

Animal welfare practices in livestock farms from the perspective of veterinarians: Northeast Anatolia region in Türkiye

P. Ayvazoğlu Demir^{1#}, A. Koç Gültekin²

¹ Department of Livestock Economics and Management, Faculty of Veterinary Medicine, Kırıkkale University, Kırıkkale, Türkiye

² Department of Veterinary History and Deontology, Faculty of Veterinary Medicine, Adnan Menderes University, Aydın, Türkiye

(Submitted 27 June 2024; Accepted 13 August 2024; Published 30 September 2024)

Copyright resides with the authors in terms of the Creative Commons Attribution 4.0 South African Licence.

See: <http://creativecommons.org/licenses/by/4.0/za>

Condition of use: The user may copy, distribute, transmit and adapt the work, but must recognise the authors and the South African Journal of Animal Science.

Abstract

The aim of this study was to determine the opinions of veterinarians providing clinical services in the northeast Anatolia region regarding the compliance of enterprises in the region with animal welfare standards. A survey was sent to veterinarians working in the region, and 82 participants provided feedback on a voluntary basis. The survey questions were designed using the principles of "Animal Welfare" and the "Animal Needs Index," and the prepared questionnaire consisted of five main headings: "good nutrition, good shelter, appropriate behaviour, good care, and good health." Closed-ended questions were used with a five-point Likert scale to determine the views of veterinarians and thoughts on practices related to animal welfare in the region. According to the perceptions of veterinarians, enterprises in the region were considered "somewhat appropriate" in terms of animal welfare criteria for care, feeding, animal behaviour, and health practices. However, it was observed that enterprises were not compliant with animal welfare criteria in terms of shelter flooring, bedding, ventilation, appropriate rations, silage use, body-udder hygiene, vaccine-parasite-drug-herd management, and some diseases. It was determined that a substantial portion of livestock enterprises in the region faced difficulties in implementing animal welfare criteria. In this context, it is believed that addressing the current deficiencies of enterprises, increasing support and incentives to enhance animal welfare, and providing technical assistance to breeders will help overcome the challenges. It is important for veterinarians to inform and guide breeders regarding animal welfare practices within the framework of the breeder–veterinarian relationship.

Key words: animal welfare, animal needs index, livestock enterprises, veterinarian, Türkiye

Corresponding author: pinardemir@kku.edu.tr

Introduction

Animal welfare is a topic that concerns all areas and individuals related to animals, and it is derived from the philosophy of animal rights and animal protection (Savaş *et al.*, 2009). Animal welfare briefly refers to the state where animals do not experience emotions such as "pain, fear, stress, anxiety" and it means the absence of conditions that would negatively affect animal life (Rowan, 1997).

Animal welfare has become an important sustainability criterion for international organizations and is based on the Brambell Report, formed in response to poor living standards for animals in 1964 (Birbeck, 1991). After the Council of Europe's decision in 1979 regarding the slaughter and killing of animals, interest in the welfare of farm animals increased, and in the early 1990s, regulations were made regarding animal experiments, animal transportation, and the welfare of farm animals (İzmirli & Yaşar, 2006). Nowadays, it has become mandatory to establish optimum conditions for animals raised for food purposes. In Turkey, it has come to the agenda especially within the framework of

harmonization laws with the European Union acquis (Özgür, 2007). The fundamental basis of animal welfare in Turkey was established by the "Animal Protection Law"^a enacted in 2004, and in 2011, the "Regulation on the Welfare of Farm Animals"^b was published.

In recent years, important studies examining the effects of animal welfare practices on animal health and productivity in farm animals, as well as their economic and ethical aspects, have attracted attention (Bennett and Blaney, 2003; McInerney, 2004; Rollin, 2004; Fraser, 2008; Vetter *et al.*, 2014; Grethe, 2017). In Turkey, Sert & Uzmay (2017) reported that it was possible to both improve the living conditions of animals and improve economic gain with animal welfare practices. They also stated that these practices could make substantial contributions to environmental and social sustainability.

Surveys on animal welfare in Turkey also show that there is a high level of public support for animal-friendly practices in animal husbandry (İzmirli & Yaşar, 2010; Turan, 2019; Çakmakçı, 2020). These findings underscore the growing societal awareness and sensitivity towards animal welfare issues in the country (Özen *et al.*, 2004; Akın *et al.*, 2020; Arslan and İlgili, 2022).

Furthermore, the concept of animal welfare has gained importance in Turkey's veterinary education with the development of curricula emphasising the 'Five Freedoms' standard, a widely-accepted framework for assessing and ensuring the welfare of animals (Gürler, 2007). This shift in educational focus reflects the growing recognition of the importance of animal welfare among the veterinary community and the public.

Recently, sensitivity to animal welfare has become an important factor in veterinary practice. Veterinarians serving farm animals can closely observe 'animal welfare practices.' In this context, the aim of this study was to determine the opinions of veterinarians providing clinical services in the northeastern Anatolia region, which ranks first in terms of livestock population in Turkey with 1.395 million (8.5%) bovine animals according to the data of the Turkish Statistical Institute (TSI, 2023), on the compliance of livestock enterprises in the region with animal welfare standards.

Materials and Methods

Kırıkkale University Non-Interventional Clinical Research Ethics Committee approved the present study (Protocol No. 2024.05.20).

The material of this study consisted of data obtained from questionnaire survey conducted with veterinarians providing clinical services in the northeast Anatolia region of Turkey (Kars, Ardahan, Iğdır, and Ağrı provinces) who volunteered to participate (informed consent obtained). According to information obtained from the Kars and Erzurum Veterinary Chambers, a total of 176 veterinary clinics were determined to be in the region. The sample size for the study was determined as 63 individuals with a 10% margin of error and a 95% confidence interval (Raosoft, 2023). A total of 82 veterinarians participated in the voluntary survey, with 27 from Kars, 21 from Ardahan, 20 from Iğdır, and 14 from Ağrı province. The survey was conducted between September 15 and October 1, 2023.

In the literature review conducted, it was determined that there was a wide variation in the methods and criteria for "welfare assessment," and animal welfare is measured by various methods, including walking score, animal observation, technical tests, emotional state (Bozkurt, 2016; Sert, 2019; Ceco, 2022). However, in this study, the declarations of the veterinarians working in the region were primarily considered rather than these criteria. The survey questions were structured using the widely-accepted "Animal Welfare" principles and the "Animal Needs Index" (HIE 35 L) (Bartussek, 2001; Welfare Quality, 2009).

In the survey form, the "Animal Welfare Perception Scale" was constructed from five categories. This scale consists of a total of 28 sub-items under five main headings: "good nutrition, good shelter, appropriate behaviour, good care, and good health" (Bartussek, 2001; Welfare Quality, 2009). Closed-ended questions with a five-point Likert-type scale were used to determine the thoughts of enterprises in the region regarding their animal welfare practices. In scoring, 1.0–1.9, animal welfare conditions in enterprises were "not suitable"; 2.0–2.4, welfare conditions in enterprises were 'rarely suitable'; 2.5–3.0, enterprises were 'somewhat suitable' for welfare conditions; 3.1–4.0, enterprises were "suitable" for welfare conditions; and 4.1–5.0, enterprises considered "very suitable" for welfare conditions.

In the second phase of the research, factor analysis was conducted to identify the key factors determining the attitudes of enterprises towards animal welfare practices in the region. Cronbach's

^a Official Gazette, Date: 01.07.2004, No: 5199, No: 25509, Animal Protection Law

^b Official Gazette, Date: 23.12.2011, No: 28151, Regulation on the Welfare of Farm Animals

alpha (α) coefficient was used in reliability analysis to determine construct validity. The suitability of the factor analysis was evaluated with Bartlett's sphericity test, and the adequacy of the sample size was evaluated using the Kaiser-Meyer-Olkin (KMO) statistic. If the KMO coefficient was above 0.60 and the Bartlett test was significant, it was assumed that the data would be suitable for factor analysis and sufficient for the sample size (Field, 2005). The items of the developed scale were determined using the Varimax rotation method. Furthermore, the differences in practices according to provinces were determined using Pearson chi-square analysis. SPSS 22 (SPSS Statistics for Windows, Version 22.0) statistical package program was used for data evaluation.

Results and Discussion

Currently, veterinarians are expected to be effective and competent not only in diagnosing and treating diseases but also in issues related to herd management, food safety, and animal welfare. The World Organisation for Animal Health (OIE) states that veterinarians should be 'leading advocates for the welfare of all animals' (Endenburg *et al.*, 2020). Veterinarians have the authority to observe animal welfare practices directly and to guide producers.

In the reliability analysis conducted to measure the attitudes of dairy cattle enterprises in the northeast Anatolia region of Turkey towards animal welfare practices, a Cronbach's alpha of 0.83 was found. Due to the high reliability of the scale developed, no question was removed from the survey form. In the factor analysis conducted, the construct validity value was determined as 70.01%. The Kaiser-Meyer-Olkin (KMO) and Bartlett's tests were conducted to assess the applicability of the factor analysis to the sample (Table 1).

Table 1. KMO and Bartlett Test parameters

Kaiser-Meyer-Olkin measure of sampling adequacy		0,797
Bartlett's test of sphericity	approx. chi-square	508,422
	sig.	0,000

Kaiser-Meyer-Olkin (KMO) was calculated as 0.797, and the chi-square value of Bartlett's test was 508.422 ($P < 0.001$). Based on these values, it was concluded that the sample size was sufficient and the data were suitable for further analysis. Subsequently, in the factor analysis, the questions were clustered into five factors (F1 = shelter, F2 = nutrition, F3 = care, F4 = social interaction and behaviour, F5 = health), and these five factors explained 79.7% of the total variance.

In this study, the criteria used to evaluate animal welfare were adapted from the Animal Needs Index and the principles of Animal Welfare. The responses to the questions and the calculated scores are provided in Table 2.

In the study, it was determined that 31.7% of livestock farms in the northeast Anatolia region of Turkey had a closed free-range system, 57.3% had a closed tethered system, and 11.0% had a semi-open barn system. When the criteria for evaluating the overall conditions of the barns in the region in terms of animal welfare under the category of 'good shelter' were examined by veterinarians, it was found that the shelters were not suitable for animal welfare conditions in terms of sufficient space per animal, bedding usage, floor condition, and adequate daylight in the barns, with ventilation being 'rarely appropriate' (Table 2). Chi-square analysis revealed that the differences in sufficient space per animal, bedding usage, floor condition, and adequate daylight in the barns among the provinces were not statistically significant ($P > 0.05$).

One of the most important factors limiting animal welfare is inappropriate shelter environments. In a study conducted with veterinarians, it was determined that the shelters on livestock farms in the northeast Anatolia region did not provide optimum conditions and were rarely suitable for animal welfare. Consistent with this finding, studies conducted in Turkey have reported that shelter problems rank among the top three welfare issues for farm animals (İzmirli and Yaşar, 2010; Şeker *et al.*, 2011). The majority of the barns in the region have traditional structures, constructed from local materials, and are old and simple (Demir *et al.*, 2014). Therefore, improving the living spaces of animals in the region will substantially increase animal welfare.

Table 2. Evaluation criteria and scores related to animal welfare

Criteria	Not suitable (%)	Rarely suitable (%)	Somewhat suitable (%)	Suitable (%)	Very suitable (%)	Avg. score	Total points	
Good shelter	sufficient space per animal	37,8	12,2	42,6	3,7	3,7	2,2	183
	use of underlay	53,7	32,9	11,0	2,4	-	1,7	135
	adequate ventilation	29,3	24,4	23,2	17,1	6,1	2,5	202
	sufficient daylight	24,4	32,9	29,3	12,2	1,2	2,3	191
	ground condition	22,0	35,4	26,8	14,6	1,2	2,4	195
Good Nutrition	access to adequate food	23,6	22,0	42,7	7,3	4,4	2,5	201
	access to sufficient water	29,3	24,4	23,2	17,1	6,1	2,5	202
	feeding environment	14,6	32,9	41,5	9,8	1,2	2,5	205
	suitable ration	34,1	26,8	34,1	4,9	0,0	2,1	172
	use of roughage	19,5	29,3	32,9	13,4	4,9	2,6	209
	use of silage	32,9	34,1	24,4	8,50	0,0	2,1	172
	use of vitamin–minerals	34,1	41,5	18,3	4,90	1,2	2,0	165
Behaviour	use of a lick block	12,2	40,2	28,0	12,2	7,30	2,6	215
	species-specific behaviour	7,3	15,9	31,7	30,5	14,7	3,3	270
	access to pasture	0,0	0,0	8,5	12,2	79,3	4,7	386
	social grouping (age, gender)	7,2	16,8	30,7	31,6	13,7	3,3	271
	carer–animal relationship	7,3	22,0	24,4	30,5	15,8	3,4	277
Good Care	maintenance conditions	23,2	32,9	37,8	6,1	0,0	2,3	186
	body condition	13,4	31,7	42,7	12,2	0,0	2,5	208
	body cleansing	22,0	35,4	26,8	14,6	1,2	2,4	195
	regular breast cleaning	41,5	29,3	19,5	9,8	0,0	2,0	165
	Instrument/equipment hygiene	34,1	36,6	23,2	6,1	0,0	2,0	165
	feeder–drinker hygiene	36,6	30,5	26,8	6,1	0,0	2,0	166
Good Health	use of regular vaccination	30,5	26,8	24,4	12,2	6,1	2,4	194
	antiparasitic vaccination	22,0	28,0	26,8	17,1	6,1	2,6	211
	herd management	48,8	23,2	22,0	4,9	1,2	1,9	158
	general health status	7,3	19,5	23,2	39,0	11,0	3,3	268

Animals are mostly kept tied in barns, which restricts their movement and causes stress, thus reducing their welfare level. This situation is consistent with findings from other studies (Demir *et al.*, 2014; Şahanoğlu and Koçak, 2014; Aydın *et al.*, 2016; Ceco, 2022). Tethering of animals in barns is more common in eastern regions of Turkey; another study reported that this practice negatively affects animal welfare in Asian and African countries in particular (Endenburg *et al.*, 2020).

The floor of the farms and the bedding used are factors that determine not only the quality of life and health of animals but also their behaviour and motivation (Yaşar *et al.*, 2004). Buenger *et al.* (2001) reported in a study that the type of bedding had a positive effect on animal productivity. Lameness is substantially decreased in barns with straw-covered floors (Sert, 2019). While ideal bedding is important for animal welfare and reducing hoof and udder diseases and increasing profitability, in the current study, the use of bedding categorized as 'good shelter' in the region received lower scores compared to other criteria and was not suitable for animal welfare.

The ventilation of the barn, which is one of the components of animal shelter conditions, is a critical factor for animal health and welfare, as it can lead to various diseases, especially respiratory diseases. In this study, although ventilation, evaluated under the category of good shelter, received the highest score of 2.5 points in the group, the shelters in the region rarely met the criteria for animal welfare. Other studies in the region have reported numerous deficiencies in more traditional barn structures, emphasizing the need for improvement/modernization of shelters regarding lighting, flooring, bedding use, and ventilation (Bakır, 2002; Aydın *et al.*, 2016; Güler *et al.*, 2017).

When the nutritional status of animals in the farms was evaluated in terms of animal welfare under the category of 'good nutrition,' it was found that the conditions of the farms were 'not suitable' in terms of vitamin–mineral supplementation for animals, provision of silage feed, and preparation of appropriate rations, whereas they were 'somewhat suitable' in terms of adequate access to food and water, feeding environment, and use of roughage and lick blocks (salt) (Table 2). Statistical analysis showed that the differences in the criteria under the good nutrition category among the provinces were

not statistically significant ($P > 0.05$). Adequate feeding with the right ration is directly reflected in overall welfare, behaviour, body condition, milk production, reproductive performance, and resistance to diseases. Arslan and Tufan (2018) reported in their study conducted in Kars province that farms feeding animals with traditional methods did not encounter serious problems with feeding; they provided salt to their animals in the form of lick blocks, but the use of vitamin–mineral blocks was found to be insufficient.

In Table 2, under the category of 'Appropriate Animal Behaviour,' when the behaviour and relationship status of animals on farms was evaluated in terms of animal welfare, it was found that grouping of animals based on their social status (age, gender), species-specific behaviour, access to pasture, and the caretaker's treatment of the animals were 'appropriate.' In this context, it was determined that farms were suitable in terms of animal welfare for animals to exhibit species-specific behaviour, access pasture, and receive good treatment from the caretaker.

In animal welfare, behavioural needs are considered as important as physiological needs such as feeding and shelter. In animal welfare, how animals communicate, socialize with each other, interact with their environment, and their behaviour are of great importance in terms of the animal's quality of life and health (Wemelsfelder and Lawrence, 2001; Marchant-Forde, 2015). Animals raised in the region were suitable for welfare criteria in terms of species-specific behaviour, social grouping, caregiver-animal relationship, and access to pasture. Demir *et al.* (2013) and Ceko (2022) reported in their studies conducted in the region that animals used the pasture for long periods except in the winter months (12 hours or more per day) and that animals of the same age and gender were kept in the same shelter but in different sections where they could see each other.

In Table 2, under the category of 'good care,' when the care conditions of animals in the farms were evaluated in terms of animal welfare, it was found that they were 'rarely appropriate' in terms of feed trough and water trough hygiene, equipment hygiene, regular udder cleaning before milking, and milking machine usage, whereas they were 'somewhat appropriate' in terms of animal body cleanliness and condition.

In animal welfare, caregivers play an important role in meeting the physical, emotional, and social needs of animals. Incorrect and poor practices can lead to fear and stress in animals (Wemelsfelder & Lawrence, 2001). The approaches of caregivers to animals were in line with welfare criteria. However, caregivers need to be knowledgeable and trained in animal health and welfare to provide care and feeding according to the age and condition of the animals, ensure a hygienic environment for the animals, and maintain and clean equipment and tools, which is important for productivity and welfare in farms (Kauppinen *et al.*, 2012). Farms were 'rarely suitable' for welfare criteria regarding body and udder cleanliness, equipment, and feed and water trough cleanliness. Ceko (2022) reported that the cleanliness of animals was inadequate in terms of welfare. The overall health status of animals on farms was deemed 'appropriate' in terms of animal welfare under the category of 'good health,' whereas regular use of antiparasitic drugs was 'somewhat appropriate,' regular vaccination practices were 'rarely appropriate,' and the herd management practices were 'insufficient' (Table 2). Analysis revealed that the differences in good health practices among provinces were not statistically significant ($P > 0.05$).

The overall health status of animals in the region was determined to be 'adequate' in terms of animal welfare, but regular vaccination, parasite control, and herd management practices were reported to be 'insufficient'. This situation is related to the traditional production practices of the farms in the region and the low educational level of the breeders, which is consistent with other study findings (Demir *et al.*, 2014).

The disease rates and rankings most commonly encountered by veterinarians in the farms in the region who participated in the study are presented in Table 3.

Table 3. Most commonly encountered diseases by veterinarians in the farms

Disease incidence rate	Disease incidence rate					Ranking
	0–20%	20–40%	40–60%	60–80%	80–100%	
Fertility problems (infertility, difficult labour, abortion)	17,1	13,4	47,6	15,8	6,1	1
Respiratory diseases	11,0	29,3	41,5	13,4	4,8	2
Calf diarrhoea	9,2	32,8	39,6	12,5	5,9	3
Mastitis	34,1	11,0	37,8	12,2	4,9	4
Metabolic diseases	7,3	39,0	40,2	9,8	3,7	5
Laminitis	11,0	42,6	39,0	3,7	3,7	6
Other (infection, injury, poisoning)	13,0	41,7	38,2	6,3	0,8	7

The most important determinant of animal welfare is the diseases observed in animals. There is an inverse relationship between animal welfare and disease. Regular examinations for foot diseases, mastitis, body condition, and clinical illnesses are important for production performance and animal welfare (Akbaş, 2010). The most common diseases encountered by the veterinarians in the farms they visited were fertility problems, respiratory tract infections and diarrhoea in calves, followed by mastitis, metabolic diseases and laminitis, respectively (Table 3). Diarrhoea in calves, which occurs as a result of the weakening of the immune system and deterioration of the general health status of the animal due to inadequate care and nutrition especially after birth, was one of the most common diseases in the region, causing substantial economic losses with high morbidity and mortality rates (Demir *et al.*, 2019). Similarly, inadequate care and nutrition of the cow after birth leads to mastitis, metritis, and metabolic diseases. The herd management practices of livestock farms in the region were deemed inadequate. The frequent occurrence of respiratory tract infections in the region can be associated with long winter colds, as well as the animals drinking cold water, and the indoor environment being humid, damp, airless, and dark in the barns (Demir and Bozukluhan, 2012; Arslan and Tufan, 2018).

According to the veterinarians, the farms in the region were 'somewhat suitable' for animal welfare criteria such as care, feeding, animal behaviour, and health care, which are fundamental criteria in the Brambell Report and the Universal Declaration of Animal Rights. However, it was observed that the farms were not/rarely suitable for animal welfare criteria in terms of shelter flooring-bedding, ventilation, appropriate ration, silage use, body-udder hygiene, vaccination-parasite-drug-herd management, and diseases. This situation is similar that of other studies (Akbaş, 2010; Şahanoğlu & Koçak, 2014; Sert, 2019; Mutlu, 2021; Ceco, 2022). Despite legal regulations related to animal rights and welfare^{c,d} being enacted in Turkey in the 2000s, it was determined that animal welfare practices in the region where the study was conducted were not at the desired level. It is believed that the existing deficiencies in practices can be overcome by making the inspection system more active, increasing supportive measures and incentives to enhance animal welfare, and providing technical support to the breeders.

Conclusions

In conclusion, animal welfare practices in livestock farms not only preserve the physical and mental health of animals but also contribute to the economic sustainability of the enterprises and enable consumers to access healthier and higher-quality products. While ensuring animal welfare criteria in livestock farms initially leads to extra costs, in the long term, it increases profitability at the micro level with the increase in production and efficiency, and at the macro level, it enhances national and international trade of animal products and competitiveness. In this context, promoting and monitoring animal welfare practices, as well as informing and guiding breeders about animal welfare practices by the veterinarians who are the subject of this study, are of great importance.

Acknowledgements

This study has not been supported by any institute or foundation.

^c Official Gazette, Date: 11.06.2010. No: 5996, No: 27610, Veterinary Services, Plant Health, Food and Feed Law

^d Official Gazette, Date: 13.12.2011. Issue: 28141, Used for Experimental and Other Scientific Purposes Regulation on the Welfare and Protection of Animals

Authors' contributions

PAD (ORCID: 0000-0002-7010-0475) methodology, analysis, writing, review; AKG (ORCID: 0000-0003-0856-9069) article idea, writing; review, editing

Conflict of interest declaration

The authors declare that they have no conflicts of interest relative to the content of this paper.

References

- Akbay, A.H., 2010. Accordance of Dairy Farm in Tekirdağ Province to Animal Welfare. Master's thesis, Namık Kemal University, Institute of Natural and Applied Sciences, Tekirdağ.
- Akin, A.C., Arikan, M.S., Çevrimli, M.B., 2020. Effect of import decisions in Turkey on the red meat sector. *Veterinary Journal of Mehmet Akif Ersoy University*, 5(2), 83–89.
- Arslan, M., Ilgili, Ö., 2022. Türkiye'de hayvan hakları ve refahı kavramlarının biyoetik yönüne değinen lisansüstü tezler: Nitel araştırma. *Veteriner Hekimler Derneği Dergisi*, 93(2), 133–150.
- Arslan, C., Tufan T., 2018. Winter feeding principles of dairy cows in Kars province. *Atatürk Üniv. Vet. Bil. Derg.* 13 (3), 355–363. DOI:10.17094/ataunivbd.410568
- Aydın, R., Güler, O., Yanar, M., Diler, A., Koçyiğit, R., Avcı M., 2016. A study on the characteristics of the barns in hınıs county of Erzurum province. *KSÜ. Doğa Bilimleri Derg.*, 19 (1), 98–111, DOI: 10.18016/ksujns.16383
- Bakır, G., 2002. The structural situation of the private dairy cattle farms in Van province. *Yuzuncu Yıl University. J Agric Sci.* 12(2), 1–10.
- Bartussek, H., 2001. Animal needs index for laying hens ANI 35L/2001 - laying hens. Federal Research Institute for Agriculture in Alpine Regions BAL Gumpenstein, Irdning, Austria, 2001. <https://bartussek.at/wp-content/uploads/2020/09/anilayinghens.pdf>. Access Date: 06.06.2023.
- Bennett, R. M., Blaney, R. J., 2003. Estimating the benefits of farm animal welfare legislation using the contingent valuation method. *Agric Econ.* 29(1), 85–98.
- Birbeck, R. A., 1991. European perspective on farm animal welfare. *JAVMA.* 198 (8), 1377–1380.
- Bozkurt, Z., 2016. Scientific approaches for on-farm animal welfare assessment. *Kocatepe Vet. Derg.*, 9(3), 236–246.
- Buenger, A., Ducrocq, V., Swalve H.H., 2001. Analysis of survival in dairy cows with supplementary data on type scores and housing systems from a region of northwest Germany. *J. Dairy Sci.* 84, 1531–1541.
- Çakmakçı, Y., 2020. Çeşitli gıda ürünlerinin pazarlamasında kullanılan çevre dostu kavramlar üzerine tüketici algısının belirlenmesi (Tekirdağ/Süleymanpaşa örneği). Master's thesis, Tekirdağ Namık Kemal Üniversitesi.
- Ceco, A., 2022. Evaluation of Animal Welfare in Terms of Shelter and Breeding Conditions in Dairy Farms in Kars Province. Master's thesis, Kafkas University, Institute of Health Sciences, Kars.
- Demir Ayvazoğlu, P., Aydın, E., Ayvazoğlu, C., 2019. Estimation of the economic losses related to calf mortalities Kars province, in Turkey. *Kafkas Üniv.Vet. Fak. Derg.*, 25(3), 283–290.
- Demir, P., Adıgüzel Isık, S., Sarı, M., Ayvazoğlu, C., 2014. The general structure and economic dimension of dairy cattle farms at central district in Kars province. *F. Ü. Sağ. Bil. Vet. Derg.* 28(1), 9–13.
- Demir, P., Elmalı A. D., Işık, S., Tazegül, R., Ayvazoğlu C., 2013. The economical importance of feed usage and animal feeding attitudes in dairy cattle husbandry in Kars province. *Atatürk Üniv. Vet. Bil. Derg.* 8(3), 229–236.
- Endenburg, N., Takashima, G., Van Lith, H. A., Bacon, H., Hazel S. J., Jouppi R., Lee N. Y. P., Seksel, K., Ryan S., 2020. Animal welfare worldwide, the opinion of practicing veterinarians. *J Appl Anim Welfare Sci.* 24, 215–237. <https://doi.org/10.1080/10888705.2020.1717340>
- Field, A., 2005. *Discovering Statistics using SPSS.* London, SAGE.
- Fraser, D., 2008. Understanding animal welfare. *Acta Veterinaria Scandinavica*, 50(Suppl 1), S1.
- Gürler, A. M., 2007. Animal welfare education in Turkey. *J Vet Med Educ. Medical Education*, 34(5), 633–638.
- Güler, O., Aydın, R., Diler, A., Yanar, M., Koçyiğit, R., Maraşlı A., 2017. A research on SCI. 27(3), 396–405.
- Grethe, H., 2017. The economics of farm animal welfare. *Ann Rev Res Econ.* 9(1), 75–94.
- IBM Corp., 2017. *IBM SPSS Statistics for Windows, Version 22.0.* Armonk, NY: IBM Corp.
- İzmirli, S., Yaşar A., 2006. Veteriner Hekimliği Etiği- Hayvan gönenci (Refahı) ilişkisi. *Vet. Bil. Derg.*, 22 (3-4), 25–29.
- İzmirli, S., Yaşar, A., 2010. A survey on animal welfare attitudes of veterinary surgeries, veterinary students, animal owners and society in Turkey. *Kafkas Üniv. Vet. Fak. Derg.* 16 (6), 981–985.
- Kauppinen, T., Vesela, M.K., Valros, A., 2012. Farmer attitude toward improvement of animal welfare is correlated with piglet production parameters. *Livest Sci.* 143, 142–150.
- Marchant-Forde, J. N., 2015. The science of animal behaviour and welfare: Challenges, opportunities and global perspective. *Front Vet Sci.* 2, 16. <https://doi.org/10.3389/fvets.2015.00016>
- McInerney, J., 2004. Animal welfare, economics and policy. Report on a study undertaken for the Farm & Animal Health Economics Division of Defra, 68.
- Mutlu, M., 2021. The Effects of Some Environmental Factors on Animal Welfare in Different Sized Dairy Cattle Farms. Doctoral thesis, Afyon Kocatepe University, Institute of Health Sciences, Afyon.
- Özen, A., Ozturk, R., Yasar, A., Armutak, A., Basagac, T., Ozgur, A., Şeker, I., Yerlikaya, H., 2004. An attitude of veterinary practitioners towards animal rights in Turkey. *Veterinární Medicína.* 49(8), 298–304.
- Özgür, A., 2007. Hayvan gönenci açısından Türkiye'de veteriner hekimlik ile ilgili mevzuatın değerlendirilmesi. *Vet. Hek. Der. Derg.* 78, 45–48.
- Rollin, B. E., 2004. Animal agriculture and emerging social ethics for animals. *J Anim Sci.* 82(3), 955–964.

- Rowan, A., 1997. The concept of animal welfare and animal suffering, animal alternatives, welfare and ethics. L.F.M van Zutphen and M. Balls, editors. pp:157–167, Published: Elsevier Science B.V., Amsterdam.
- Raosoft, 2023. Sample Size Calculator by Raosoft. Inc. Raosoft.com. Available online: <http://www.raosoft.com/samplesize.html> (accessed on 08.02.2023).
- Savaş, T., Yurtman, İ. Y., Tölü, C., 2009. Animal rights and animal welfare: Philosophical view – Objective pursuit, *Hayvansal Üretim*. 50 (1), 54–61.
- Sert, H., 2019. Süt sığırcılığında hayvan refahı ekonomisinin analizi ve tarım politikaları açısından değerlendirilmesi: İzmir ili örneği. Master's thesis, Ege Institute of Natural and Applied Sciences, İzmir.
- Sert, H., Uzman, A., 2017. Dünya'da hayvan refahı uygulamalarının ekonomik ve sürdürülebilirlik açısından değerlendirilmesi. *Adnan Menderes Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 4(4), 263–276. <https://doi.org/10.30803/adusobed.353373>
- Şahanoğlu, E., Koçak, S., 2014. Evaluation of animal welfare conditions in terms of barns and husbandry practices in dairy cattle enterprises of Afyonkarahisar province. *Lalahan Hay. Araşt. Enst. Derg.* 54(2), 47–55.
- Şeker, İ., Özen, A., Güler, H., Şeker, P., Özden, İ., 2011. Red meat consumption behaviour in Elazığ and consumers' opinion in animal welfare. *Kafkas Üniv. Vet. Fak. Derg.* 17 (4), 543–550.
- Turan, Ö., 2019. Büyükbaş ve kanatlı hayvan yetiştiriciliğinde olası hayvan refahı uygulamalarına yönelik tüketici tercihlerinin belirlenmesi üzerine bir araştırma. Doctora thesis, Uludağ University, Bursa.
- Turkish Statistical Institute (TŞİ), 2023. Livestock statistics. Access: www.tuik.gov.tr
- Vetter, S., Vasa, L., & Ózsvári, L., 2014. Economic aspects of animal welfare. *Acta Polytechnica Hungarica*, 11(7), 119–134.
- Welfare Quality, 2009. Welfare quality assessment protocols for cattle. Lelystad, Hollanda. <https://edepot.wur.nl/233467>, Access Date: 02.02.2021.
- Wemelsfelder, F., Lawrence A. B., 2001. Qualitative assessment of animal behaviour as an on-farm welfare-monitoring tool. *Acta Agriculturae Scandinavica, Section A-Animal Science*. 51(S30), 21–25.
- Wiktorsson, H., Sørensen J. T., 2004. Implications of automatic milking on animal welfare. In: *Automatic Milking. A Better Understanding*. Wageningen Academic Publishers, The Netherlands. pp. 371–381.
- Yaşar, A., Yerlikaya, H., 2004. A research on relation of animal welfare to veterinary medicine and regulations in European Union. *Vet. Bil. Derg.* 20, 17–24.