistically significant difference between sheep farmers' perceptions of animal welfare in terms of farm size?

Hypothesis 2: Is there a statistically significant difference between a farmer and a consumer regarding animal welfare perception?

Hypothesis 3: Is there a statistically significant difference between hearing the concept of animal welfare before and perceptions of animal welfare?

Hypothesis 4: Is there a statistically significant difference between gender and perceptions of animal welfare?

Hypothesis 5: Is there a statistically significant difference between education level and perceptions of animal welfare?

Hypothesis 6: Is there a statistically significant difference between age groups and perceptions of animal welfare?

MATERIALS and METHODS

Materials

The materials of the study consist of primary data collected via surveys conducted for the sheep farmers and consumers consuming sheep products in Samsun Province. The surveys were performed by the researchers personally in 2020. Besides, statistical data collected by the various institutions and organizations supporting the study and their publications have been utilized.

Research Data

Sheep farmers have been divided into four layers considering the dairy cattle frequency they had as 10-29 heads, 30-89 heads, 90 heads and 90-above heads respectively. In determining the sample volume of these layers, stratified random sampling method has been used (Yamane, 2001). The sample number has been found as 151 farms by considering the %5 allowable error quantity of the average and %95 confidence interval (Table 1).

$$n = \frac{(\sum NhSh)^2}{N^2 D^2 + \sum NhSh^2}$$

Where n is the required sample size; N is the number of farm in the target population; Nh is the number of the population in h; Sh is the standard deviation of h, Sh^2 is the variance of h; $D^2 = d^2/ z^2$; d is the precision; z is the reliability coefficient

(1.96 which represents the 95% reliability). The permissible error in the sample size was defined to be 5% for 95% confidence.

Table 1. Number of interviewed sheep farmers in 2020

Farms size Group(head)	Nh	Sh	NhSh	Nh(Sh*Sh)	Sample size (n)
10-29	754	5,82	4387,90	25535,49	8,05
30-89	1325	17,24	22842,74	393804,51	41,92
90-300	1048	52,54	55067,46	2893525,00	101,03
Total	3127	75,60	82298,00	3312865,00	151,00

In determining the sample size of consumers, unclustered probability sampling method has been used (Collins, 1986).

$n = t^2 \times (p \times q)/e^2$

Where; n: Sample size, t: T table value corresponding to 99% significance level (2,58), p: Occurrence probability of the relevant case within the main mass taken as 65%, q: Non-occurrence probability of the relevant case (1-p), e: Accepted margin of error (The margin of error was taken as 10% in this study). According to this formula, the sample size was calculated as 151 consumers.

Method for Determining Perception

Descriptive statistical analyses (frequency, mean and percentage) were performed on the socio-demographic characteristics of farmers and consumers. The likert type scale was used to evaluate the factors that consumers and farmers perceive the factors that were effective in ensuring animal welfare. In the study, expressions on the attitude scale were evaluated on a five point (1=strongly disagree, 2=disagree, 3=no idea, 4=agree, 5=strongly agree).

To analyze and comment on fewer variables, factor analysis was conducted with 62 propositions to determine the animal welfare perception of sheep breeders and consumers (Appendix 1). Factor analysis was used to obtain fewer variables consisting of linear forms of these propositions instead of many propositions to measure the level of perception. The mathematical model of factor analysis is as follows (Ness, 2002).

X1= b11 f1 +b12 f2 +.....+b1k fk+u1

X2= b21 f1+b22 f2+.....+b2k fk +u2

XP= bp1 f1 +bp2 f2 +.....+bpk fk + up

Where; fk= general factors (importance of the kth factor in measuring the p-th variable or factor weight) bpk= factor weights (the degree of correlation between the p-th variable and the k-th factor) UP= the Unique factor (sources of all changes that cannot be explained by the factors).

The means of the factors determined as a result of the factor analysis performed on the propositions directed to both groups, which were arranged according to a 5-point Likert scale, were taken and the sub-hypotheses were tested as a result of these determined factors. The relationship between the socio-demographic characteristics of farmers and consumers and their perception levels was tested with chi-square.

RESULTS and DISCUSSION

Animal welfare perception factors

62 potential animal welfare perception propositions were factor analyzed and clustered using the main components method after being rated by farmers and consumers on a Likert scale. The KMO test was used to assess the accuracy of the factor analysis results. (Table 2). Although it is preferable for the KMO test result to be more than 50%, the KMO value in this study was 90%, which was considered very good.

As a result of factor analysis, 5 factors with eigenvalues greater than one were determined. These were (a) perception of shelter conditions, (b) perception of transportation and physical health, (c) perception of mental health, (d) perception of nutritional conditions, and (e) perception of animal handling in animal welfare. The determined factors explain 52% of the total variance. The factor load of the variables was taken into account in naming the factors obtained. Variables with high factor loading in the first factor; the air quality inside the shelter, the space for wandering outside the shelter, grazing needs, and the comfort level of the shelter. Variables with high factor loading in the second factor; animal health, the application of preventive treatment methods and the number of animals in transportation. Variables with high factor loading in the third factor; distraction, stress, and fear. Variables with high factor load in the fourth factor were water availability, feed availability and hygiene. The variables with high factor loading in the fifth factor were; respecting the animals, taking care of the animals by experienced shepherds and taking care of the animals in the barn, around and in the pasture areas. Kıllç et al. (2013) studied the perceptions of sheep farmers in Afyonkarahisar province, performed factor analysis with 34 propositions prepared on a 5-likert scale, and identified five factors affecting animal welfare perceptions by consumers' namely housing, nutritional status, stocksman, health status, and other.

Table 2. KMO and Barlett's Tests

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0,896**
Bartlett's Test of Sphericity	Approx. Chi-Square	13441,847
	df	1891
	Sig.	0,000

Demographics of farmers and consumers

Despite the fact that the sex ratios of the producers were nearly equal, 47 % were female and 53 % were male of the respondents. ₹78% of them were found under the age of 31. Although that the majority of producers were young, their level of education was poor. While 60% of them had completed primary school, no university graduates were identified. Kılıç et al. (2013) found that 11.9% of the participants were female and 88.1% of them were male in the animal welfare perception study conducted with sheep farmers. Participants' ages were classified into five groups: 25 and under, 26-35, 36-45, 46-55, and 56 and above, with rates of 9.0 %, 26.6 %, 16.9 %, 29.9 %, and 17.5 %, respectively. In addition, only 2.8 % of the participants were illiterate, while 72.9 % had completed primary school.

According to the results of the study, 44% of consumers were women. Consumers consuming sheep products were also found across the young population. 82% of them were under the age of 31 and 45% of them were university graduates (Table 3). Şeker et al. (2011) found that 56.8% of the participants in their animal welfare perception survey with customers who also consume sheep meat (15.3 %) were male and the majority were university graduates (66.3%).

Also, 75,5% of the farmers and 76,0% of consumers have heard of the concept of animal welfare before. There was a perception of animal welfare in both groups. Turan (2018), found that 83% of consumers do not have knowledge about animal welfare in cattle and poultry farming.

Table 3. Demographic characteristics

Variables		Farmers		Consumers	
		n	%	n	%
Gender	Female	71	47,0	66	44,0
	Male	80	53,0	84	56,0
Age	<31	117	77,5	123	82,0
	31-45	22	14,6	21	14,0
	>45	12	7,9	6	4,0
Education	Primary sc.	91	60,3	35	23,0
	Middle sc.	54	35,8	18	12,0
	High sc.	6	3,9	30	20,0
	Graduates	-	-	68	45,0

The relationship between the socio-demographic characteristics of farmers and consumers and their perception levels

The conditions of housing (p=0.077), transportation and physical health (p=0.0010), and mental health perception (p=0.006) in animal welfare decrease as the sheep farms size increases. In other words, as the number of animal numbers increases, breeders place less emphasis on shelter conditions, transportation, and physical and mental wellbeing. There was no statistically significant difference between the size of the

sheep farms and the perception of farmers' behavior and nutritional conditions in animal welfare (Table 4).

Table 4. Perception of animal welfare by farm size

	Hipotez	Farms size Group(head)	**n**	X	SS	Sd	F	P
Farmers	H1a	10-29	8	3,6	0,895	0,316	2,609	0,077**
		30-89	42	3,3	1,230	0,189		
		90-300	101	2,3	1,085	0,108		
	H1b	10-29	8	3,7	0,706	0,249	15,546	0,001*
		30-89	42	3,6	1,245	0,192		
		90-300	101	3,0	0,997	0,094		
	H1c	10-29	8	4,1	1,335	0,472	5,321	0,006*
		30-89	42	3,5	1,415	0,218		
		90-300	101	2,9	0,943	0,093		
	H2d	10-29	8	3,6	0,643	0,227	0,109	0,896
		30-89	42	3,3	1,140	0,176		
		90-300	101	3,5	0,987	0,098		
	H1e	10-29	8	2,5	1,127	0,398	0,743	0,477
		30-89	42	3,5	1,476	0,227		
		90-300	101	3,6	1,281	0,120		

There is a statistical difference at the *1%, **10% significance level.

It has been determined that there was no statistically significant difference between sheep farmers' and consumers' perceptions of animal transportation and physical health. However, the perceptions of breeders on housing conditions ($p=0.028<0.05$), wellbeing ($p=0.001<0.01$), nutritional conditions ($p=0.039<0.05$) and handling ($p=0.001<0.01$) was found to be at a higher level (Table 5).

Table 5. Farmer and consumers' perception of animal welfare

Hypothesis	Analysis unit	n	X	SS	Sd	T value	P value
H2a	Farmers	151	3,9	0,651	0,053	2,205	0,028**
	Consumers	150	3,7	0,356	0,029		
H2b	Farmers	151	3,7	0,765	0,062	0,697	0,486
	Consumers	150	3,6	0,399	0,032		
H2c	Farmers	151	2,0	1,239	0,100	6,365	0,001*
	Consumers	150	1,2	0,610	0,049		
H2d	Farmers	151	4,4	0,564	0,045	2,072	0,039**
	Consumers	150	4,3	0,473	0,038		
H2e	Farmers	151	4,6	0,566	0,046	-4,453	0,001*
	Consumers	150	4,8	0,291	0,023		

There is a statistical difference at the *1%, **5% significance level.

Farmers' perception of animal welfare and housing conditions in animal welfare ($p=0.448>0.05$), transportation and physical conditions perceptions ($p=0.160>0.05$), feeding conditions ($p=0.970>0.05$) and animal handling perceptions ($p=0.670>0.05$), there was no statistically significant difference. Animal wellbeing perception, on the

other hand, was shown to be higher (p=0.043) among farmers who had never heard of animal welfare before. No statistically significant difference was found between consumers' awareness of animal welfare and their perceptions of animal welfare (Table 6).

Table 6. Perception of animal welfare according to their previous experience of the concept of animal welfare

	Hypothesis	Analysis unit	n	X	SS	Sd	T	P
Farmers	H3a	Heard	114	3,8	0,590	0,055	-0,765	0,448
		Unheard	37	3,9	0,816	0,134		
	H3b	Heard	114	3,7	0,724	0,067	-1,426	0,160
		Unheard	37	3,9	0,866	0,142		
	H3c	Heard	114	1,9	1,138	0,106	-2,077	0,043*
		Unheard	37	2,4	1,450	0,238		
	H3d	Heard	114	4,4	0,545	0,051	-0,037	0,970
		Unheard	37	4,4	0,528	0,103		
	H3e	Heard	114	4,5	0,140	0,048	0,426	0,670
		Unheard	37	4,5	0,712	0,117		
Consumes	H3a	Heard	114	3,7	0,349	0,032	0,942	0,347
		Unheard	36	3,7	0,377	0,062		
	H3b	Heard	114	3,6	0,397	0,037	-0,237	0,813
		Unheard	36	3,6	0,411	0,068		
	H3c	Heard	114	1,2	0,580	0,054	-0,073	0,942
		Unheard	36	1,3	0,698	0,116		
	H3d	Heard	114	4,3	0,470	0,044	0,802	0,424
		Unheard	36	4,2	0,486	0,081		
	H3e	Heard	114	4,7	0,321	0,030	-0,650	0,517
		Unheard	36	4,8	0,164	0,027		

There is a statistical difference at the *5%, **10% significance level.

Table 7. Perception of animal welfare by gender

	Hypothesis	Analysis unit	n	X	SS	Sd	T	P
Farmers	H4a	Female	71	3,9	0,723	0,085	0,466	0,642
		Male	80	3,8	0,583	0,065		
	H4b	Female	71	3,7	0,825	0,098	0,448	0,655
		Male	80	3,6	0,711	0,079		
	H4c	Female	71	2,1	1,235	0,146	0,741	0,460
		Male	80	1,9	1,246	0,139		
	H4d	Female	71	4,3	0,691	0,082	-0,934	0,338
		Male	80	4,4	0,421	0,472		
	H4e	Female	71	4,6	0,584	0,069	0,435	0,664
		Male	80	4,5	0,553	0,061		
Consumers	H4a	Female	66	3,7	0,335	0,041	-1,178	0,241
		Male	84	3,8	0,371	0,040		
	H4b	Female	66	3,6	0,406	0,050	0,840	0,402
		Male	84	3,6	0,394	0,430		
	H4c	Female	66	1,2	0,488	0,060	-1,533	0,127
		Male	84	1,4	0,687	0,075		
	H4d	Female	66	4,2	0,489	0,060	-1,794	0,075*
		Male	84	4,3	0,454	0,049		
	H4e	Female	66	4,8	0,337	0,041	0,311	0,756
		Male	84	4,7	0,251	0,027		

*There is a statistical difference at 10% significance level.

There was no statistically significant difference between farmers' genders and their perceptions of animal welfare (Table 7). The gender of consumers and their perceptions of nutritional circumstances in animal welfare were found to be statistically significant ($p=0.079<0.10$).

According to the findings, 48 % have completed primary school, 42% have finished middle school, and 10% have graduated from high school. No university graduate was found among the farmers. It was determined that there was no statistically significant difference between the education levels of farmers and their perceptions of animal welfare. On the other hand, 23% of the consumers were primary school, 12 of them were in middle school, 20% of them were in high school, and 45% of them were university graduates (Table 8).

Table 8. Perception of animal welfare by education level

	Hypothesis	Analysis unit	n	X	SS	Sd	F	P
Farmers	H5a	Primary sc.	72	3,842	0,646	0,076	0,623	0,538
		Middle sc.	64	3,948	0,642	0,080		
		High sc.	15	4,000	0,728	0,188		
	H5b	Primary sc.	72	3,651	0,751	0,088	0,575	0,564
		Middle sc.	64	3,746	0,784	0,98		
		High sc.	15	3,862	0,767	0,198		
	H5c	Primary sc.	72	2,075	1,254	0,147	0,203	0,816
		Middle sc.	64	1,979	1,238	0,154		
		High sc.	15	1,876	1,233	0,318		
	H5d	Primary sc.	72	4,414	0,544	0,064	0,025	0,975
		Middle sc.	64	4,411	0,575	0,071		
		High sc.	15	4,447	0,652	0,168		
	H5e	Primary sc.	72	4,553	0,550	0,064	0,118	0,889
		Middle sc.	64	4,550	0,621	0,077		
		High sc.	15	4,627	0,406	0,104		
Consumers	H5a	Primary sc.	35	3,7	0,368	0,260	0,172	0,084**
		Middle sc.	18	3,5	0,358	0,029		
		High sc.	30	3,6	0,357	0,031		
		Bachelor	68	3,7	0,356	0,029		
	H5b	Primary sc.	35	3,3	0,282	0,200	1,134	0,325
		Middle sc.	18	3,5	0,399	0,032		
		High sc.	30	3,6	0,369	0,012		
		Bachelor	68	3,7	0,399	0,032		
	H5c	Primary sc.	35	1,1	0,202	0,142	5,720	0,004*
		Middle sc.	18	1,3	0,594	0,049		
		High sc.	30	2,2	0,624	0,051		
		Bachelor	68	3,3	0,610	0,049		
	H5d	Primary sc.	35	4,5	0,495	0,350	1,522	0,222
		Middle sc.	18	2,8	0,243	0,020		
		High sc.	30	3,7	0,029	0,022		
		Bachelor	68	4,8	0,291	0,023		
	H5e	Primary sc.	35	4,8	0,001	0,001	34,113	0,001*
		Middle sc.	18	2,8	0,243	0,020		
		High sc.	30	3,7	0,029	0,022		
		Bachelor	67	4,8	0,291	0,023		

There is a statistical difference at the *1%, **10% significance level.

There was a significant difference between the education of the consumers and the animal welfare indicators such as; housing conditions (p=0.084<0.10), animal wellbeing (p=0.004<0.01) and animal handling perceptions (p=0.001<0.01). As the education level of the consumers increased, the average animal wellbeing perceptions in animal welfare also increased. Animal handling perception was found to be higher in primary school and university graduate consumers (Table 8).

In the study conducted by Şeker et al. (2011) in which they measured the perception of animal welfare of red meat consumers, a statistical difference was found between the education level and gender of consumers for the slaughter process. However, in our study, there was no statistical difference between the perception of transportation and health conditions, which including slaughter, and the gender and educational status of the consumers.

Table 9. Perception of animal welfare by age groups

	Hypothesis	Analysis unit	n	X	SS	Sd	F	P
Farmers	H6a	<=30	117	3,9	0,646	0,059	5,331	0,006*
		31-45	22	3,6	0,613	0,130		
		>45	12	4,3	0,531	0,153		
	H6b	<=30	117	3,7	0,795	0,073	1,467	0,234
		31-45	22	3,6	0,643	0,137		
		>45	12	4,0	0,598	0,172		
	H6c	<=30	117	2,1	1,304	0,120	1,962	0,144
		31-45	22	1,5	0,678	0,144		
		>45	12	1,9	1,259	0,363		
	H6d	<=30	117	4,4	0,596	0,055	0,265	0,768
		31-45	22	4,4	0,450	0,096		
		>45	12	4,5	0,442	0,127		
	H6e	<=30	117	4,5	0,530	0,049	0,120	0,887
		31-45	22	4,5	0,765	0,163		
		>45	12	4,6	0,539	0,155		
Consumers	H6a	<=30	123	3,8	0,355	0,032	1,650	0,196
		31-45	21	3,7	0,268	0,058		
		>45	6	4,0	0,575	0,235		
	H6b	<=30	123	3,6	0,401	0,036	0,854	0,428
		31-45	21	3,6	0,300	0,065		
		>45	6	3,8	0,638	0,260		
	H6c	<=30	123	1,3	0,568	0,051	0,818	0,443
		31-45	21	1,4	0,809	0,176		
		>45	6	1,5	0,697	0,274		
	H6d	<=30	123	4,3	0,452	0,040	1,540	0,218
		31-45	21	4,1	0,569	0,124		
		>45	6	4,5	0,509	0,207		
	H6e	<=30	123	4,8	0,231	0,020	1,550	0,216
		31-45	21	4,7	0,516	0,112		
		>45	6	4,9	0,326	0,133		

There is a statistical difference at the *1%, **10% significance level.

78% of farmers were under 30 years, 15% of them were between 31-45 years, and 7% of them were over 45 years old. Farmers under the age of 30 and over the age of 45 had higher perceptions of housing conditions for animal welfare ($p=0.006<0.01$). There was no significant difference between the age of the farmers and other animal welfare perceptions (Table 9).

82% of consumers were under 30 years old, 14% of them were between 31-45 years, and 4% of them were over 45 years old. No statistically significant difference was found between the age of consumers and their perceptions of animal welfare (Table 9).

CONCLUSIONS

75,5% of the farmers and 76,0% of consumers have heard of the concept of animal welfare before. There was a high perception of animal welfare in both groups. However, as the size of sheep farms increases, animal welfare, housing conditions, transportation and physical health and wellbeing conditions decrease. According to the findings, the public's opinion of animal welfare was not yet fully established, and there were gaps and inadequacies in understanding the concept. In order to raise awareness about animal welfare and its significance, it was necessary to promote animal welfare as well as capacity building activities for farmers. While there was no difference in farmer perceptions of animal welfare based on gender or education level, individuals aged at 30-45 have lower perceptions of animal welfare. For this reason, an incentive grant should be provided to young farmers for capacity building and to farmers over 45 years of age who have gained certain experience to increase their capacity. Sustainable sheep breeding will be supported by transferring the incentive resources allocated to sheep breeding in Turkey to producers with a high perception of fan welfare.

It has been determined that there was no significant difference between sheep farmers and consumers and their perceptions of animal transportation and physical health. Yet, farmers' perceptions of housing conditions, wellbeing, nutritional conditions and animal handling were found significant. We conclude that consumer perceptions of animal welfare were lower than those of farmers. While there was no statistical difference between the age of consumers and animal welfare, a difference between gender and education levels has been determined. Awareness of animal welfare ought to be created at the citizen level, regardless of the target age group.

It was anticipated that research into topics such as animal welfare in terms of economic and sustainability at the farm level, the proclivity of consumers to buy labeled products produced with animal welfare considerations, and their willingness to pay will contribute to the development efficient and applicable policies on welfare in the coming years.

Conflict of Interest Statement

The authors have declared that there is no competing interest.

Authors' Contributions

All authors have equally contributed.

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Appendix 1. Issues that farmers and consumers care about animal welfare (mean)

No	Issues	Farmers	Consumers
1	m^2 area per sheep in the shelter	4,03	3,81
2	Air quality inside the shelter	4,30	4,15
3	There are sections in the shelter where the sheep will be able to rest sufficiently.	3,91	3,83
4	Having enough area in and around the shelter for sheeps	3,99	3,75
5	Area for animals to roam and graze outside of the shelter	4,20	3,83
6	Comfort level of shelters	4,32	4,08
7	Presence of shaded areas in and around the shelter where the animals can feel comfortable	3,85	3,79
8	Temperature inside the shelter	3,95	3,81
9	Lighting level inside the shelter	4,39	4,21
10	Litter type	3,68	3,59
11	Size of animal groups in the shelter	4,18	4,02
12	Group sheltering of animals in the shelter	3,57	3,67
13	Presence of functional areas inside the barn	3,89	4,02
14	Flock size	3,75	3,76
15	Excessive noise in or around the barn	4,33	4,09
16	The effect of daylight on the ability of sheep to engage in natural behavior	3,74	3,77
17	Finding a natural, authentic environment for sheep	3,55	3,73
18	Social behavior of sheep in or around the shelter	3,93	3,67
19	Sheeps giving birth on their own	3,82	3,65
20	Sexual behavior tendencies of sheep	3,89	3,62
21	The effect of increased natural growth rate on the ability to	3,68	3,55

	engage in natural behavior in sheep.		
22	The freedom of sheep in the barn, around the barn and in pasture areas	3,89	3,61
23	The effect of exploratory behavior in sheep on the ability of sheep to engage in natural behavior	3,54	3,39
24	Grazing behavior in sheeps	3,87	3,65
25	Animal health	4,18	3,93
26	The effect of maternity behaviors on the ability of sheep to engage in natural behaviors	4,20	4,09
27	Hygiene in the barn	4,23	4,34
28	Methods of treatment with drugs applied on sheep	4,71	4,65
29	A painless and stress-free slaughtering	3,86	3,97
30	The effect of sheeps' communication with each other on the level of their natural behavior	3,95	4,28
31	Thirst condition of sheeps during transport	2,23	1,58
32	Length of transportation time	3,56	3,59
33	The effect of applying preventive treatment methods to sheep on the health level of sheep	3,46	2,75
34	Negative effect of high mortality rate in the flock in sheep	3,98	3,91
35	Pozitive effect of low mortality rate in the flock in sheep	3,76	3,83
36	The effect of life expectancy on animal health in sheep	3,93	3,69
37	Stunning the sheep with electroshock during slaughter	3,50	3,59
38	Handling methods in slaughterhouses	2,90	3,41
39	A calm and slow transport	3,97	4,09
40	Animal handling during transport and slaughter	3,66	3,65
41	Temperature of the transport vehicle	3,64	3,56
42	Number of sheep in transport	3,83	3,66

43	Transportation time	3,90	3,77
44	The presence of space inside the transport vehicle	3,62	3,63
45	Hunger status of animals during transportation	3,72	3,61
46	Keeping different types of animals in the transport vehicle during the transportation period of the sheeps	4,32	4,19
47	Infrastructure of the slaughterhouse	4,33	4,07
48	Keeping water in the barn	4,71	4,71
49	Keeping feed in the barn	4,64	4,61
50	Feeding the sheep in the barn at the same time	2,93	1,13
51	Feeding with growth hormone	4,54	4,21
52	Inflicting pain on sheep by humans	2,29	1,23
53	Stress in sheeps	1,02	0,22
54	Keeping various feeds in the barn	1,05	0,22
55	Fear in sheeps	1,25	0,24
56	Respect for sheep	1,51	0,36
57	Experienced shepherds taking care of sheep	1,61	0,36
58	Frequent control of sheep in the shelter	4,64	4,93
59	Establishment of farmer-sheep bond	4,81	4,94
60	Signs of tiredness in sheep	4,64	4,92
61	Distraction in sheeps	4,72	4,90
62	Taking care of sheep in the barn, its surroundings and pasture areas	4,72	4,90