

SHEEP AND GOAT WELFARE IN CROATIA: ASSESSING VETERINARY STUDENT ATTITUDES

Mario OSTOVIĆ^{1*}, Tomislav MIKUŠ², Velimir SUŠIĆ³,
Kristina MATKOVIĆ¹, Željko PAVIČIĆ¹, Željka MESIĆ⁴

¹University of Zagreb, Faculty of Veterinary Medicine, Department of Animal Hygiene, Behaviour and Welfare, Zagreb, Croatia;

²University of Zagreb, Faculty of Veterinary Medicine, Department of Hygiene, Technology and Food Safety, Zagreb, Croatia;

³University of Zagreb, Faculty of Veterinary Medicine, Department of Animal Breeding and Livestock Production, Zagreb, Croatia;

⁴University of Zagreb, Faculty of Agriculture, Department of Marketing in Agriculture, Zagreb, Croatia

Received 22 July 2021; Accepted 04 October 2021

Published online: 20 October 2021

Copyright © 2021 Ostović et al. This is an open-access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited

How to cite: Mario Ostović, Tomislav Mikuš, Velimir Sušić, Kristina Matković, Željko Pavičić, Željka Mesić. Sheep and goat welfare in Croatia: assessing veterinary student attitudes. Veterinarski Glasnik, 2021. 75 (2), 202-210. <https://doi.org/10.2298/VETGL210722010O>

Abstract

Research into the veterinary perception of animal welfare is becoming ever more relevant. Following previous studies on Croatian veterinary students' attitudes and opinions towards farm animal and pet welfare, the present study assessed their attitudes towards sheep and goat welfare, focusing on the year of veterinary medicine study and area of student residence. The questionnaire survey involved students of all six years of the integrated undergraduate and graduate study programme at the Faculty of Veterinary Medicine, University of Zagreb, Zagreb, Croatia. First-year students filled out the questionnaire twice, before and after having attended the animal welfare subject. The questionnaire consisted of two sections. The first section included questions on student demographic and experiential characteristics, whereas the second section asked them to define the level of cognition, sentience and welfare compromise in sheep and goats through five-point Likert scale questions. Study results revealed that students agreed that sheep and goats have cognitive abilities and feelings, but they neither agreed nor disagreed about their welfare compromise. There was no significant difference in student responses according to years of study or between first-year student responses before and after having attended the animal welfare subject or according to areas of

*Corresponding author – e-mail: mostovic@vef.unizg.hr

student residence. These results could suggest poor student interaction with small ruminants and, therefore, help expand the respective curriculum.

Key Words: attitudes, Croatia, farm animal welfare, veterinary students

INTRODUCTION

Animal welfare refers to how an animal copes with its living conditions. An animal is in a good state of welfare if it is healthy, comfortable, well-fed, safe, able to express species-specific behaviour, and if it is not suffering from unpleasant states such as pain, fear and distress. Good animal welfare implies disease prevention and adequate veterinary care, provision of shelter (if necessary), appropriate management and nutrition, a stimulating and safe environment, and humane handling and killing (OIE, 2018).

The European Union legislation provides a legal frame determining minimal welfare standards in livestock breeding and production, but, except for recommendations, there are no specific legal requirements for sheep and goats (Spoolder et al., 2016).

Small ruminants are generally perceived to have a higher welfare level as compared with pigs, poultry and cattle. This could be ascribed to the fact that sheep and goats were traditionally managed extensively, outdoors, and thus, were less exposed to the unfavourable effects of intensive breeding and production (Bugarija et al., 2014a; Mioč & Kasap, 2019). However, ever more studies and practical experience indicate that, in spite of higher behavioural freedom, extensively managed animals are also exposed to welfare challenges, especially due to the quality of stockperson. Besides this, the ever more intensive sheep and goat production is resulting in additional welfare concern for these species (Dwyer, 2009; Bugarija et al., 2014a;b; 2015; Caroprese et al., 2015).

The World Organization for Animal Health recommends that “veterinarians should be the leading advocates for the welfare of all animals, recognizing the key contribution that animals make to human society through food production, companionship, biomedical research, and education” (OIE, 2012). As attitudes can influence future behaviours (Glasman & Albarracin, 2006), research into veterinarian attitudes, including those of veterinary students, towards animal welfare are assuming increasing importance (Mikuš et al., 2020).

The aim of this study was to present attitudes of veterinary students in Croatia towards sheep and goat welfare, and to identify possible differences in their attitudes according to the year of study and area of residence.

MATERIALS AND METHODS

The questionnaire was filled-out by students of all six years of the integrated undergraduate and graduate study programme at the Faculty of Veterinary Medicine,

University of Zagreb, Zagreb, Croatia. First-year students filled out the questionnaire twice, before and after having attended the obligatory animal welfare subject. Therefore, there were two overall response rates of 93% (n=513) and 91% (n=505), respectively.

The questionnaire was divided into two sections. The first section collected information on demographic and experiential characteristics of study participants, including sex, age, secondary school, early environment, area of residence, and whether they owned or kept farm or pet animals. Briefly, this information showed that 74.9% of students were females, mostly aged 18-21 (59%), had completed high school (81.8%), grew up in an urban environment (74.9%) in Zagreb and central Croatia (44.8%) with no previous experience of owning or keeping farm animals (60.2%) but had owned or kept pet animals (95%). The second section of the questionnaire consisted of statements in the form of five-point Likert scale questions (1 – totally disagree to 5 – totally agree), asking them to define the level of cognition, sentience and welfare compromise in sheep and goats.

The survey was approved by the Faculty Board on Quality Management. More detailed description of the participants and questionnaire is available elsewhere (Ostović et al., 2016; Ostovic et al., 2017; Mikuš et al., 2020; Sabolek et al., 2021).

The SPSS v. 21.0 statistical software was employed in data analysis. Univariate analysis was used to determine the frequencies of student responses. Student attitudes were assessed by calculating mean responses to particular statements. Wilcoxon signed-rank test was used to analyse differences between first-year student responses before and after having attended the animal welfare subject, and Kruskal-Wallis test to analyse differences in student responses according to years of study and areas of residence. On calculating residential differences, first-year student responses after having attended the animal welfare subject were taken in consideration. $P < 0.05$ was considered significant in all tests. Study results were expressed as mean \pm standard error of the mean (SEM) student responses.

RESULTS

As shown in Table 1, students agreed that sheep and goats have cognitive abilities and feelings but they were not sure about the welfare compromise of the animals. There was no significant difference ($P > 0.05$) in the mean student responses to any of the statements according to years of study or between first-year student responses before and after having attended the animal welfare subject. There was no significant difference ($P > 0.05$) in the mean student responses according to area of their residence either (Table 2).

Table 1. Mean* \pm SEM veterinary student responses related to sheep and goat cognition, sentience and welfare compromise according to year of study, and total score

Study year	Cognition		Sentience		Welfare compromise	
	Sheep	Goats	Sheep	Goats	Sheep	Goats
First ^A (n=143)	3.61 \pm 0.08	3.66 \pm 0.08	3.83 \pm 0.08	3.85 \pm 0.08	3.20 \pm 0.07	3.20 \pm 0.07
First ^B (n=135)	3.72 \pm 0.09	3.80 \pm 0.08	3.96 \pm 0.08	3.99 \pm 0.08	3.38 \pm 0.08	3.36 \pm 0.08
Second (n=108)	3.71 \pm 0.10	3.81 \pm 0.10	4.05 \pm 0.09	4.07 \pm 0.09	3.16 \pm 0.08	3.15 \pm 0.09
Third (n=74)	3.78 \pm 0.12	3.77 \pm 0.12	4.07 \pm 0.12	4.01 \pm 0.13	3.37 \pm 0.12	3.28 \pm 0.12
Fourth (n=73)	3.71 \pm 0.11	3.58 \pm 0.11	3.84 \pm 0.13	3.64 \pm 0.13	3.16 \pm 0.14	3.18 \pm 0.13
Fifth (n=55)	3.69 \pm 0.14	3.62 \pm 0.13	3.89 \pm 0.13	3.76 \pm 0.13	3.15 \pm 0.14	3.13 \pm 0.14
Sixth (n=60)	3.75 \pm 0.11	3.88 \pm 0.11	3.92 \pm 0.13	4.00 \pm 0.13	3.03 \pm 0.12	3.00 \pm 0.13
Total score ^{-A} (n=505)	3.73 \pm 0.04	3.76 \pm 0.04	3.96 \pm 0.04	3.94 \pm 0.05	3.23 \pm 0.04	3.21 \pm 0.04

*1: totally disagree, 5: totally agree; SEM: standard error of the mean; A: answered before attending the subject on animal welfare, B: answered after the subject on animal welfare.

Table 2. Mean* \pm SEM veterinary student responses related to sheep and goat cognition, sentience and welfare compromise according to area of student residence

Area of student residence	Cognition		Sentience		Welfare compromise	
	Sheep	Goats	Sheep	Goats	Sheep	Goats
Eastern Croatia (n=76)	3.51 \pm 0.11	3.55 \pm 0.11	3.76 \pm 0.11	3.76 \pm 0.11	3.11 \pm 0.11	3.09 \pm 0.11
Northwest Croatia (n=65)	3.75 \pm 0.11	3.79 \pm 0.12	3.94 \pm 0.14	3.99 \pm 0.14	3.23 \pm 0.12	3.23 \pm 0.12
Zagreb and central Croatia (n=226)	3.85 \pm 0.06	3.85 \pm 0.06	4.07 \pm 0.06	4.01 \pm 0.06	3.35 \pm 0.06	3.31 \pm 0.06
Istria and Croatian littoral (n=44)	3.73 \pm 0.15	3.71 \pm 0.16	3.98 \pm 0.14	3.93 \pm 0.14	3.16 \pm 0.15	3.09 \pm 0.16
Lika and Gorski Kotar (n=13)	3.85 \pm 0.27	4.08 \pm 0.27	3.85 \pm 0.34	4.00 \pm 0.34	3.23 \pm 0.43	3.46 \pm 0.39
Dalmatia (n=68)	3.52 \pm 0.13	3.57 \pm 0.12	3.88 \pm 0.12	3.81 \pm 0.12	2.99 \pm 0.12	3.00 \pm 0.13
Other country (n=13)	3.77 \pm 0.36	4.00 \pm 0.28	4.00 \pm 0.34	4.00 \pm 0.34	3.39 \pm 0.24	3.31 \pm 0.24

*1: totally disagree, 5: totally agree; SEM: standard error of the mean.

DISCUSSION

The study revealed that students perceived sheep and goats as species capable of cognition and sentience, which is consistent with the study conducted by Levine et al. (2005), while expressing neutral attitudes about their welfare compromise. In addition, there were no significant differences in student responses to any of the statements according to years of study, including differences in first-year student responses before and after having attended the animal welfare subject.

Similar results have been reported by Mikuš et al. (2020), showing that veterinary students in Croatia perceived dogs and cats as animals highly capable of cognition and sentience, while giving indecisive responses related to welfare compromise in these animals kept as pets. In their study, the majority of student responses did not differ significantly between first and sixth year of study or before and after having attending the animal welfare subject in first-year students. The authors concluded that students had strongly positive opinions towards pet animals and their welfare generally throughout their study, trying to explain their uncertainty concerning welfare compromise in pet dogs and cats with the ever-greater number of welfare issues encountered in these species. It is presumed that this was not the case in the present study, and that student uncertainty related to welfare compromise in sheep and goats arose from animal rearing conditions and farm management. For instance, most veterinary students at a United States college considered many procedures performed on small ruminants inhumane (Levine et al., 2005), whereas veterinary students from Italy perceived sheep and goats as species with a high welfare level (Magnani et al., 2017).

In Croatia, the pasture-stable system for sheep breeding predominates, where animals are on pasture during the day in the vegetation period, while being in the stable in the night and in winter. Sheep farming fully outdoors is less common, and is mostly on the islands where sheep are used exclusively for meat production (Bugarija et al., 2014a). A similar situation is observed in goat farming, where the pasture-stable system is suitable in areas with under-utilized pastures or for family farms with small pasture areas (Mioč & Pavić, 2002; Vladanović, 2015). Generally, zootechnical procedures on sheep and goats are not performed in Croatia. Only sheep shearing is usually performed once a year, whereas other procedures such as tail docking, dehorning/disbudding and/or castration of lambs and kids are extremely rare (Mioč & Pavić, 2002; Mioč et al., 2020).

Nevertheless, many of the recently demonstrated welfare issues in small ruminants, which are not associated with zootechnical procedures (Munoz et al., 2019; Rioja-Lang et al., 2020; Sejian et al., 2021) could also refer to the sheep and goats in Croatia. In order to improve livestock farming conditions in intensive production, including sheep and goats, Measure 14 on Animal Welfare implying implementation of high welfare standards exceeding the regulated standards or common practices, has been added to the Republic of Croatia Ministry of Agriculture (MoA) Rural Development Programme for the 2014-2020 period (MoA, 2016).

A previous study (Ostović et al., 2016) on the attitudes of veterinary students in Croatia towards farm animal welfare showed that students were indecisive about cognition and sentience in poultry, while attributing these features significantly more frequently to cattle and pigs as compared with poultry, and attributing cognition more often to pigs as compared with cattle. On the other hand, students believed pig and cattle welfare to be significantly less compromised as compared with poultry. For most statements, there was no significant difference between first-year student responses given before

and after having attended the animal welfare subject, while student empathy for farm animals was found to decline with years of study.

Another previous study (Sabolek et al., 2021), reported on Croatian veterinary student attitudes towards farm animal (cattle, pigs and poultry) and pet animal (dogs and cats) welfare. Regional differences in student attitudes were revealed, suggesting that these differences could not be attributed exclusively to cultural and social variation among the regions of Croatia, but that students encountered more animal welfare issues in particular regions, with special reference to pet animals. In the present study, however, there were no significant regional differences in student responses to any of the questionnaire statements, suggesting that students from all Croatian regions had comparable attitudes, either being indecisive about sheep and goat welfare, or they did not think much about it at all.

CONCLUSIONS

The results of this study assessing veterinary student attitudes towards sheep and goat welfare in Croatia appear to point to inadequate student interaction with small ruminants. This could help in future educational decision-making and in upgrading the curriculum for small ruminants.

Acknowledgements

The authors express their gratitude to all participants in the survey.

Authors' contributions

All authors contributed equally to this work.

Competing interests

The authors declare that they have no competing interests.

REFERENCES

- Bugarija Š., Ostović M., Pavičić Ž., Sušić V. 2014a. Sheep welfare – Part 1. *Stočarstvo*, 68:25-37. (in Croatian)
- Bugarija Š., Ostović M., Pavičić Ž., Sušić V. 2014b. Sheep welfare – Part 2. *Stočarstvo*, 68:51-57. (in Croatian)
- Bugarija Š., Ostović M., Pavičić Ž., Sušić V. 2015. Goat welfare. *Stočarstvo*, 69:11-15. (in Croatian)
- Caroprese M., Albenzio M., Sevi A. 2015. Sustainability of sheep and goat production systems. In *The sustainability of agro-food and natural resource systems in the Mediterranean Basin*. Ed. A. Vastola, Springer, Cham, pp. 65-75. https://doi.org/10.1007/978-3-319-16357-4_6

- Dwyer C. M. 2009. Welfare of sheep: Providing for welfare in an extensive environment. *Small Ruminant Research*, 86:14-21. <https://doi.org/10.1016/j.smallrumres.2009.09.010>
- Glasman L. R., Albarracín D. 2006. Forming attitudes that predict future behavior: A meta-analysis of the attitude-behavior relation. *Psychological Bulletin*, 132:778-822. <https://doi.org/10.1037/0033-2909.132.5.778>
- Levine E. D., Mills D. S., Houpt K. A. 2005. Attitudes of veterinary students at one US college toward factors relating to farm animal welfare. *Journal of Veterinary Medical Education*, 32:481-490. <https://doi.org/10.3138/jvme.32.4.481>
- Magnani D., Ferri N., Dalmau A., Messori S. 2017. Knowledge and opinions of veterinary students in Italy toward animal welfare science and law. *Veterinary Record*, 180:225. <https://doi.org/10.1136/vr.103938>
- Mikuš T., Ostović M., Sabolek I., Matković K., Pavičić Ž., Mikuš O., Mesić Ž. 2020. Opinions towards companion animals and their welfare: A survey of Croatian veterinary students. *Animals*, 10:199. <https://doi.org/10.3390/ani10020199>
- Mioč B., Držaić V., Širić I., Kasap A. 2020. Wool – past, present and future. Faculty of Agriculture, University of Zagreb, Zagreb, Croatia, pp. 319. (in Croatian)
- Mioč B., Kasap A. 2019. Welfare in goat husbandry and recommendations for production improvement. Proceedings of the 21st Conference of Sheep and Goat Breeders in the Republic of Croatia, 17-18 October, Sv. Martin na Muri, Croatia, 2019, pp. 21-34. (in Croatian) <https://www.hapih.hr/wp-content/uploads/2019/11/Zbornik-radova-21-savjetovanje-uzgajivaca-arhiva.pdf> (accessed on 2 July 2021)
- Mioč B., Pavić V. 2002. Goats breeding. Croatian Dairy Union, Zagreb, Croatia, pp. 301. (in Croatian)
- MoA. 2016. Rural Development Programme of the Republic of Croatia for the Period 2014-2020. Ministry of Agriculture, Directorate for Support in Agriculture and Rural Development, Zagreb, Croatia. <https://ruralnirazvoj.hr/files/Program-ruralnog-razvoja-Republike-Hrvatske-2014.-2020.-odobrena-inacica-EN-verzija-9.1.pdf> (accessed on 29 June 2021)
- Munoz C. A., Campbell A. J. D., Hemsworth P. H., Doyle R. E. 2019. Evaluating the welfare of extensively managed sheep. *PLoS One*, 14:e0218603. <https://doi.org/10.1371/journal.pone.0218603>
- OIE. 2012. OIE recommendations on the competencies of graduating veterinarians (“Day 1 graduates”) to assure National Veterinary Services of Quality. World Organization for Animal Health, Paris, France, pp. 13. <https://www.oie.int/app/uploads/2021/03/dayone-b-ang-vc.pdf> (accessed on 29 June 2021)
- OIE. 2018. Terrestrial Animal Health Code. World Organization for Animal Health, Paris, France. https://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/2018/en_sommaire.htm (accessed on 28 June 2021)
- Ostovic M., Mikus T., Pavicic Z., Matkovic K., Mesic Z. 2017. Influence of socio-demographic and experiential factors on the attitudes of Croatian veterinary students towards farm animal welfare. *Veterinarni Medicina*, 62:417-428. <https://doi.org/10.17221/172/2016-VETMED>
- Ostović M., Mesić Ž., Mikuš T., Matković K., Pavičić Ž. 2016. Attitudes of veterinary students in Croatia toward farm animal welfare. *Animal Welfare*, 25:21-28. <https://doi.org/10.7120/09627286.25.1.021>

- Rioja-Lang F. C., Connor M., Bacon H. J., Lawrence A. B., Dwyer C. M. 2020. Prioritization of farm animal welfare issues using expert consensus. *Frontiers in Veterinary Science*, 6:495. <https://doi.org/10.3389/fvets.2019.00495>
- Sabolek I., Ostović M., Mikuš T., Pavičić Ž., Matković K., Antunović B., Mesić Ž. 2021. Regional differences in the attitudes of veterinary students in Croatia towards welfare of farm and companion animals. *Veterinarska stanica*, 52:65-71. <https://doi.org/10.46419/vs.52.1.5>
- Sejian V., Silpa M. V., Reshma Nair M. R., Devaraj C., Krishnan G., Bagath M., Chauhan S. S., Suganthi R. U., Fonseca V. F. C., König S., Gaughan J. B., Dunshea F. R., Bhatta R. 2021. Heat stress and goat welfare: Adaptation and production considerations. *Animals*, 11:1021. <https://doi.org/10.3390/ani11041021>
- Spoolder H. A. M., Schöne M., Bracke M. B. M. 2016. Initiatives to reduce mutilations in EU livestock production. Wageningen UR (University & Research centre) Livestock Research, Livestock Research Report 940, Wageningen, The Netherlands, pp. 84. <https://edepot.wur.nl/374964> (accessed on 28 June 2021)
- Vladanović K. 2015. Goat farming in the area of Dalmatia. Graduate Thesis, Undergraduate Study, Faculty of Agriculture Mediterranean Agriculture, Split, Croatia, pp. 22. (in Croatian)

DOBROBIT OVACA I KOZA U HRVATSKOJ: PROCENA STAVOVA STUDENATA VETERINARSKE MEDICINE

Mario OSTOVIĆ, Tomislav MIKUŠ, Velimir SUŠIĆ, Kristina MATKOVIĆ, Željko PAVIČIĆ, Željka MESIĆ

Kratak sadržaj

Istraživanja percepcije veterinarske profesije o dobrobiti životinja dobijaju sve više na važnosti. U skladu sa prethodnim studijama o stavovima i mišljenjima hrvatskih studenata veterinarske medicine prema dobrobiti farmskih životinja i kućnih ljubimaca, ovaj rad prikazuje njihove stavove prema dobrobiti ovaca i koza, s fokusom na godine studija i regije Hrvatske iz kojih studenti dolaze. Anketnim ispitivanjem obuhvaćeni su studenti svih šest godina integrisanih dodiplomskih i diplomskih studija Veterinarskog fakulteta Univerziteta u Zagrebu, Zagreb, Hrvatska. Studenti prve godine anketni upitnik ispunili su dvaput, pre i nakon odslušanog predmeta o dobrobiti životinja. Upitnik se sastojao iz dva dela. Prvi deo odnosio se na pitanja o demografskim i iskustvenim karakteristikama studenata, dok su u drugom delu studenti pitani da se izjasne o nivou kognicije, osećajnosti i narušenosti dobrobiti ovaca i koza korišćenjem Likertove merne skale od pet nivoa. Rezultati istraživanja pokazali su da se studenti slažu s izjavama da ovce i koze imaju razvijene kognitivne sposobnosti i osećaje, ali se niti slažu niti se ne slažu s narušenošću njihove dobrobiti. Nisu utvrđene značajne razlike u odgovorima studenata između godina studija, kao ni između odgovora studenata prve godine pre i nakon odslušanog predmeta o dobrobiti životinja, niti regionalne razlike u

odgovorima studenata. Dobijeni rezultati sugerišu slabu interakciju studenata s malim preživarima te mogu poslužiti za proširenje nastavnog plana i programa iz ove oblasti.

Ključne reči: stavovi, Hrvatska, dobrobit farmskih životinja, studenti veterinarske medicine