UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

Institut de Sostenibilitat IS.UPC

Animal welfare in Europe and Iran: policy perspective and society

DOCTORAL THESIS BY:

Niloofar Pejman

THESIS SUPERVISOR

Zein Kallas Calot

INSTITUT DE SOSTENIBILITAT

Programa de Doctorado en Sostenibilidad

Universitat Politècnica de Catalunya (UPC)

February 2022

UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

Animal welfare in Europe and Iran
policy perspective and society

A dissertation submitted in partial fulfillment of the requirements for the degree Doctor of Philosophy in sustainability

DOCTORAL THESIS BY:

Niloofar Pejman

THESIS SUPERVISOR

Zein Kallas Calot

INSTITUT DE SOSTENIBILITAT

Programa de Doctorado en Sostenibilidad

Universitat Politècnica de Catalunya (UPC)

February 2022

Acta de qualificació de tesi doctoral

Curs acadèmic: 2021-2022

Nom i cognoms: Niloofar Pejman

Programa de doctorat: Sostenibilitat

Unitat estructural responsable del programa: Institut de Sostenibilitat

Resolució del Tribunal

Reunit el Tribunal designat a l'efecte, el doctorand / la doctoranda exposa el tema de la seva tesi doctoral titulada

_____

_____.

Acabada la lectura i després de donar resposta a les qüestions formulades pels membres titulars del tribunal, aquest atorga la qualificació:

NO APTE ☐ APROVAT ☐ NOTABLE ☐ EXCEL·LENT ☐

(Nom, cognoms i signatura) President/a		(Nom, cognoms i signatura) Secretari/ària
(Nom, cognoms i signatura) Vocal	(Nom, cognoms i signatura) Vocal	(Nom, cognoms i signatura) Vocal

_____, _____ d'/de _____ de _____

El resultat de l'escrutini dels vots emesos pels membres titulars del tribunal, efectuat per la Comissió Permanent de l'Escola de Doctorat, atorga la MENCIÓ CUM LAUDE:

☐ SÍ ☐ NO

(Nom, cognoms i signatura) President/a de la Comissió Permanent de l'Escola de Doctorat	(Nom, cognoms i signatura) Secretari/ària de la Comissió Permanent de l'Escola de Doctorat

Barcelona, _____ d'/de _____ de _____

Acknowledgments

First and foremost I am extremely grateful to my supervisor, Dr. Zein Kallas for his marvelous supervision, guidance and encouragement during my PhD study.

I would also like to thank my family for their constant love ,hope and support over the years. Without that hope, this thesis would not have been possible. Thank you all for the strength you gave me. I love you all

And last but not the least, I would like to thank all the members in the CREDA group who were very welcoming, warm and friendly.

Thank you very much

ABSTRACT

Intensive animal production systems are compromising current animal welfare standards. Societies' growing concerns regarding how animals are raised have resulted in continuous policy reforms and regulations that have banned certain intensive farming methods. However, these concerns toward animal welfare can vary across different countries and cultures. In many developed countries, EU policymakers are continuously identifying and implementing more restrictive regulations driven by social changes that go beyond the current minimum animal welfare requirements. However, animal welfare is also an emerging concern in developing countries. In this context, the main objectives of this thesis are threefold:

Firstly, to analyze the EU consumers' and citizens' attitudes towards more restrictive animal welfare (AW) regulations. The Logit Model (LM) regression was used in eight European countries (Spain, the United Kingdom, Poland, Greece, Lithuania, Romania, Italy, and Sweden) on a sample of 3860 respondents. The results showed that consumers are more reluctant to adopt more restrictive regulations than respondents in their role of citizens. Respondents from northern European countries (Poland and Sweden) are more likely to support more restrictive animal welfare regulations than respondents from southern countries (Spain and Italy). Women were found to be more concerned with the welfare of pigs and laying hens, giving credibility to the Internet as an information source and more likely to support more restrictive animal welfare legislation. Secondly, the students' opinions towards the inclusion of the AW subjects in their educational program were analyzed. The Logit Model (LM) from eight European Union (EU) countries with 1,952 secondary students and 1,929 graduate students was also used. The results showed that female university students with a high level of subjective and objective knowledge on AW and who required more restrictive AW regulations gave support to include the concept in their educational programs. However, students who support medical experiments that use animals to improve human health were less likely to accept the inclusion of the AW in their educational curricula. Furthermore, students in Italy compared to those in Sweden were prone to support AW educational programs.

Thirdly, in order to have a comparative view of a developing country compared to results in EU, Iranian citizens' and consumers' willingness to pay (WTP) for animal welfare (AW) milk products were analyzed using the choice experiment. The results indicate that citizens are willing to pay the highest price for traditional AW milk but not for industrial and traditional milk without AW certification. Moreover, individuals in their role as consumers exhibit a higher WTP for all types of milk but with a marked preference for industrial AW than traditional. Citizen's women and those who rely on the Internet were more concerned with dairy cattle farms and were more likely to choose AW milk. Furthermore, consumer women and those who do not have children show a higher preference for

industrial AW milk with lower animal welfare standards. However, consumers who support using animals for sport and those who assign high credibility to the television as an information source were less likely to pay a premium for AW products. Our results highlighted that both consumers and citizens are demanding higher standards regarding animal welfare. Consumers by purchasing animal welfare-friendly products and citizens by adopting a holistic approach to society legislation to achieve a minimum standard of welfare conditions. Finally, our results highlight the importance of policymakers adopting reforms that are in accordance with societal preference and concerns to create more effective and acceptable animal welfare policies. Also, teaching the AW concept at universities and schools' programs, mainly in the Mediterranean countries in secondary schools, is needed.

Keywords: animal welfare, citizens, consumers, EU, educational programs, secondary school, university, Willingness to pay, Milk

Resumen

Los sistemas de producción animal intensiva están comprometiendo los estándares actuales de bienestar animal. La creciente preocupación de las sociedades con respecto a cómo se crían los animales ha dado lugar a continuas reformas políticas y regulaciones que han prohibido ciertos métodos de cultivo intensivo. Sin embargo, estas preocupaciones sobre el bienestar animal pueden variar entre diferentes países y culturas. En muchos países desarrollados, los formuladores de políticas de la UE están identificando e implementando continuamente regulaciones más restrictivas impulsadas por cambios sociales que van más allá de los requisitos mínimos actuales de bienestar animal. Sin embargo, el bienestar animal también es una preocupación emergente en los países en desarrollo. En este contexto, los principales objetivos de esta tesis son tres:

En primer lugar, analizar las actitudes de los consumidores y ciudadanos de la UE hacia normas más restrictivas sobre el bienestar de los animales (AW). La regresión del Modelo Logit (LM) se utilizó en ocho países europeos (España, Reino Unido, Polonia, Grecia, Lituania, Rumania, Italia y Suecia) en una muestra con una muestra de 3860 encuestados. Los resultados mostraron que los consumidores son más reacios a adoptar regulaciones más restrictivas que los encuestados en su papel de ciudadanos. Los encuestados de los países del norte de Europa (Polonia y Suecia) son más propensos a apoyar regulaciones de bienestar animal más restrictivas que los encuestados de los países del sur (España e Italia). Se descubrió que las mujeres estaban más preocupadas por el bienestar de los cerdos y las gallinas ponedoras, lo que da credibilidad a Internet como fuente de información y es más probable que apoye una legislación de bienestar animal más restrictiva. En segundo lugar, se analizaron las opiniones de los estudiantes hacia la inclusión de las asignaturas AW en su programa educativo. También se utilizó el modelo Logit (LM) de ocho países de la Unión Europea (UE). Los resultados mostraron que estudiantes universitarias con un alto nivel de conocimiento subjetivo y objetivo sobre AW y que requerían regulaciones de AW más restrictivas dieron apoyo para incluir el concepto en sus programas educativos. Sin embargo, los estudiantes que apoyan los experimentos médicos que utilizan animales para mejorar la salud humana tenían menos probabilidades de aceptar la inclusión del AW en sus planes de estudios educativos. Además, los estudiantes de Italia, en comparación con los de Suecia, eran propensos a apoyar los programas educativos de AW.

En tercer lugar, para tener una visión comparativa de un país en desarrollo en comparación con los resultados de la UE, se analizó la disposición a pagar (DAP) de los ciudadanos y consumidores iraníes por productos lácteos de bienestar animal (AW) utilizando el experimento de elección. Los resultados indican que los ciudadanos están dispuestos a pagar el precio más alto por la leche AW

tradicional, pero no por la leche industrial y tradicional sin certificación AW. Además, los individuos en su rol de consumidores exhiben una DAP más alta para todos los tipos de leche, pero con una marcada preferencia por la AW industrial que la tradicional. Las mujeres ciudadanas y las que dependen de Internet estaban más preocupadas por las granjas de ganado lechero y eran más propensas a elegir la leche AW. Además, las mujeres consumidoras y las que no tienen hijos muestran una mayor preferencia por la leche industrial AW con un estándar de bienestar animal más bajo. Sin embargo, los consumidores que apoyan el uso de animales para el deporte y aquellos que asignan una alta credibilidad a la televisión como fuente de información tenían menos probabilidades de pagar una prima por los productos AW. Nuestros resultados destacaron que tanto los consumidores como los ciudadanos exigen estándares más altos en materia de bienestar animal. Los consumidores compran productos respetuosos con el bienestar animal y los ciudadanos adoptan un enfoque holístico de la legislación de la sociedad para lograr un estándar mínimo de condiciones de bienestar. Finalmente, los resultados muestran que la enseñanza del concepto de AW en las universidades y programas escolares, principalmente en los países mediterráneos en las escuelas secundarias, es necesaria.

Palabras clave: bienestar animal, ciudadanos, consumidores, UE, programas educativos, escuela secundaria, universidad, disposición a pagar, Leche

Contents

CHAPTER 1. INTRODUCTION AND BACKGROUND

1.1 Introduction

Growing ethical concerns for farm animal welfare (FAW), the rising preferences for healthy diets, and perceived high food quality, tastier, environmentally friendly, and traditional (de Graaf et al., 2016) have increased consumers' preferences for the consumption of animal welfare meat products (AWM) (Mulder & Zomer, 2017). Animal welfare (hereafter, AW) per se is a complex and multidimensional concept (Nocella et al., 2010). However, there is an agreement in the literature that access to natural and suitable housing, space management, good quality nutrition, disease prevention, and treatment are the cornerstones of AW standards which are reflected by the growing body legislations at EU (Buller et al., 2018) and national policy levels. In this context, EU policymakers are continuously reforming, defining, approving, implementing, and monitoring more restrictive regulations driven by social changes that go beyond the current minimum requirements of animal welfare. Moreover, the World Organization for Animal Health (OIE) has supported the banning of several intensive livestock production systems (Kallas et al., 2013; OIE, 2017) and promotes measures to improve livestock conditions.

However, the increasing consumption of animal products relating to the growing population, income growth, and changes in human diets has led to questioning the sustainability of current agricultural systems (FAO, 201; Vannuccini, 2018). This potential increase in demand for meat products is usually accompanied by a deterioration in livestock welfare, which increases societal concerns about how animals are raised and treated (Khaneghahi Abyaneh et al., 2020). Nevertheless, concerns related to intensive livestock production systems do not always translate into the consumption of animal welfare products, nor do they pay a premium price for them (Clark et al., 2016). This limitation could be related to price barriers (Harper et al., 2001), the role of individuals as citizens or consumers (Boogaard et al. 2011), lack of availability of AWP at retail (Vermeir & Verbeke, 2004), subjective and objective level of information (Zander & Feucht, 2018), insufficient information (Vanhonacker & Verbeke, 2014), product type (Waldrop & Roosen, 2021), animal species (Carlsson et al., 2007), socio-economic characteristics and countries and cultures.

Several studies showed that concerns regarding animal welfare are related to animal species (Cicia & Colantuoni, 2010). Considerable concern has been found, in general, with respect to pig production systems (Clark et al., 2016), broilers (Broom, 2017), and laying hens (Campbell et al., 2017). Consumers are also concerned about laboratory animals used in research, such as rodents and rabbits, and those used in teaching and experiments related to medical issues. The relatively low animal welfare standards may be justified by the social benefits of permitting such animal uses (Carbone, 2004). Many consumers may agree to use animals to support medical issues, whereas they are much more concerned about using animals for developing secondary products, such as cosmetics and furs.

Preferences and willingness to pay (WTP) for AW products can differ depending on what people think in their different roles as citizens and how they behave as consumers (Zaremba & Smoleński, 2000; Frewer et

al., 2005; Krystallis et al., 2009). Consumers express values and interests related to the process of purchasing, preparing, and consuming animal-based products. Also, consumers tend to respond to economic incentives with individualistic and materialistic concerns by maximizing their utility and thus rationally choosing products. These issues for citizens, including vegetarians and vegans, are associated with the organization of society and political issues that may not be influenced by purchasing behavior (Korzen & Lassen, 2010). A citizen's point of view is not necessarily based on economic interest but can be based on other sets of values more related to altruistic concerns, adopting a holistic approach to society (Bayarri et al., 2012).

Whereas citizens and consumers are both concerned about intensive production systems, a discrepancy between their attitudes and WTP toward animal welfare has been identified (Ouyang & Sharma, 2019; Clark et al., 2016). This finding is supported by several studies showing that citizens voted in favor of banning battery eggs, while this type of egg was the most commonly purchased and consumed egg (Verbeke, 2009; Vanhonacker et al., 2010; Lusk & Norwood, 2012). Several studies have shown that citizens have a higher WTP for food with sustainable attributes compared to consumers (Dransfield et al., 2005; Ovaskainen & Kniivilä, 2005; Eurobarometer, 2007; Vanhonacker et al., 2010; Lusk & Norwood, 2012; Wolf et al., 2016; Ouyang & Sharma, 2019). This result is also supported by Alphonce et al. (2014), who showed that individuals in the role of the citizen were willing to pay more for food safety in restaurants than those in the role of consumer.

Also, several studies have shown that animal welfare attitudes can vary across countries and cultures. Animal welfare attitudes can be related to economic development and the modernization of animal farming at the country level (EC, 2005). Consumers from southern European countries compared with those from northern countries and the United Kingdom show a higher willingness to pay a premium for products produced under stricter animal welfare standards (Veissier et al., 2008). Consumers in Sweden and the United Kingdom trust animal production systems that ensure animal welfare standards jointly with public institution interventions (Veissier et al., 2008). Piglet castration is perceived differently across Europe as an animal welfare issue (Kallas et al., 2007). While consumers in the United Kingdom agree that pig castration should be banned, the issue is less salient to Spanish consumers (Kallas et al., 2007). There are considerable differences between the countries, indicating that in many developing countries such as Iran, regulatory and legislated animal welfare standards are still not well implemented, and livestock farming and production management are under tremendous pressure to adapt and expand to meet new demands and international standards (Shariatmadari, 2000). This result is in line with the World Animal Protection Index which has ranked countries according to their AW legislation, and Iran has achieved the lowest possible rating among all nations (Garrahy & Advisor, 2019). In general, the two common types of dairy farming in Iran are traditional and industrial (Beldman et al., 2017). Traditional livestock farming is practiced by farmers in rural areas, while industrial livestock farming refers to intensive farms where a large number of animals are mainly kept in barns with high stocking density,

without access to pasture land, and they are mainly fed on concentrated feeds such as corn and soybean (Statistics Centre of Iran, 2020). In 2006, the majority of the cattle population in Iran was kept on farms consisting of 10 or fewer head (88% of total cattle holders), 31% of cattle were reared in herds of 11-50 head, and only 15% were reared in herds over 50 head(Maysami,2013).

Concerns about animal welfare are also related to an individual's information level. Lack of knowledge about animal welfare has led to a gap between attitude and behavior (Harper et al., 2001). Consumers are, in general, unaware about welfare issues at the farming level (Schröder & McEachern, 2004; McEachern & Schróder, 2002). However, it is not clear whether consumers are wilfully ignorant regarding how animals are raised and thus only focus on other products aspects (Bell, 2017; Borrisser-Pairó et al., 2016; Heerwagen et al., 2013), or whether they are simply poorly informed about the production process. Trust in information provides important context regarding the conditions in which animal-based foods are produced. The level of trust is associated with the reliability of information sources and certified products related to animal welfare. Currently, European Union (EU) consumers are demanding that food labels be more informative about the methods used for food production. However, they only trust information received from food experts, consumer organizations, and food authorities (Bock, 2015).

Therefore, in parallel with growing public attitudes toward the current level of animal welfare (hereafter, AW) (Weijden & Verhave, 2013), the education system becomes an important pathway to enhance adolescent's awareness regarding farm animal's life (Ascione & Weber, 1996; Taylor & Signal, 2005; Jamieson et al., 2012). A significant and positive relationship was found between AW education received and individuals' perceptions and attitudes (Bernués et al., 2003; Maria, 2006). Lips (2010) mentioned that AW education programs have a significant influence on raising people's awareness and motivation. Lawrence et al. (2010) reported that the inclusion of AW in all educations levels will help societal understanding of obligations and responsibility regarding the welfare of animals. In general, education can be considered as either a private good or a public good (Langford, 2006). On the one hand, if AW education is considered as a private good, students as consumers could affect all stages of a farm animal's life through influence on the current and future purchasing of animal-based products that ensure better AW conditions (Jamieson et al., 2012) as also highlighted by Clark et al., (2017) and Verain et al., (2016). On the other hand, if AW education is considered as a public good, students as citizens are educated to become a member of society to further communal gain, leading to positive attitudes toward the animal's life and reduction of children's fear of pets and reducing pets abandonment (Mariti et al., 2011). Several studies have shown that positive attitudes toward AW can be achieved through the education of AW to children aiming to provide opportunities to develop their attitudes of kindness, responsibility, and respect toward animals (European Commission, 2010). This result is also supported by Hawkins & Williams, (2017) who reported that AW education affects children's learning behaviors and attitudes to prevent animal cruelty, neglect, and abandonment. Also, other studies confirmed the importance

of teaching AW in primary schools (Miranda-de la Lama et al., 2017; Mazas et al., 2013). As a case studies, in the UK, AW educational program "prevention through education" that focus on pets, wild animals, farm animals, and general animal rescue and encourage empathy towards animals have the largest impact on children's humane treatment of animals (Hawkins & Williams, 2017). In Sweden, AW non-governmental organizations (NGOs) promote the REDE initiative (Respect, Empathy, Animals, and Ethics) as a collection of teaching materials for school children and primary school to develop a respectful treatment towards animals, humans, and nature. In Lithuania, secondary students can choose the subject of AW as optional following their interests. In Poland, several majors include cross-curricular topics covering aspects related to ecological education, in which AW is also included (EDUCAWEL, 2016).

1.2 Objectives

The main objective of this thesis is **to understand society concerns and policy perspectives regarding animal welfare in two different political regions: EU and Iran**. In order to reach this main objective, several secondary objectives were set as intermediate steps as follows:

1. Firstly, to analyze the EU consumers' and citizens' attitudes towards more restrictive animal welfare (AW) regulations.
2. Secondly, to understand the students' opinions towards the inclusion of the AW subjects in their educational programs.
3. Thirdly, in order to have a comparative view of a developing country compared to results in EU, to explore Iranian citizens' and consumers' willingness to pay (WTP) for animal welfare (AW) milk products.

1.3 Bibliography

Ascione, F. R. and Weber, C. V. (1996) 'Children's attitudes about the humane treatment of animals and empathy: One-year follow UP of a school-based intervention', Anthrozoos, 9(4), pp. 188–195. doi: 10.2752/089279396787001455.

Bayarri, S. et al. (2012) 'Identifying drivers of liking for commercial spreadable cheeses with different fat content', Journal of Sensory Studies, 27(1), pp. 1–11. doi: 10.1111/j.1745-459X.2011.00362.x.

Beldman, A. et al. (2017) Dairy farming and dairy industry in Iran.

Bell, E., Norwood, F. B. and Lusk, J. L. (2017) 'Are consumers wilfully ignorant about animal welfare?', Animal Welfare, 26(4), pp. 399–402. doi: 10.7120/09627286.26.4.399.

Bernués, A., Olaizola, A. and Corcoran, K. (2003) 'Extrinsic attributes of red meat as indicators of quality in Europe: An application for market segmentation', Food Quality and Preference, 14(4), pp. 265–276. doi: 10.1016/S0950-3293(02)00085-X.

Bock, B. B. (no date) 'Unni Kjærnes , The National Institute of Consumer Research ', (April 2015).

Boogaard, B. K. et al. (2011) 'Social Acceptance of Dairy Farming: The Ambivalence Between the Two Faces of Modernity', Journal of Agricultural and Environmental Ethics, 24(3), pp. 259–282. doi: 10.1007/s10806-010-9256-4.

Borrisser-Pairó, F. et al. (2016) 'Prevalence of boar taint in commercial pigs from Spanish farms', Meat Science. Elsevier Ltd, 111, pp. 177–182. doi: 10.1016/j.meatsci.2015.10.001.

Broom, D. M. (2017) 'Animal Welfare in the European Union', European Union. Available at: http://www.europarl.europa.eu/RegData/etudes/STUD/2017/583114/IPOL_STU(2017)583114_EN.pdf.

Buller, H. et al. (2018) 'Towards farm animal welfare and sustainability', Animals, 8(6), pp. 1–13. doi: 10.3390/ani8060081.

Campbell, D. L. M. et al. (2017) 'Outdoor stocking density in free-range laying hens: Effects on behaviour and welfare', Animal, 11(6), pp. 1036–1045. doi: 10.1017/S1751731116002342.

Carbone, L. (2004) What Animals Want: Expertise and Advocacy in Laboratory Animal Welfare Policy, What Animals Want: Expertise and Advocacy in Laboratory Animal Welfare Policy. doi: 10.1093/acprof:oso/9780195161960.001.0001.

Carlsson, F., Frykblom, P. and Lagerkvist, C. J. (2007) 'Farm Animal Welfare—Testing for Market Failure', Journal of Agricultural and Applied Economics, pp. 61–73. doi: 10.1017/s1074070800022756.

Cicia, G. and Colantuoni, F. (2010) '6 Willingness to pay for traceable meat attributes: a meta-analysis', International Journal on Food …, 3, pp. 252–263. Available at: http://centmapress.ilb.uni-bonn.de/ojs/index.php/fsd/article/viewArticle/95.

Clark, B. et al. (2016) 'A Systematic Review of Public Attitudes, Perceptions and Behaviours Towards Production Diseases Associated with Farm Animal Welfare', Journal of Agricultural and Environmental Ethics. Springer Netherlands, 29(3), pp. 455–478. doi: 10.1007/s10806-016-9615-x.

Clark, B. et al. (2017) 'Citizens, consumers and farm animal welfare: A meta-analysis of willingness-to-pay studies', Food Policy. Elsevier Ltd, 68(January 2018), pp. 112–127. doi: 10.1016/j.foodpol.2017.01.006.

Dransfield, E. et al. (2005) 'Consumer choice and suggested price for pork as influenced by its appearance, taste and information concerning country of origin and organic pig production', Meat Science, 69(1), pp. 61–70. doi: 10.1016/j.meatsci.2004.06.006.

EDUCAWEL (2016) 'Study on education and information activities on animal welfare'. Available at: https://ec.europa.eu/food/sites/food/files/animals/docs/aw_eu-strategy_study_edu-info-activ.pdf.

Eurobarometer (2007) 'Attitudes of EU citizens towards Animal Welfare', European Commision, (October 2006), p. 82. Available at: http://ec.europa.eu/public_opinion/archives/ebs/ebs_270_en.pdf.

European Commission (2005) 'Special EUROBAROMETER 224 "Europeans, Science And Technology"', Special EUROBAROMETER 224 'Europeans, Science And Technology', (February), pp. 35–39. doi: 10.1080/10916460903394144.

FAO (2018) 'Shaping The Future of Livestock', The 10th Global Forum for Food and Agriculture (GFFA), pp. 18–20.

Frewer, L. J. et al. (2005) 'Consumer attitudes towards the development of animal-friendly husbandry systems', Journal of Agricultural and Environmental Ethics, 18(4), pp. 345–367. doi: 10.1007/s10806-005-1489-2.

de Graaf, S. et al. (2016) 'Determinants of consumer intention to purchase animal-friendly milk', Journal of Dairy Science. Elsevier, 99(10), pp. 8304–8313. doi: 10.3168/jds.2016-10886.

Harper Spencer Henson, G. et al. (2001) Consumer Concerns about Animal Welfare and the Impact on Food Choice EU FAIR CT98-3678 FINAL REPORT. Available at: https://ec.europa.eu/food/sites/food/files/animals/docs/aw_arch_hist_eu_fair_project_en.pdf.

Hawkins, R. D. and Williams, J. M. (2017) 'Assessing Effectiveness of a Nonhuman Animal Welfare Education Program for Primary School Children', Journal of Applied Animal Welfare Science. Routledge, 20(3), pp. 240–256. doi: 10.1080/10888705.2017.1305272.

Heerwagen, L. R., Christensen, T. and Sandøe, P. (2013) 'The prospect of market-driven improvements in animal welfare: Lessons from the case of grass milk in Denmark', Animals, 3(2), pp. 499–512. doi: 10.3390/ani3020499.

Jamieson, J. et al. (2012) 'Measuring the success of a farm animal welfare education event', Animal Welfare, 21(1), pp. 65–75. doi: 10.7120/096272812799129402.

Kallas, Z. et al. (2013) 'Effect of tasting and information on consumer opinion about pig castration', Meat Science. Elsevier Ltd, 95(2), pp. 242–249. doi: 10.1016/j.meatsci.2013.05.011.

Kallas, Z., Gómez-Limón, J. A. and Arriaza, M. (2007) 'Are citizens willing to pay for agricultural multifunctionality?', Agricultural Economics, 36(3), pp. 405–419. doi: 10.1111/j.1574-0862.2007.00216.x.

Korzen, S. and Lassen, J. (2010) 'Meat in context. On the relation between perceptions and contexts', Appetite. Elsevier Ltd, 54(2), pp. 274–281. doi: 10.1016/j.appet.2009.11.011.

Krystallis, A. et al. (2009) 'Attitudes of European citizens towards pig production systems', Livestock Science. Elsevier B.V., 126(1–3), pp. 46–56. doi: 10.1016/j.livsci.2009.05.016.

Langford, C. L. (2006) 'Consumer Student or Citizen Student? The Clash of Campus Speech Codes and Free Speech Zones', Free Speech Yearbook, 43(1), pp. 93–105. doi: 10.1080/08997225.2006.10556331.

Lawrence A.B., Muldoon J. , Lakestani N., Currie C.E., & Williams J. (2010). Animal welfare education: evidence for action. Proceedings of the international conference on animal welfare education: everyone is responsible. Brussels. Retrieved from https://ec.europa.eu/food/sites/food/files/animals/docs/aw_arch_proc_102010_brussels_en.pdf

Lips, D. (2010). Animal welfare education programs. Proceedings of the international conference on animal welfare education: everyone is responsible. Brussels. Retrieved from https://ec.europa.eu/food/sites/food/files/animals/docs/aw_arch_proc_102010_brussels_en.pdf

Lusk, J. L. and Norwood, F. B. (2012) 'Speciesism, altruism and the economics of animal welfare', European Review of Agricultural Economics, 39(2), pp. 189–212. doi: 10.1093/erae/jbr015.

Mariti, C. et al. (2011) 'Improvement in children's humaneness toward nonhuman animals through a project of educational anthrozoology', Journal of Veterinary Behavior: Clinical Applications and Research. Elsevier Inc, 6(1), pp. 12–20. doi: 10.1016/j.jveb.2010.07.003.

Maysami, M. (2014). Energy efficiency in dairy cattle farming and related feed production in Iran.

Mazas, B. et al. (2013) 'Development and Validation of a Scale to Assess Students' Attitude towards Animal Welfare', International Journal of Science Education, 35(11), pp. 1775–1799. doi: 10.1080/09500693.2013.810354.

McEachern, M. G. and Schröder, M. J. A. (2002) 'The role of livestock production ethics in consumer values towards meat', Journal of Agricultural and Environmental Ethics, 15(2), pp. 221–237. doi: 10.1023/A:1015052816477.

Miranda-de la Lama, G. C. et al. (2017) 'Mexican consumers' perceptions and attitudes towards farm animal welfare and willingness to pay for welfare friendly meat products', Meat Science. Elsevier Ltd, 125, pp. 106–113. doi: 10.1016/j.meatsci.2016.12.001.

Mulder, M. and Zomer, S. (2017) 'Dutch Consumers' Willingness to Pay for Broiler Welfare', Journal of

Applied Animal Welfare Science. Routledge, 20(2), pp. 137–154. doi: 10.1080/10888705.2017.1281134.

Nocella, G. et al. (2010) 'Farm Animal Welfare , Consumer Willingness to Pay , and Trust : Results of a Cross-National Survey Paper presented at the 2010 NZARES Conference Survey'. doi: 10.1093/aepp/ppp009.

OIE (2017) 'OIE global animal welfare strategy', (May).

Ouyang, Y. and Sharma, A. (2019) 'Consumer-citizen willingness to pay for healthy eating messages', International Journal of Contemporary Hospitality Management, 31(2), pp. 890–909. doi: 10.1108/IJCHM-08-2017-0490.

Ovaskainen, V. and Kniivilä, M. (2005) 'Consumer versus citizen preferences in contingent valuation: Evidence on the role of question framing', Australian Journal of Agricultural and Resource Economics, 49(4), pp. 379–394. doi: 10.1111/j.1467-8489.2005.00309.x.

Schröder, M. J. A. and McEachern, M. G. (2004) 'Consumer value conflicts surrounding ethical food purchase decisions: A focus on animal welfare', International Journal of Consumer Studies, 28(2), pp. 168–177. doi: 10.1111/j.1470-6431.2003.00357.x.

Shariatmadari, F. (2000) 'Poultry production and the industry in Iran', World's Poultry Science Journal, 56(1), pp. 55–65. doi: 10.1079/wps20000006.

Statistics Centre of Iran (2020) 'Consumer Price Index in the Month of Esfand of the Year 1398', pp. 1–20. Available at: https://www.amar.org.ir/english/SCI-News-Archive/ID/12789/Consumer-Price-Index-in-the-Month-of-Esfand-of-the-Year-1398.

Taylor, N. and Signal, T. D. (2005) 'Empathy and attitudes to animals', Anthrozoos, 18(1), pp. 18–27. doi: 10.2752/089279305785594342.

Vanhonacker, F. et al. (2010) 'Citizens' Views on Farm Animal Welfare and Related Information Provision: Exploratory Insights from Flanders, Belgium', Journal of Agricultural and Environmental Ethics, 23(6), pp. 551–569. doi: 10.1007/s10806-010-9235-9.

Vanhonacker, F. and Verbeke, W. (2014) 'Public and Consumer Policies for Higher Welfare Food Products: Challenges and Opportunities', Journal of Agricultural and Environmental Ethics, 27(1), pp. 153–171. doi: 10.1007/s10806-013-9479-2.

Vannuccini, S. (2018) 'Oecd-Fao', Fao.

Veissier, I. et al. (2008) 'European approaches to ensure good animal welfare', Applied Animal Behaviour Science, 113(4), pp. 279–297. doi: 10.1016/j.applanim.2008.01.008.

Verain, M. C. D., Sijtsema, S. J. and Antonides, G. (2016) 'Consumer segmentation based on food-category attribute importance: The relation with healthiness and sustainability perceptions', Food Quality and Preference. Elsevier Ltd, 48, pp. 99–106. doi: 10.1016/j.foodqual.2015.08.012.

Verbeke, W. (2009) 'Stakeholder, citizen and consumer interests in farm animal welfare', Animal Welfare, 18(4), pp. 325–333.

Vermeir, I. and Verbeke, W. (2004) 'Faculteit Economie En Bedrijfskunde Hoveniersberg 24 B-9000 Gent Sustainable Food Consumption: Exploring the Consumer Attitude-Behaviour Gap Sustainable Food Consumption: Exploring the Consumer Attitude-Behaviour Gap'.

Waldrop, M. E. and Roosen, J. (2021) 'Consumer acceptance and willingness to pay for cow housing systems in eight European countries', Q Open, 1(1), pp. 1–18. doi: 10.1093/qopen/qoab001.

Weijden, J. J. A. Van Der and Verhave, S. I. P. S. (2013) 'Attitudes towards the use of Animals of Students

enrolled in Animal Welfare and Laboratory Science courses in The Netherlands', (3516660), pp. 1–22.

Wolf, C. A. et al. (2016) 'Public and farmer perceptions of dairy cattle welfare in the United States', Journal of Dairy Science, 99(7), pp. 5892–5903. doi: 10.3168/jds.2015-10619.

Zander, K. and Feucht, Y. (2018) 'Consumers' Willingness to Pay for Sustainable Seafood Made in Europe', Journal of International Food and Agribusiness Marketing. Taylor & Francis, 30(3), pp. 251–275. doi: 10.1080/08974438.2017.1413611.

Zaremba, L. S. and Smoleński, W. H. (2000) 'Optimal portfolio choice under a liability constraint', Annals of Operations Research, 97(1–4), pp. 131–141. doi: 10.1023/A.

CHAPTER 2. SHOULD ANIMAL WELFARE REGULATIONS BE MORE RESTRICTIVE? A CASE STUDY IN EIGHT EUROPEAN UNION COUNTRIES

animals

MDPI

Article

Should Animal Welfare Regulations Be More Restrictive? A Case Study in Eight European Union Countries

Niloofar Pejman [1,*], Zein Kallas [2,*], Antoni Dalmau [3] and Antonio Velarde [3]

1 Institute for Research in Sustainability Science and Technology (IS-UPC), Polytechnic University of Catalonia, 08034 Barcelona, Spain
2 Centre for Agro-food Economy and Development, CREDA-UPC-IRTA, 08860 Castelldefels, Spain
3 Institute of Agrifood Research and Technology—IRTA, Animal Welfare Subprogram, 17121 Monells, Spain; antoni.dalmau@irta.cat (A.D.); antonio.velarde@irta.cat (A.V.)
* Correspondence: niloofar.pejman@upc.edu (N.P.); zein.kallas@upc.edu (Z.K.)

Received: 22 February 2019; Accepted: 18 April 2019; Published: 25 April 2019

check for updates

Simple Summary: Intensive animal production systems are compromising current animal welfare standards. European societies' growing concerns regarding how animals are raised have resulted in continuous European Union (EU) policy reforms that have banned certain intensive farming methods. We investigated whether EU respondents, differentiated by their roles as citizens and consumers, believe that the current regulations on animal welfare should be more restrictive. Data were collected using a survey approach implemented in eight European countries (Spain, the United Kingdom, Poland, Greece, Lithuania, Romania, Italy, and Sweden) with a sample of 3860 respondents. The results show that women citizens are more concerned with animal welfare and are prone to accept more restrictive regulations. Respondents from northern European countries (Poland and Sweden) are willing to accept regulations that are more restrictive than the current minimum standards than respondents from southern countries (Spain and Italy). Our results suggest that increasing knowledge of animal welfare is related to effective information campaigns that use the Internet to endorse the current animal welfare legislation.

Abstract: Increasingly, intensive livestock production systems have increased societal concern regarding the current animal welfare standards. We investigated whether individuals in their roles as consumers and citizens believe that the current European regulations regarding animal welfare should be more restrictive. Factors affecting this decision were assessed by analyzing respondents' understanding of animal welfare-related issues, their subjective and objective knowledge levels, the credibility they assign to different information sources, their perceptions toward the current restrictiveness of animal welfare standards, and their socioeconomic characteristics. Data were collected using a semi-structured questionnaire distributed in eight European Union (EU) countries (Spain, the United Kingdom, Poland, Greece, Lithuania, Romania, Italy, and Sweden) with 3860 total responses. The results showed that consumers are more reluctant to adopt more restrictive regulations than respondents in the role of citizens. Respondents from northern European countries (Poland and Sweden) are more likely to support regulations that are more restrictive than the current minimum requirements than respondents from southern countries (Spain and Italy). Women were found to be more concerned with the welfare of pigs and laying hens—lending credibility to the Internet as an information source—and were more likely to support more restrictive animal welfare legislation.

Keywords: animal welfare; citizens; consumers; EU

Number of citations (JCR): 15

Impact Factor: 2.75

Quartiles: Q1

2.1 Methodological Framework

To accomplish the objectives specified in the first chapter of this Proposal, the first survey was dedicated to identify consumers and citizen's attitudes toward restrictive animal welfare (AW) regulations and the questionnaires collect: a) respondents' understanding of animal welfare-related issues, b) their subjective and objective knowledge levels, c) the credibility they assign to different information sources, d) their perceptions toward the current restrictiveness of animal welfare standards, their socioeconomic characteristics and e) countries and culture.

2.1.1 Data Collection and Sample Size

Data were collected during January–February 2014 using a semi-structured questionnaire distributed in eight European countries (Spain, the United Kingdom, Poland, Greece, Lithuania, Romania, Italy, and Sweden) with different socio-economic and cultural characteristics to determine attitudes toward animal welfare.

Respondents were randomly selected and interviewed in person on different days of the week in different places to ensure the high heterogeneity of the participants. A quota sampling approach was selected. The criteria used to establish the sampling quotas were the following: sex, age, and residence in rural and urban regions in northern, central, and southern locations in each country. An additional stratifying criterion was applied to the respondent profiles to ensure an even representation of consumers and citizens. A total of 96 categories was determined (2 sexes × 4 ages ranges × 2 areas × 3 regions × 2 respondent profiles). Sample quotas were assigned proportionately to the target population (by country) in each quota. Once quotas were calculated for each category, random routes were established to determine the places from which an effective sample could be extracted (Kallas et al., 2007).

To differentiate consumers from citizens, the former was represented by respondents over 18 years of age who are in part or totally responsible for purchasing food and beverages for the household and had purchased and consumed meat products in the last week. In this case, respondents were instructed to complete the survey from the perspective of a consumer of animal products, highlighting their preferences as an individual. The latter was represented by respondents over 18 years of age, including non-consumers of meat products (vegetarians, vegans, etc.). In this case, respondents were asked to consider themselves as members of a society with current values and principles.

The countries were selected according to their different geographical and marketing contexts within Europe with a priori identified distinctive patterns of attitudes, knowledge, and behavior toward animal welfare. The selected countries can be grouped into three subsets a priori based on location: Mediterranean European countries (Greece, Italy, and Spain), Central European countries (Romania, Poland, and Lithuania), and Northern European countries (the United Kingdom and Sweden). These countries also exhibit highly heterogeneous socio-economic characteristics that have intensified since the global financial crisis in 2008, reflecting income inequality, labor market, and sex gaps, changing unemployment rates, and immigration

(OECD,2018; Principles, 1999). The presence of disparities in these socio-economic indicators varies from country to country, even when analyzing relatively similar European countries (Marcińczak & Musterd,2012). The questionnaire was divided into several parts addressing different aspects related to our objectives. The questionnaires distributed to the consumer and citizen groups are provided in Supplementary Materials. The questionnaire was approved by the ethics committee of the Centre for Agro-food Economy and Development of the Polytechnic University of Catalonia (Castelldefels, Spain) and conducted according to the relevant ethical principles, taking specific care to protect personal information according to European General Data Protection Regulation No. 2016/679. Respondents received an explanation of the objective of the study, emphasizing that the information requested would be exclusively used for research and that confidentiality is absolutely guaranteed. Respondents were informed that their participation was voluntary and that they were randomly selected to participate in the study. Table 1 provides a summary of the main socio-economic variables of the samples across countries and groups.

Table 1. Summary of socio-demographic variables of the samples by groups and country (values are in percentage).

Country		Romania		Italy		Spain		Greece		Lithuania		United Kingdom		Poland		Sweden	
		P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C
Region (%)	North	33.1	33.5	33.8	52.6	35.2	33.6	33.3	33.3	26.7	36.3	40.9	27.9	43.8	78.8	-	15.4
	Center	66.9	66.5	33.8	17.0	31.2	32.4	33.3	33.3	40.0	23.1	46.1	57.9	32.9	20.8	13.3	84.6
	South	-	-	32.5	30.4	33.6	34.0	33.3	33.3	33.3	40.6	13.0	14.2	23.3	0.4	86.7	-
Area (%)	Rural	49.4	50.0	50.8	51.4	53.0	52.3	50.0	50.0	24.2	21.8	43.5	45.3	33.8	55.8	53.8	17.1
	Urban	50.6	50.0	49.2	48.6	47.0	47.7	50.0	50.0	75.8	78.2	56.5	54.7	66.3	44.2	46.3	82.9
Employment situation (%)	Unemployed	1.7	1.7	12.9	6.9	9.3	4.9	19.2	19.2	9.2	13.8	8.3	5.3	2.5	2.1	5.0	4.2
	Self-employed	17.0	16.9	16.7	27.1	5.7	4.5	25.5	21.3	0.4	1.3	6.5	8.5	-	2.5	8.3	5.0
	Salaried	63.0	65.7	18.8	34.4	51.8	77.9	31.0	40.0	55.8	66.3	55.2	57.5	69.2	84.2	64.2	68.3
	Retired	9.4	8.7	5.8	10.9	0.4	6.1	12.6	8.3	0.8	3.3	3.9	2.4	5.8	2.1	0.8	-
	Student	4.7	2.9	42.1	9.3	32.8	3.7	7.9	7.5	32.5	14.6	17.8	18.6	22.5	7.9	19.2	20.8
	Housewife	4.3	4.1	3.3	10.9	-	2.9	3.8	3.3	1.3	0.8	0.4	2.8	-	1.3	2.5	1.7
Gender (%)	Female	66.1	56.2	45.4	70.0	57.9	62.7	62.9	62.9	80.0	82.9	50.0	59.5	72.9	67.1	74.6	77.1
	Male	33.9	43.8	54.6	30.0	42.1	37.3	37.1	37.1	20.0	17.1	50.0	40.5	27.1	32.9	25.4	22.9
Age categories (%)	18–30	33.1	19.8	60.8	20.6	46.2	25.0	26.7	29.6	67.9	56.3	60.3	56.3	48.3	27.9	49.6	40.4
	31–40	29.3	37.6	18.3	27.9	27.1	34.8	20.8	25.0	16.7	14.6	14.0	15.4	17.9	28.7	19.2	23.8
	41–55	27.6	31.8	13.8	32.8	20.6	24.6	37.5	35.0	11.7	14.6	19.2	20.6	20.4	32.1	29.6	23.8
	>55	10.0	10.7	7.1	18.6	6.1	15.6	15.0	10.4	3.8	14.6	6.6	7.7	13.3	11.3	1.7	12.1
Age (average years)		38.15	39.75	31.87	42.83	33.81	40.29	41.43	40.08	29.72	34.82	32.53	33.36	35.76	39.32	33.36	36.47
Observations by respondent type		239	242	240	247	247	247	240	240	240	240	230	248	240	240	240	240
Sample Size		481		487		494		480		480		478		480		480	
Confidence interval		4.47%		4.44%		4.41%		4.47%		4.47%		4.48%		4.47%		4.47%	

P: citizens; C: consumers.

2.2 Respondents' Opinions Regarding Whether Animal Welfare Regulations Should Be More Restrictive?

We aimed to analyze factors affecting respondents' opinions regarding whether or not animal welfare regulations should be more restrictive. Respondents were directly asked if animal welfare regulations should be more restrictive in their countries and were asked to respond with a yes or no answer. For this reason, a binomial logistic regression (logit model) was selected as the best-fitting model to describe the relationship between this binary dependent variable and a set of independent variables. The logit model analyzes the probability that an event has success in the response variable (Y = 1) as a linear function of independent variables. In our case, the response variable (Y) has a value of 1 if a respondent answers "yes" for more restrictive animal welfare regulations and a value of 0 if a respondent answers "no" for more restrictive animal welfare regulations. The independent variables were those previously noted as potentially relevant factors and were presented according to the following categories:

(1) Socio-economic variables previously presented in Table 1;
(2) The understanding of the animal welfare concept;
(3) Subjective knowledge level regarding animal welfare;
(4) Objective knowledge level regarding animal welfare;
(5) The credibility of the information source;
(6) Animal welfare concerns for specific animal species;
(7) Perception of the current level of animal welfare standards;
(8) Respondent role (i.e., consumer or citizen); and
(9) Country of residency.

In this case, the logit of this probability (P_i) of answering "Yes" for more restrictive animal welfare regulations is expressed as a function:

$$\ln\left(\frac{P_i}{1-P_i}\right) = X_i^{'}\beta^{'}, \quad (1)$$

Where $X_i^{'} = (1, X_{1i}, X_{2i}..., X_{ki})$ represents the (k) independent variables of the respondent i and $\beta^{'} = (\beta_0, \beta_1, \beta_2 ..., \beta_k)$ is the vector of the coefficients to be estimated through the regression. This logistic regression is posteriorly interpreted by calculating the values of the odds ratios (ORs) for each variable $(\mathrm{OR}_i = \mathrm{e}^{\beta_i})$, which represents the modification that occurs in the response variable for each one-unit change in the independent variable. In other words, it quantifies the increase or decrease in the probability of answering "Yes" for more restrictive animal welfare regulations when the independent variable increases by one unit. For the estimation procedure, the maximum likelihood (ML) criteria and the stepwise method were used for the selection of the independent variables, as

they were the best choices in our case. The Wald index was used for each variable's statistical significance at a 95% confidence level, and the Hosmer and Lemeshow goodness-of-fit test was used to determine the goodness of fit of the model. More detailed information about this regression technique can be found in (Paul et al., 2013).

2.2.1 Definition of Animal Welfare

The definition of animal welfare is not only related to the state of the animal's body but also to ethical aspects, its feelings, and the living environment. To clarify the meaning of animal welfare, an open question was introduced in the survey to collect respondents' opinions on this issue. These primary data were analyzed using conventional qualitative content analysis, which provides insight into the interpretation of the meaning of the term from the content of the data by identifying specific categories that refer to different concepts of animal welfare. From the open answer responses, several aspects regarding the perception of animal welfare were identified a posteriori.

To quantify respondents' understanding of the animal welfare concept, they were asked about their level of agreement with several statements on animal welfare using an 11-point Likert-type scale ranging from 0 (absolutely disagree) to 10 (absolutely agree). The statements on animal welfare were as follows:

(1) Do you agree that animals should be used for work?
(2) Do you agree with using animals for entertainment or sports?
(3) Do you agree with keeping animals for the production of food?
(4) Do you agree with rearing animals for the production of fur?
(5) Do you agree with killing animals when they are seriously injured or ill?
(6) Do you agree with observing animal behavior in an experiment?
(7) Do you agree that medical experiments should be able to use animals to improve human health?
(8) Do you agree with testing cosmetics or household products on animals?
(9) Do you agree with improving animals' health or increasing their disease resistance via genetic changes?
(10) Do you agree with inflicting pain or injury on animals as part of cultural traditions?

2.2.2 Perceived Subjective and Objective Knowledge Level Regarding Animal Welfare

The study of knowledge level was differentiated between what respondents believe they know (subjective knowledge level) and what they objectively know (objective knowledge level). To analyze both knowledge types, we referred to their subjective experience and objective measurement. Thus, respondents were asked to respond about their perceived knowledge level (subjective) via an 11-point Likert-type scale ranging from 0 (participants do not have any knowledge) to 10 (participants have absolute knowledge). Respondent's objective knowledge level was measured by asking respondents to identify eight issues currently regulated in a common policy framework at the EU level from a group of 13 proposed statements about different aspects of animal welfare. For each respondent, an

index that counted the correct classification of the aforementioned statements was created. This index ranged from 1 (if a respondent correctly identified only one issue) to 13 (if a respondent correctly identified all the issues). The presentation of the different issues was randomized to mitigate any order bias. The issues presented were the following:

(1) Space allowance per animal in relation to the animal's weight;
(2) Age at and method of castration of animals;
(3) Limits to the use of cages and ties on animals;
(4) The obligation with respect to certain species to use straw as a bedding material or environmental enrichment material;
(5) Animals that are not to be transported;
(6) The obligation to stun animals before slaughtering;
(7) The obligation to feed animals after a certain number of hours at the slaughterhouse;
(8) The obligation to use showers in cases of heat stress (not regulated);
(9) The obligation to have background music in farmyards (not regulated);
(10) The obligation to limit groups of animals to four individuals (not regulated);
(11) The obligation to have available water for animals that are transported, whatever the duration of transport (not regulated);
(12) The obligation to give animals space for resting before slaughter;
(13) Limits to the number of animals per drinking trough in pen (not regulated).

To compare subjective and objective knowledge levels, both estimated indexes were recalculated in percentage terms. Both types of knowledge levels were related to respondents' perceptions about the amount of animal welfare information they receive. Respondents were asked if the information they receive in relation to animal welfare is sufficient using an 11-point Likert-type scale ranging from 0 (the information is insufficient) to 10 (the information is sufficient).

2.2.3 The credibility of Information Sources Regarding Animal Welfare

Respondents were asked about their opinions regarding the credibility of the different information sources (n) using an 11-point Likert-type scale ranging from 0 (not credible at all) to 10 (totally credible). The information sources analyzed were the following:

(1) News from television (TV) and radio;
(2) Advertisements from TV and radio;
(3) Specific programs/radio or TV documentaries;
(4) Generalist newspapers;
(5) Specialized magazines;
(6) Books;
(7) Informative brochures;

(8) Formative sessions;

(9) Labels of products;

(10) Communication campaigns of private companies;

(11) Governmental programs;

(12) Generalist websites on the Internet; and

(13) Specialized websites on the Internet.

2.2.4 Perception of Current Level of Animal Welfare Regulations and Concerns Regarding Specific Animal Species

Perceptions of the current level of animal welfare standards in each country may play a relevant role in affecting respondents' opinions regarding whether more restrictive legislation is warranted. In Italy, Spain, and Poland, the legislation is essentially the same because it originated from the adoption of the same European Commission (EC) directives, whereas in Sweden and the United Kingdom, the legislation on animal welfare includes specific and restrictive national rules, most of which were already in force before the adoption of EC directives. Animal welfare concern in Spain is considered an important issue, but such concern is still lower in Spain than in the observed northern European countries (Frewer et al., 2005). The Swedish legislation, as well as that of the United Kingdom, takes an individual-focused approach to the welfare of animals. Here, respondents were asked about their perceptions about the current level of animal welfare (p) using an 11-point Likert-type scale ranging from 0 (very low) to 10 (very high).

The relative importance of animal welfare concerns within specific animal production systems was also elicited. Respondents were asked about their concerns regarding animal welfare depending on the animal species using an 11-point Likert-type scale ranging from 0 (not concerned at all) to 10 (I am completely concerned). The following animal production systems were included: laying hens, milk cows, cows for meat, goats for milk/meat, broilers for meat, rabbits for meat, pigs for meat, sheep for milk/meat, and laboratory animals.

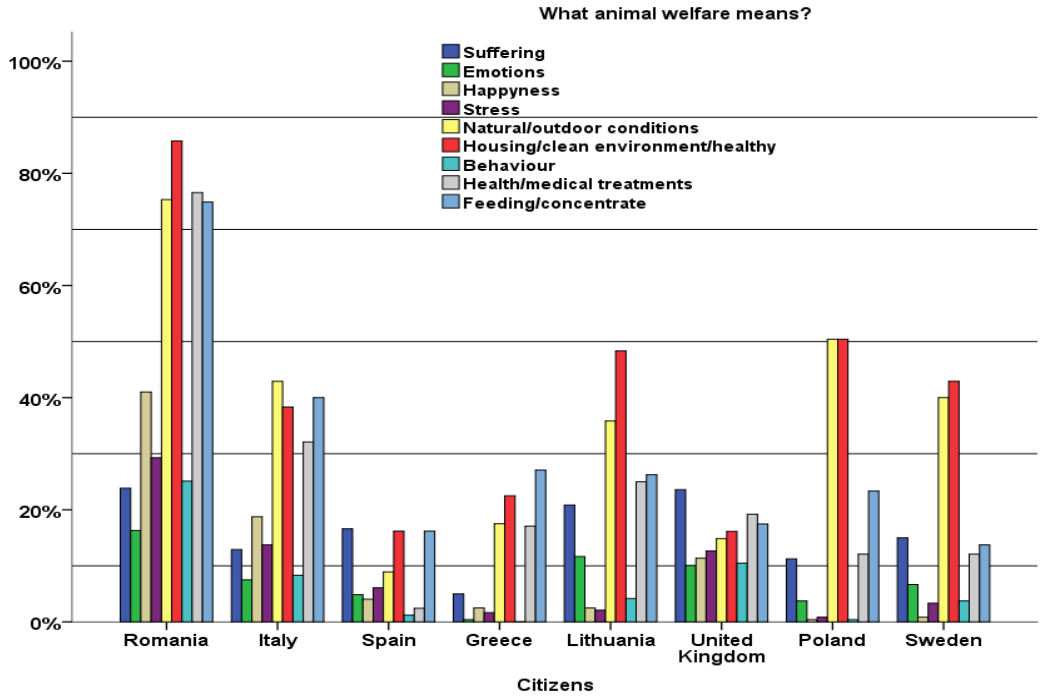
2.3 Results and Discussions

2.3.1 Animal Welfare Understanding of Citizens and Consumers

From the qualitative content analysis, the categories extracted from the open question regarding the meaning of the concept of animal welfare were as follows: suffering, emotions, happiness, stress, natural/outdoor conditions, housing/clean environment/health, behavior, health/medical treatments, and feeding/concentrate. The categories of perceived animal welfare-related issues obtained in this study are in accordance with other findings in the literature regarding public concern about animal welfare. Lassen et al. (2006) showed that consumers and citizens tend to understand the definition of animal welfare in terms of housing, outdoor conditions, behavior, and medical treatment. Frewer et al.(2005) showed that consumers are concerned about animal welfare with respect to issues of animal health and living environment. The results from European populations showed that predominant

concerns are related to issues of natural environments (Vanhonacker et al., 2008), animal suffering (Phillips et al., 2009), and animal well-being (Lassen et al., 2006). Our results (Figure 2) showed a high level of variation with respect to the understanding of the animal welfare concept across countries and respondent profiles. Some trends were elicited. Focusing on the consumer group, animal welfare was perceived to be more related to natural and outdoor conditions and to clean and healthy housing environments. These were the issues that were most often raised by consumers in Sweden, Poland, Lithuania, and Romania. However, consumers in Italy and Greece highlighted good feeding as the most important aspect of animal welfare. The results show that consumers in the United Kingdom do not prioritize any specific issues, as almost all factors were noted with equal importance; however, citizens in the United Kingdom assigned the highest overall score to the avoidance of pain and suffering. Finally, consumers in Spain highlighted the relevance of avoiding suffering as an important aspect of animal welfare. Citizens in Romania, Lithuania, Italy, Poland, and Sweden attributed the highest importance to aspects related to natural living conditions and clean environment. Respondents from the northern European countries assigned lower values to the aspects of feeding, pain, and healthiness in animal welfare compared with those from other regions.

Independent of the identified differences between the consumer and citizen points of view, content was analyzed in each country for the pooled sample. The results showed that respondents in Romania, Lithuania, Poland, and Sweden are more interested in the “natural conditions and clean environment” of animal rearing. These results highlight that animal welfare concerns in certain countries (Lithuania, Poland, and Sweden) include more than just feeding conditions, medical treatment, and animal stress, being more related to the natural conditions of living with outdoor access. The Mediterranean countries (Italy, Greece, and Spain) assign more importance to the suitable and natural feeding of animals. However, avoiding pain and suffering was the most important aspect reported in Spain. This could be because of the several cultural activities in Spain involving animals, such as quail catapulting, horse wrestling, goose decapitating, throwing a goat off a building, donkey stoning, and setting a bull’s face on fire.



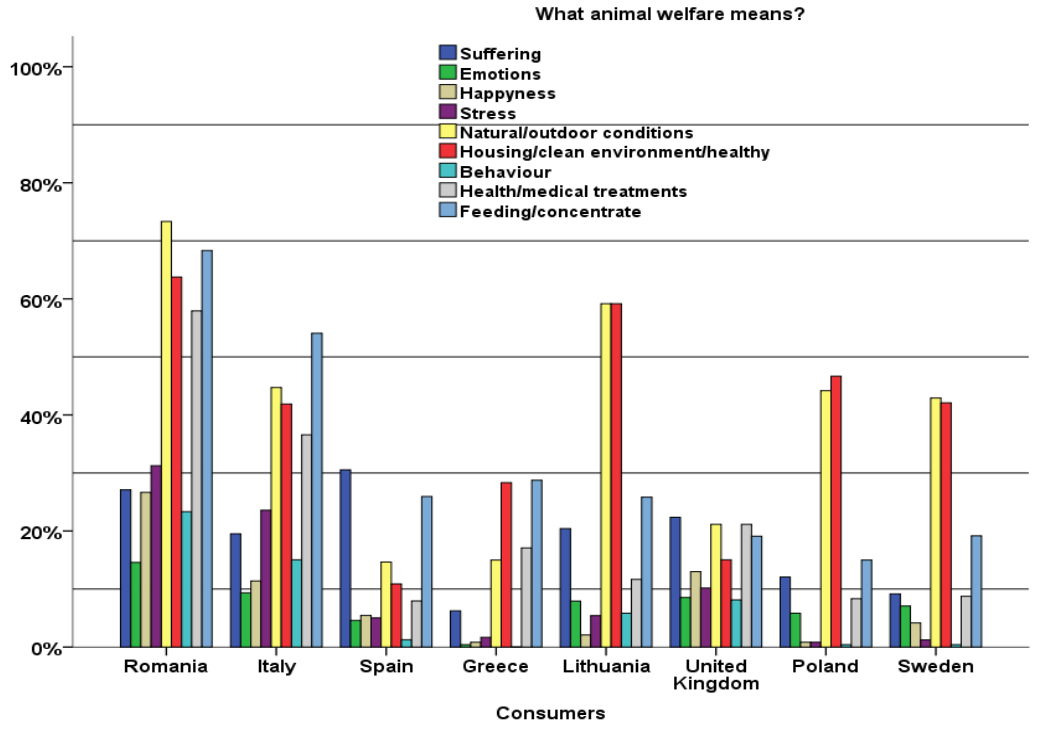


Figure 2. Animal welfare understanding of citizens and consumers.

2.3.2 Perceived Subjective and Objective Knowledge Level Regarding Animal Welfare

The results in Table 2 show that consumers and citizens in Romania, Italy, Spain, and Greece have a lower subjective knowledge level of animal welfare (below 50%) compared with those in Lithuania, the United Kingdom, Poland, and Sweden, whose values were higher than 50%. The results also show a low level of objective knowledge in all countries, with the number of correct answers being below 50%. For each type of respondent and country, we compared the subjective and objective knowledge levels. In the majority of the results, significant differences were obtained, showing that respondents tended to exhibit higher subjective knowledge than what they know objectively. If we analyzed the differences across countries, there was a clear differentiation between two groups of countries. The first group (Romania, Italy, Spain, and Greece) exhibited a low discrepancy level (i.e., the difference between the subjective and objective knowledge levels) compared with the other group (Lithuania, the United Kingdom, Poland, and Sweden), whose respondents believed that they know a lot more than they do in reality. This higher discrepancy level was identified in countries whose respondents selected a higher agreement level with the assertion that they receive sufficient information regarding animal welfare. This could have created an artificial confidence that led respondents to believe that they know more than they do. Any information provided regarding animal welfare appears to not have been completely absorbed. These results also highlight the positive correlation between the sufficient information level and respondents' objective and subjective knowledge. When an agreement with sufficient information increased, exhibited knowledge increased as well. This helps to explain why respondents in Italy, Spain, and Greece exhibited a lower knowledge level compared with those in Lithuania, the United Kingdom, Poland, and Sweden.

Table 2. Objective and subjective knowledge levels.

		Subjective Knowledge Level	Objective Knowledge Level	Discrepancy Intensity between Knowledge	Sufficient Information Level	Subjective Information Level	Objective Information Level
Romania	P	44.51 ^{a,x}	39.26 ^{b,x}	5.25	4.66	+ ***	+ ***
	C	45.77 ^{a,x}	37.64 ^{b,x}	8.06	4.15	+ ***	+ ***
Italy	P	45.29 ^{a,x}	43.01 ^{a,x}	2.28	3.45	+ ***	
	C	45.75 ^{a,x}	41.39 ^{b,x}	4.36	3.15	+ ***	
Spain	P	43.19 ^{a,x}	37.27 ^{b,x}	5.92	3.62	+ ***	
	C	42.48 ^{a,x}	33.65 ^{b,x}	8.83	3.74	+ ***	
Greece	P	44.04 ^{a,x}	41.18 ^{b,x}	2.86	2.27	+ ***	+ **
	C	40.83 ^{a,x}	37.28 ^{a,x}	3.55	2.14	+ ***	+ **
Lithuania	P	62.87 ^{a,x}	52.69 ^{b,x}	10.18	4.85	+ ***	+ **
	C	49.96 ^{a,y}	39.29 ^{b,y}	10.67	3.82	+ ***	+ ***
	P	50.52 ^{a,x}	38.06 ^{b,x}	12.46	4.48	+ ***	+ ***

United Kingdom	C	51.84 [a,y]	34.10 [b,x]	17.74	4.19	+ ***
Poland	P	65.50 [a,x]	49.74 [b,x]	15.76	5.71	
	C	59.58 [a,x]	42.98 [b,x]	16.60	5.50	
Sweden	P	54.20 [a,y]	48.58 [a,y]	5.62	6.27	
	C	60.21 [a,x]	46.47 [b,x]	13.74	6.58	

The level of subjective knowledge is measured in percentage terms where 0 indicates a very low knowledge level and 100 a very high knowledge level. The level of the objective knowledge represents the percentage of the successful rate of correct answers. The sufficient information level is measured with an 11-point Likert-type scale that ranges from 0 (the information is insufficient) to 10 (the information is sufficient). [a, b]: statistical difference between the subjective and objective knowledge level (i.e., by row); [x, y]: the statistical difference between citizens and consumers (i.e., by column); ***: significance at 99% level, **: significance at 95% level.

The results also show that when respondents' agreement regarding sufficient information was above average (i.e., >5.5 points on an 11-point scale), a non-significant association was found, as was the case with Sweden and Poland. These results suggest that policies based on increasing information campaigns about animal welfare as a tool to provide consumers and citizens with sufficient information could positively impact their knowledge level, but only if such campaigns are conducted with adequate intensity to be efficient. Policy tools should identify the optimum effort required for such information campaigns because a higher level of information does not necessarily translate to retained knowledge and may result in higher discrepancy levels.

Providing consumers and citizens with sufficient information about animal welfare may effectively improve their knowledge. Therefore, identifying which information sources are the most effective is important. In this context, understanding respondents' perception regarding the credibility of information sources is highly relevant for the development of effective information campaigns regarding animal welfare.

2.3.3 Credibility of Information Sources

The credibility of information resources was assessed using principal component analysis (PCA). The results show the presence of four main factors with a high goodness of fit, explaining 58.53% of the total explained variance, a Kaiser–Meyer–Olkin measure of about 0.820, and a very good significance level with respect to Bartlett's Test of Sphericity (0.000). Factor 1 (17.55% of explained variance) was called "specialized written media," as it encompasses information sources from books, specialized magazines, formative sessions, and informative brochures. Factor 2 (16.47% of explained variance) was categorized as traditional media and contained the following information sources: news from TV and radio, advertisements from TV and radio, specific programs/radio or TV documentaries, and generalist newspapers. Factor 3 (13.33% of explained variance) was defined as market information, including information from the labels of products, communication campaigns of private companies, and governmental programs. Factor 4 (11.18% of explained variance) was labeled "Internet" and contained specialized and generalist websites on the Internet.

The relation between the credibility of the information using PCA and the level of objective and subjective knowledge was analyzed. The results showed that specialized written media are the most important factor that can affect citizens' and consumers' knowledge, especially the objective information level. A significant and positive relationship was found for this relationship in almost all countries with the exception of the United Kingdom and Poland. Toma et al. (2012) found that access to information has a significant influence regarding attitudes toward and knowledge of animal welfare. In Italy, Spain, and Greece, the results showed that an increase in the credibility of specialized written media was related to an increase in the objective knowledge level. In Lithuania, respondents exhibited higher levels of both objective and subjective knowledge, where specialized written media are the most affordable means of information, as also highlighted in (Marcus et al.,1998).

This result is also supported by two studies (Carbone, 2004; Whiting, 2003), which reported that consumers are more affected by public information campaigns based on posters/brochures and labels. The results also showed that Internet websites are relevant as important media, having a major effect on the subjective knowledge level. To summarize in general terms, the results showed that respondents who rely on the Internet exhibit higher subjective information levels than those who rely on specialized media, who display higher objective information levels. On the basis of respondents' knowledge, traditional media and market information were found to be less effective communication tools.

2.3.4 Animal Welfare Concerns Regarding Different Animal Species

As previously stated, respondents indicated varying levels of concern regarding animal welfare for different animal species. The results in Table 3 show different levels of concern across countries and respondent types. Consumers exhibited greater animal welfare concerns than citizens. In this case, consumers exhibited a greater level of concern because they appreciate the quality and safety guaranteed by more restrictive animal welfare standards (Clark et al., 2016; Boogaard et al., 2011). As noted by Serpell (2018), consumers are more utility-oriented, and their concerns are not solely motivated by ethical considerations.

Respondents in Spain, Italy, Greece, and Romania exhibited greater concern regarding animal welfare compared with those in the other countries, in particular for pigs for meat, broilers for meat, milk cows, cows for meat, and laying hens. Pork is one of the most produced and consumed meats in the EU (Krystallis et al., 2009). Respondents in Italy, consumers in Spain, and citizens in Sweden showed high levels of concern with respect to broiler production. Respondents in Lithuania and Poland, consumers in Sweden, and citizens in Spain are more concerned with pig production systems. These results are in accordance with the findings of O'Driscoll et al. (2010), which showed that individual attitudes toward animals are highly related to animal species.

Table 3. Animal welfare concerns by animal species and respondent type.

Country	Romania		Italy		Spain		Greece		Lithuania		United Kingdom		Poland		Sweden	
	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C
Level of animal welfare	4.43	5.46	4.95	4.86	4.78	4.45	3.73	4.13	4.72	4.63	5.98	5.42	5.73	5.81	6.05	6.70
Laying hens	6.44	6.21	5.80	6.73	6.59	7.3	7.02	7.1	5.22	5.44	5.60	6.29	5.25	5.01	5.85	5.00
Milk cows	6.78	6.43	6.42	7.11	7.15	7.51	7.27	7.15	5.33	5.40	5.42	5.81	5.18	4.92	5.00	4.94
Beef for meat	5.96	6.16	6.71	7.23	7.24	7.51	7.60	7.29	5.37	5.21	5.71	6.13	4.87	4.76	5.02	4.93
Broilers for meat	6.75	6.40	6.83	7.65	6.89	7.57	7.71	7.51	5.50	5.71	5.25	5.69	5.18	5.05	5.65	6.68
Pigs for meat	6.66	6.28	6.69	7.14	7.27	7.45	7.64	7.12	5.51	5.76	5.62	5.87	5.43	5.26	5.52	7.38
Goats for milk/meat	4.98	5.43	5.63	5.63	6.84	6.87	7.03	6.56	5.05	4.80	4.71	5.00	4.95	3.44	4.85	5.06
Rabbits for meat	5.19	5.51	6.44	6.66	6.65	6.56	6.80	5.87	5.18	4.89	5.09	5.28	4.81	4.03	4.76	5.27
Sheep for milk/meat	5.28	5.50	5.96	6.18	6.85	6.89	7.22	6.77	5.30	4.98	5.23	5.40	5.09	5.00	4.62	4.76
Laboratory animals	3.81	5.12	6.56	7.26	6.85	6.92	8.44	7.95	5.34	5.07	6.49	6.84	5.21	4.90	5.34	6.26

P: public (citizens), C (consumers). Animal welfare concerns are measured using an 11-point Likert-type scale ranging from 0 (not concerned at all) to 10 (I am totally concerned).

2.3.5 Respondents' Opinions on Whether Animal Welfare Regulations Should Be More Restrictive

Following the methodological approach, a logit model was applied to analyze factors affecting respondents' decision to support more restrictive regulations of animal welfare. The descriptive results of the dependent variable (Table 4) show two distinct opinions: consumers and citizens in Romania, Italy, Spain, and the United Kingdom exhibited reluctance to support more restrictive regulations regarding animal welfare; whereas Poland, Sweden, Lithuania, and Greece showed greater interest in more restrictive regulations. Sweden has the most advanced legislation related to animal protection, and Swedish consumers were found to be less worried about animal welfare, exhibiting a higher trust level in their animal production systems and regulations (Kjærnes & Lavik, 2008). However, the rejection of more restrictive regulations regarding animal welfare could be related to cultural traditions, such as in the case of Spain, where animals play a significant role.

Table 4. Should regulation be more restrictive across countries and respondent types?

		Yes	No
Romania	Citizens	46.40	53.60
	Consumers	43.00	57.00
Italy	Citizens	35.90	64.10
	Consumers	51.80	48.20
Spain	Citizens	32.40	67.60
	Consumers	47.50	52.50
Greece	Citizens	68.80	31.30
	Consumers	67.90	32.10
Lithuania	Citizens	54.00	46.00
	Consumers	42.10	57.90
United Kingdom	Citizens	37.00	63.00
	Consumers	35.20	64.80
Poland	Citizens	52.10	47.90
	Consumers	53.10	46.90
Sweden	Citizens	51.20	48.80
	Consumers	53.10	46.90

For the logit model estimation, we used the pooled dataset by including a dummy variable for the respondent types, that is, 1 for citizens and 0 for consumers. For each country, a dummy variable was created to include heterogeneity across countries if needed. The goodness of fit was measured by the Hosmer–Lemeshow test, which ensures that all coefficients jointly are different from zero. The results of the logit model are shown in Table 5.

Our results show an acceptable rate (62.1%) of correct prediction representing the probability of accepting more restrictive legislation based on a one-unit change in an independent variable when all other independent variables are kept constant. The respondent type is a relevant variable in explaining the decision to support more restrictive regulations regarding animal welfare. Citizens showed a higher likelihood of accepting more restrictive regulations than consumers. This

outcome demonstrates that citizens, even when exhibiting less concern regarding animal welfare, are more likely to agree to more restrictive regulations. Our results suggest that, compared with consumers, a smaller increase in citizens' concern translates to greater support for restrictive regulations. These results are in line with Clark et al. (2016), who found that greater concern voiced by citizens indicates that legislative solutions are necessary for ensuring animal welfare standards. Respondents may behave differently in the role of citizen versus consumer by expressing different preferences for animal welfare when interviewed (Vanhonacker et al., 2008). In this context, the importance of animal welfare for consumers in their purchasing decisions can be related to other attributes, such as price, origin, color, or tenderness, or to other barriers regarding purchasing animal-based products produced with higher animal welfare standards (Harper et al., 2001; Clark et al., 2016). However, in some studies, non-significant differences were elicited (Harper et al., 2001; Grunert et al., 2018a), showing the importance of differentiating between both groups and updating our understanding regarding their perceptions.

Table 5. Logit model to analyze factors affecting the agreement with more restrictive regulations.

	B	Sig.	Exp (B)
Type of questionnaire (q)	0.29	0.000	1.33
Sweden (r)	0.20	0.063	1.23
Poland (r)	0.24	0.030	1.27
Subjective information level (l)	0.10	0.001	1.10
Concerns for laying hens/broilers for meat (o)	0.07	0.000	1.07
Credibility of Internet media (factor) (n)	0.06	0.081	1.06
Concerns for pigs animal welfare (o)	0.03	0.036	1.03
Spain (r)	−0.34	0.002	0.71
Italy (r)	−0.18	0.090	0.83
Gender (j)	−0.12	0.090	0.88
Perceived current animal welfare level (p)	−0.09	0.000	0.92
Animal use for fur, work, sport, and cosmetics (k)	−0.04	0.000	0.96
Correct classification		62.1%	
Hosmer and Lemeshow Test (Sig. = 0.12)			

Respondents from Poland and Sweden were prone to supporting more restrictive regulations. Respondents who exhibited high subjective information levels were more concerned with the welfare of laying hens, broilers, and pigs and were more likely to agree with adopting more restrictive animal welfare legislation. Respondents who attributed higher credibility to Internet information showed a higher likelihood of accepting more restrictive regulations. Respondents from Spain and Italy were less likely to accept more restrictive regulations. These results highlight the Spanish opinion regarding animal welfare legislation. According to the Eurobarometer survey (Eurobarometer, 2005), 60% of respondents believed that welfare protection had improved over

the last 10 years, so there is probably no need for additional restrictive regulations. Compared with those from other European countries, respondents from northern European countries showed the greatest concern for animal welfare in farm production systems. Respondents who perceived that the current animal welfare level in their country is high and who agree with using animals for fur and cosmetic production, work, and sports were less likely to accept more restrictive regulations. Finally, men exhibited less interest in adopting more restrictive animal welfare regulations. In general, women are more concerned about this issue and are more likely to support more restrictive regulations regarding animal welfare (A. Cornish et al., 2016). Women generally demonstrate more affection toward animals and exhibit a greater preference for more restrictive animal welfare standards (Vanhonacker et al., 2008; Lagerkvist & Hess, 2011).

2.4 Bibliography

Boogaard, B. K. et al. (2011) 'The sociocultural sustainability of livestock farming: an inquiry into social perceptions of dairy farming', Animal, 5(09), pp. 1458–1466. doi: 10.1017/s1751731111000371.

Carbone, L. (2004) What Animals Want: Expertise and Advocacy in Laboratory Animal Welfare Policy, What Animals Want: Expertise and Advocacy in Laboratory Animal Welfare Policy. doi: 10.1093/acprof:oso/9780195161960.001.0001.

Clark, B. et al. (2016) 'A Systematic Review of Public Attitudes, Perceptions and Behaviours Towards Production Diseases Associated with Farm Animal Welfare,' Journal of Agricultural and Environmental Ethics. Springer Netherlands, 29(3), pp. 455–478. doi: 10.1007/s10806-016-9615-x.

Cornish, A., Raubenheimer, D. and 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(11), pp. 1–15. doi: 10.3390/ani6110074.

Eurobarometer (2005) 'Attitudes of consumers towards the welfare of farmed animals Wave 2', TNS Opinions & Social, (229), p. 56. Available at: http://ec.europa.eu/food/animals/docs/aw_arch_hist_sp_barometer_fa_en.pdf.

Frewer, L. J. et al. (2005) 'Consumer attitudes towards the development of animal-friendly husbandry systems,' Journal of Agricultural and Environmental Ethics, 18(4), pp. 345–367. doi: 10.1007/s10806-005-1489-2.

Grunert, K. G. et al. (2018) 'Consumer interest in environmental impact, safety, health and animal welfare aspects of modern pig production: Results of a cross-national choice experiment,' Meat Science. Elsevier, 137(July 2017), pp. 123–129. doi: 10.1016/j.meatsci.2017.11.022.

Harper Spencer Henson, G. et al. (2001) Consumer Concerns about Animal Welfare and the Impact on Food Choice EU FAIR CT98-3678 FINAL REPORT. Available at: https://ec.europa.eu/food/sites/food/files/animals/docs/aw_arch_hist_eu_fair_project_en.pdf.

Kallas, Z., Gómez-Limón, J. A. and Arriaza, M. (2007) 'Are citizens willing to pay for agricultural multifunctionality?', Agricultural Economics, 36(3), pp. 405–419. doi: 10.1111/j.1574-0862.2007.00216.x.

Kjærnes, U. and Lavik, R. (2008) Opinions on animal welfare and food consumption in seven European countries, Consumption, Distribution and Production of Farm Animal Welfare. Opinions and Practices within the Supply Chain. Welfare Quality Reports No.7.

Krystallis, A. et al. (2009) 'Attitudes of European citizens towards pig production systems,' Livestock Science. Elsevier B.V., 126(1–3), pp. 46–56. doi: 10.1016/j.livsci.2009.05.016.

Lagerkvist, C. J. and Hess, S. (2011) 'A meta-analysis of consumer willingness to pay for farm animal welfare,' European Review of Agricultural Economics, 38(1), pp. 55–78. doi: 10.1093/erae/jbq043.

Lassen, J., Sandøe, P. and Forkman, B. (2006) 'Happy pigs are dirty! - conflicting perspectives on animal welfare', Livestock Science, 103(3), pp. 221–230. doi: 10.1016/j.livsci.2006.05.008.

Marcińczak, S. and Musterd, S. (no date) '15 Inequality and rising levels of socio-economic segregation Lessons from a pan-European comparative study', (Nightingale 2012).

Marcus, B. H. et al. (1998) 'Physical activity interventions using mass media, print media, and information technology', American Journal of Preventive Medicine, 15(4), pp. 362–378. doi: 10.1016/S0749-3797(98)00079-8.

O'Driscoll, K., von Keyserlingk, M. A. G. and Weary, D. M. (2010) 'Effects of Mixing on Drinking and Competitive Behavior of Dairy Calves,' Journal of Dairy Science. Elsevier, 89(1), pp. 229–233. doi: 10.3168/jds.s0022-0302(06)72087-2.

Paul, P., Pennell, M. L. and Lemeshow, S. (2013) 'Standardizing the power of the Hosmer-Lemeshow goodness of fit test in large data sets,' Statistics in Medicine, 32(1), pp. 67–80. doi: 10.1002/sim.5525.

Phillips, C. J. C. et al. (2009) 'Perceptions of the importance of different welfare issues in livestock production,' Animal, 3(08), pp. 1152–1166. doi: 10.1017/s1751731109004479.

Principles, O. (1999) 'The OECD Principles of Corporate,' Organisation for Economic Co-operation and development, (216), pp. 183–194.

Serpell, J. A. (2018) 'Factors Influencing Human Attitudes to Animals and Their Welfare,' (April).

Toma, L. et al. (2012) 'Consumers and animal welfare. A comparison between European Union countries', Appetite. Elsevier Ltd, 58(2), pp. 597–607. doi: 10.1016/j.appet.2011.11.015.

Vanhonacker, F. et al. (2008) 'Do citizens and farmers interpret the concept of farm animal welfare differently?', Livestock Science, 116(1–3), pp. 126–136. doi: 10.1016/j.livsci.2007.09.017.

Whiting, T. L. (2003) 'Foreign animal disease outbreaks, the animal welfare implications for Canada: Risks apparent from international experience,' Canadian Veterinary Journal, 44(10), pp. 805–815.

CHAPTER 3. SHOULD ANIMAL WELFARE BE INCLUDED IN EDUCATIONAL PROGRAMS? ATTITUDES OF SECONDARY AND UNIVERSITY STUDENTS FROM EIGHT EU COUNTRIES.

JOURNAL OF APPLIED ANIMAL WELFARE SCIENCE
https://doi.org/10.1080/10888705.2021.1969931

Should Animal Welfare be Included in Educational Programs? Attitudes of Secondary and University Students from Eight EU Countries

Niloofar Pejman [a], Zein Kallas [b], Lourdes Reig [b], Antonio Velarde [c], María Moreno [c], Diego Magnani [c], Vicky Protopapadaki [c], Vytautas Ribikauskas [d], Daiva Ribikauskienė [e], and Antoni Dalmau [c]

[a]Institute for Research in Sustainability Science and Technology (IS-UPC), Polytechnic University of Catalonia, Barcelona, Spain; [b]Centre for Agro-food Economy and Development, CREDA-UPC-IRTA, Castelldefels, Spain; [c]Institute of Agrifood Research and Technology- IRTA, Nutrition, Health and Animal Welfare Programm, Animal Welfare Subprogram, Monells, Spain; [d]Veterinary Academy, Lithuanian University of Health Sciences, Department of Food Safety and Quality, Kaunas, Lithuania; [e]Kauno Kolegija/University of Applied Sciences, Department of Environmental Engineering, Kaunas, Lithuania

ABSTRACT

Animal Welfare (AW) educational programs aim to promote positive attitudes of future generations toward animal production systems. This study investigated whether secondary and university students in the majors that are not related to AW teaching believe that this concept should be included also in their educational programs. The determinant factors affecting students' attitudes toward such a decision were analyzed. This research has focused on eight European countries (Spain, the United Kingdom, Poland, Greece, Lithuania, Romania, Italy, and Sweden) targeting 3,881 respondents composed of 1,952 secondary and 1,929 university students. The results showed that female university students with a high level of subjective and objective knowledge on AW and who required more restrictive AW regulations, gave support to include the concept in their educational programs. However, Students who support medical experiments that use animals to improve human health were less likely to accept AW education. Furthermore, students in Italy compared to those in Sweden were prone to support AW educational programs. Results highlight the importance of teaching the AW concept as a comprehensive teaching tool at universities and schools' programs as it may constitute a starting point for a more sustainable society toward improving animal living conditions, mainly in the Mediterranean countries in secondary schools.

KEYWORDS

Animal welfare; educational programs; secondary school; university; European union

Introduction

In parallel with growing public attitudes toward the current level of animal welfare (hereafter, AW) (Miranda-de la Lama et al., 2013; Van Der Weijden & Verhave, 2013), the education system becomes an important pathway to enhance adolescent's awareness regarding farm animal's life (Ascione & Weber, 1996; Jamieson et al., 2012; Taylor & Signal, 2005). The World Health Organization (WHO) declared that the high school education provides the opportunity to deliver information and knowledge, affecting the younger generation's attitudes toward informed food choices (WHO_HPR_HEP_96.1.pdf, n.d.) that may include AW as a relevant credence factor.

CONTACT Niloofar Pejman niloofar.pejman@upc.edu Institute for Research in Sustainability Science and Technology (IS-UPC), Polytechnic University of Catalonia, Barcelona 08034, Spain; Zein Kallas zein.kallas@upc.edu Centre for Agro-food Economy and Development, CREDA-UPC-IRTA, Castelldefels 08860, Spain

Impact Factor:1.44

Q1 (2020)

3.1 Data Collection, questionnaire, and sample size

In 2014, the European Commission launched the research project EDUCAWEL dealing with education and information activities, including various aspects of European culture, in eight European countries: Spain, Italy, Romania, Greece, Lithuania, the United Kingdom, Poland, and Sweden. The Institute for Research and Technology in Food and Agriculture (IRTA, Spain) coordinated the project in which several member states took part. Secondary and university students were interviewed and randomly selected from the students' population. In this regard, 1,952 secondary students (54% female and 46% male) from 6 schools per country (3 in rural and 3 in urban areas) were selected. Their mean age ranged from 15 years in Sweden and the United Kingdom, 16 in Poland and Lithuania, and 17 in Greece, Italy, Romania, and Spain. Also, 1,929 graduate students (58% female and 42% male) from 8 faculties per country (64 in total) were analyzed. In each country, the communication, education, economics, and engineering faculties at universities in the capital cities and the second largest city of each country were visited. The mean age was 20 in Poland and Sweden, 21 in Greece, 22 in Lithuania, Romania, Spain, the United Kingdom, and 23 in Italy. The questionnaire was approved by the ethics committee of the Centre for Agro-food Economy and Development of the Universitat Politècnica de Catalunya (UPC). The survey was conducted according to the relevant ethical principles, taking specific care to protect personal information according to the European General Data Protection Regulation No. 2016/679. The questionnaire was divided into different parts dealing with different aspects of AW. The questionnaire started with an open question regarding the driven- definition of AW. Further, it contained several questions dealing with the level of concerns related to animal species, students' subjective and objective knowledge level regarding AW concept, the sources of information they usually use to be informed, their opinions towards the different potential use of animals in different human life activities and the socio-demographic variables.

3.2 Factors affecting students' opinions to include AW in their curricula

To assess students' opinions towards AW and its inclusion in their educational program, they were directly asked if AW concept and issues should be taught and included in their curriculum. A binomial logistic regression (logit model) was applied to understand the factor affecting the student's decision and opinion. The response variable (Y) is defined as 1 if a respondent answer "yes" for implementing AW in the curriculum of school and university and a value of 0 if a respondent answer "no." The independent variables were presented according to the following categories:

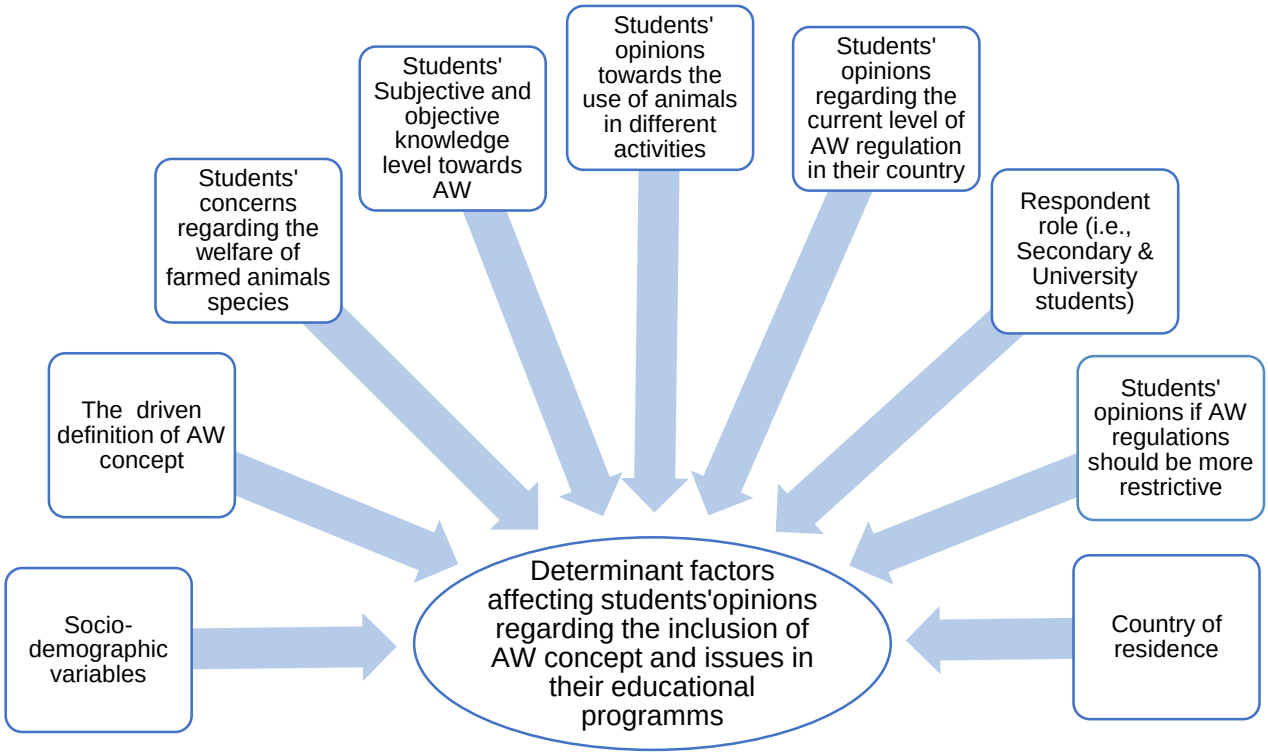


Figure 1: Set of the dependent variables included in the modeling approach

The Logit model is a probabilistic model used to predict the relationship between predictors (independent variables) and a predicted variable (dependent) where the dependent variable Y is a dummy (coded as 0 and 1). In our empirical application:

Y_i= 1 represents the student agreement with implementing the AW concept within the curriculum of secondary school and university

Y_i = 0 otherwise.

In this case, the logit model can be modeled as follows: $\ln\left(\frac{p_i}{1-p_i}\right) = X_i^{'}.\beta$

where $\beta' = [\beta_0, \beta_1, ..., \beta_k]$ is the coefficient(s) on the independent variable(s) $X_i' = [1, X_{1i}, X_{2i}, ..., X_{ki}]$. For the estimation process, the maximum likelihood was used following the stepwise method and the Wald index to select the best independent variables with the best goodness of fit and individual classification.

The next sections describe how the set of the independent variables identified in Figure 1 was measured.

3.2.1 What Animal Welfare concept means to students?

To set the baseline level of what AW means for students, an open question was introduced to collect their opinions. Students were asked directly, "*What do you think Animal Welfare means*?". The interviewers qualitatively collected the students' answers. The words and expressions were analyzed *a posteriori* using the qualitative content analysis.

The most common expressions and words extracted were categorized according to the Five Domains (FD) model approach for AW assessment proposed in Mellor & Beausoleil, 2015. The FD includes the 1) appropriate and natural behavior, 2) good and clean environment, 3) good and natural feeding, 4) good health, and 5) emotional state (good feeding, happiness, other emotions, fear & distress). Accordingly, in this research, an adapted form of the FD was used to define the main dimensions of the AW concept (Figure 2) that were described into the following AW aspects: 1) outdoor access, 2) housing conditions, 3) suffering, 4) healthy conditions, 5) stress, 6) emotions 7) behavior 8) feeding and 9) happiness. Thus in the logit modeling specification, dummy variables were created for each aspect.

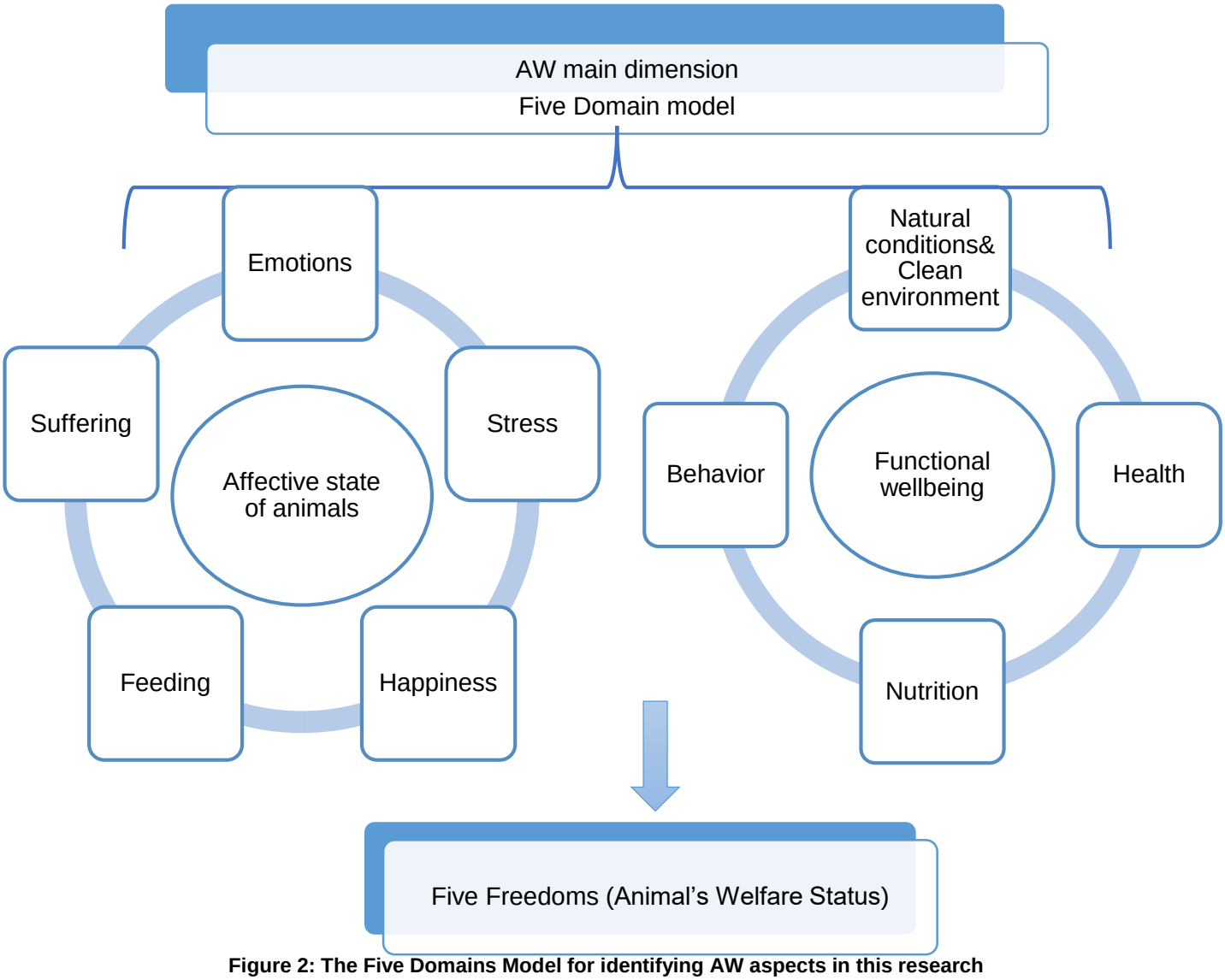


Figure 2: The Five Domains Model for identifying AW aspects in this research (Adapted from Mellor & Beausoleil, 2015)

3.2.2 Students' concerns regarding the welfare of farmed animals' species

To identify the relative importance of students' concerns regarding the AW of different animal species, they were asked, "*How much they worry about the welfare of the following animal species?"* using an 11 points Likert-type scale ranging from 0 (not worried at all) to 10 (completely worried). Several studies highlighted the importance of analyzing the attitude towards AW depending on the animal species involved (Bradley et al., 2020). Some studies showed that there is a significant positive relationship between knowledge about specific animal species and responsible environmental' attitudes (Randler et al., 2005). In this context, the different animal production systems included were: 1) Laying hens, 2) Milk cows, 3) Beef for meat, 4) Goats for milk, 5) Broilers for meat, 6) Rabbits for meat, 7) Pigs for meat, 8) Sheep for milk and 9) Laboratory animals.

3.2.3 Students' opinions regarding animals use in human activities

Students were asked about their opinions regarding the alternative uses of animals using an 11 points Likert-type scale ranging from 0 (absolutely disagree) to 10 (absolutely agree). Several statements regarding the AW concept were identified from the literature on AW perception and attitudes after a deep review regarding the potential animal use within human activities. Several statements were included according to the main objective of this research as follows:

1 Do you agree that animals are used for work? (Tesfaye & Curran, 2005; Pritchard et al., 2005; Burn et al., 2010).
2 Do you agree that animals are used for entertainment or sports? (Keeling et al., 2017; Martens et al., 2019; Cembalo et al., 2016).
3 Do you agree with keeping animals for the production of fur? (Broom & Fraser, 2015; Phillips et al., 2012b).
4 Do you agree with keeping animals for the production of food? (Gruzalski, 1983; Phillips et al., 2012b).
5 Do you agree with observing animal behavior in an experiment? (Sandgren et al., 2020; Phillips et al. 2012c).
6 Do you agree that medical experiments use animals to improve human health? (Sandgren et al., 2020; Phillips et al. 2012b)
7 Do you agree with testing cosmetics or household products on animals? (Sandgren et al., 2020; Cornish et al., 2020; Phillips et al. 2012b).
8 Do you agree with improving animals' health through genetic changes?(Ormandy & Schuppli, 2014; Devolder & Eggel, 2019).
9 Do you agree with inflicting pain or injury on animals as part of cultural traditions? (María et al., 2017).

3.2.4 Students' subjective and objective knowledge towards animal welfare regulations

The students' subjective knowledge (i.e., what the students believe they know) about current AW regulations in farmed animal production systems, as well as their objective knowledge (what the students objectively know), were analyzed. The former was assessed by asking students, "*How much informed do you think you are about animal welfare regulations?"* using an 11-point Likert-type scale ranging from 0 (Not informed at all) to 10 (have high knowledge). The latter was measured by asking respondents to identify from a group of 13 proposed statements on AW regulations that only some of them (8 statements) are currently regulated in a common policy framework at the EU level. For each respondent, an index was created in which the correct classification of the aforementioned statements was counted. This index ranged from 1 (if a respondent correctly recognized only one regulation) to 13 (if a respondent correctly recognized all the proposed regulations). The regulations presented (Figure 3) were the following:

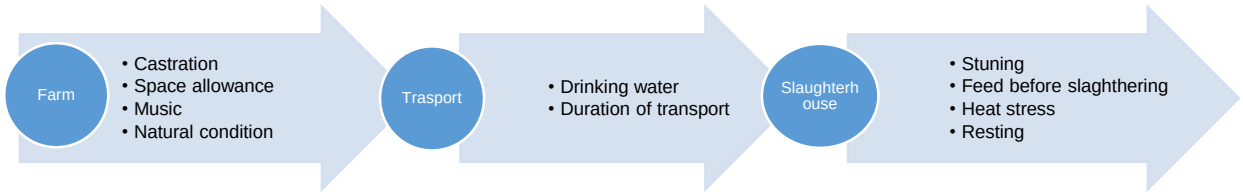


Figure 3: Understanding the aspect of AW issues currently regulated in a common policy framework at the EU level

The question to collect the knowledge level was: *Which of the following aspects do you think are regulated by Animal welfare legislation?*

(1) Space allowance per animal in relation to the animal's weight; (Council Directive 2007/43/EC).

(2) Age at and method of castration of animals (Council Directive 2001/88/EC of 23 October 2001).

(3) Limits to the use of cages and ties on animals (EU Directive 99/74/EC).

(4) The obligation with respect to certain species to use straw as a bedding material or environmental enrichment material (EC Directive 2001/93/EC).

(5) Animals that are not to be transported (Council Directive 91/628/EEC of 19 November 1991).

(6) The obligation to stun animals before slaughtering (Council Directive 74/577/EEC of 18 November 1974).

(7) The obligation to feed animals after a certain number of hours at the slaughterhouse; (93/119/EC of 22 December 1993).

(8) The obligation to use showers in cases of heat stress (not regulated);

(9) The obligation to have background music in farmyards (not regulated);

(10) The obligation to limit groups of animals to four individuals (not regulated);

(11) The obligation to have available water for animals that are transported, whatever the duration of transport (not regulated);

(12) The obligation to give animals space for resting before slaughter; (Council Directive 93/119/EC of 22 December 1993).

(13) Limits to the number of animals per drinking trough in a pen (not regulated).

3.2.5 Credibility of the information source on AW

Respondents were asked, "*what is for you the credibility of these sources of information on AW?"* using an 11-point Likert-type scale ranging from 0 (low level of credibility) to 10 (high level of credibility). The categories of information sources were: a) News from TV and radio, b) spots from TV and radio, c) specific programs/ radio or TV documentaries, d) generalist newspapers, e) specialized magazines, f) books, g) informative brochures, h) label of the products, I) communication campaigns of private companies, j) generalist websites in internet and k) specialized websites on the internet.

3.3 Results and Discussions

3.3.1 What does Animal Welfare mean for students?

From the qualitative content analysis carried out on both students' types, the frequency of the previously identified AW aspects was calculated. As can be seen (Figure 4), the most important aspect relating to the understanding of the AW concept was the clean housing and healthy environment for animals for the students from the Central European countries (Romania, Poland, and Lithuania), United Kingdom, and Sweden as Northern European country.

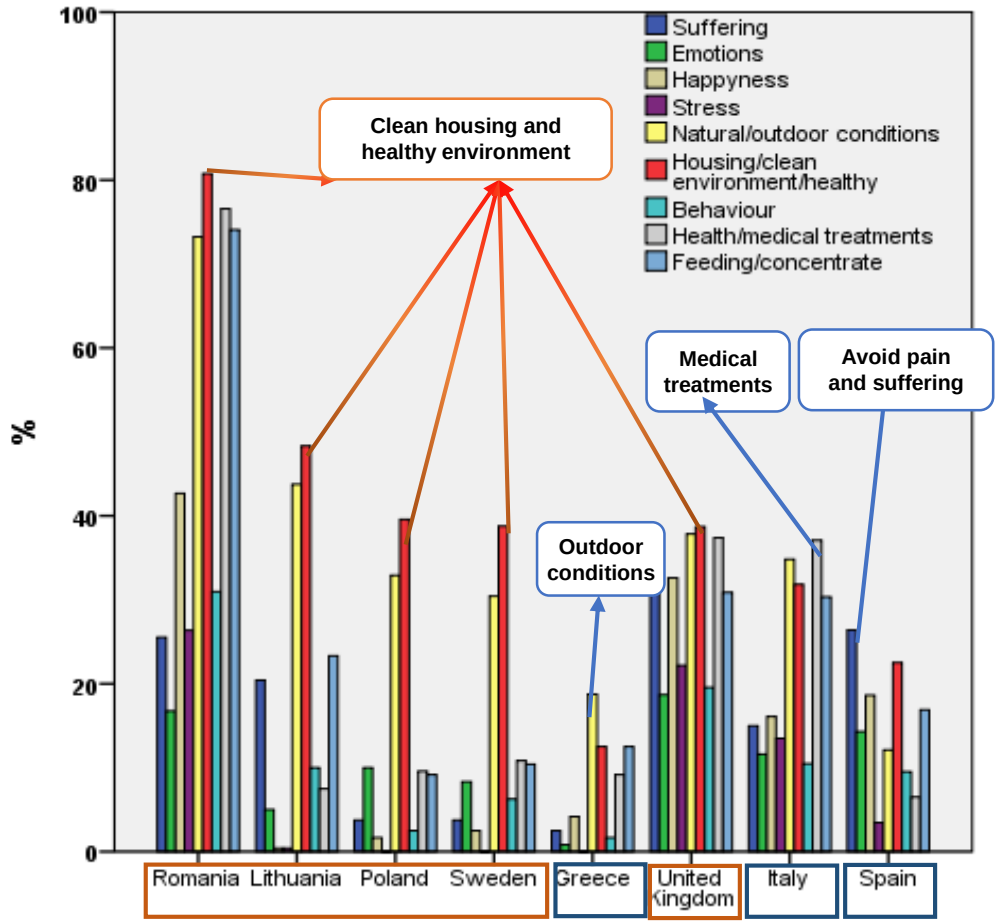


Figure 4. Animal welfare understanding of secondary and university students

This is consistent with Carenzi & Verga. (2009), who found that the management and resource-based terms including housing, feeding, health, and natural conditions are usually the most important factors of AW among students. These results are also supported by Magnani et al. (2017), who showed that students with different majors at university, including communication, education, economics, and engineering assigned the highest overall value to issues of animal feeding, housing, and natural conditions.

However, students from the Mediterranean European countries (Greece, Spain, and Italy) showed a high heterogeneity level of AW understanding. The most important aspect in Greece, Spain, and Italy was the outdoor conditions, avoid pain and suffering, and medical treatment, respectively. In

the case of Spain, this could be related to cultural and traditional events such as bullfights in which animals are injured (María et al., 2017). In recent years concerns increased as some societal organizations consider these festivals as cruel acts and thus in some regions in Spain (Catalonia) are currently banned. In the case of students in Italy, AW was more related to medical treatment and natural conditions. Annunziata et al. (2010) highlighted that for Italian the most important additional information on the label that assesses animal welfare is the use of antibiotics, hormones, and growth promoters. Our results also are in the same line as (Caracciolo et al., 2016), who mentioned that outdoor access in Greece was evaluated as the most positive aspect for a cleaner livestock production system.

3.3.2 Students' concerns regarding the Animal Welfare of the farmed animals

Results (Table 1) showed a high level of heterogeneity regarding students' concerns towards farmed animal AW. However, in general, students in Romania, Italy, Spain, and Greece demonstrated a high concern level for the different animal species compared to Lithuania, the United Kingdom, Poland, and Sweden. In the majority of the analyzed countries, students assigned higher levels of concern for pigs, milk cows, and broilers than rabbits, goats, and laying hens. Regarding animals for food, pork is considered the most popular and consumed meat product, with a world production of 113,070 thousand tons' meat in 2018 (Soare & Chiurciu, 2017). Pigs are also used to test cosmetics products and for other medical uses around the world (Lara De La Casa, 2017). As in the case of the pig, the regularly consumed dairy products such as milk, cheese, and yogurt would also play a relevant role in highlighting the respondent's concerns.

The results showed that secondary students in the Mediterranean countries (Italy, Spain, Greece), Central European countries (Romania and Lithuania), and the United Kingdom exhibited greater concern regarding AW than university students. This result is supported by Kellert (1984), who showed that secondary students are more concerned about ethical issues related to animals and the natural environment. This author suggested that some wildlife-related activities, visiting natural surroundings, zoos, and aquarium activities have a positive impact on secondary students' perception toward animal species. Also, Martens et al. (2019) showed that 12 to 15-year-old students are much more concerned about using animals for different activities and they can develop more mature cognitive capacities than 16-21-year-old students. Campbell (2008) commented that there is a strong relationship between secondary students and animal ownership, which makes students more capable of better elaborate moral judgments based on feelings of concern (Bjerke et al.,1998) found that there is a significant relationship between a high level of empathy toward animals and early age of students.

Results also showed that secondary students exhibited greater concern toward the welfare of broilers and pigs. Italian secondary students assigned the highest overall score to pigs' welfare. This result is in accordance with the findings of Pagani et al. (2007), who showed that the attitudes toward

animals of Italian secondary students are highly related to animal abuse. In Spain, considerable concern has been found concerning pig production systems, broilers, beef, and cow's milk. In Sweden, students' concerns towards the different animal species were in general low. This could be related to the strict regulations applied, including cattle, poultry, and pigs in terms of transportation, housing, and management (Averós et al., 2013).

Analyzing the students' opinions regarding the current AW level applied in their countries (shadowed cells of Table 1), results showed the lowest perceived level in Greece and the highest in the UK. The additional AW legislation in the UK could have played a role, affecting respondents' trust towards AW level (Van Horne & Achterbosch, 2008) positively. Vogeler (2019) showed that individuals in the UK believe that animals do not need better protection. Students in Greece showed that AW was not given enough importance in their countries' policies, as also highlighted by Phillips et al. (2012b), who confirmed the lack of knowledge on animal production systems. This could be related to the use of animals in experimental research and medical issues, which had their roots in ancient Greece (Baumans, 2005). Following the methodological approach (the last row of table 2), results showed distinct opinions among secondary and university students: all university students exhibited high agreement to support more restrictive regulations regarding animal welfare, whereas Romania secondary students showed greater interest in more restrictive regulations. This result is supported by the finding of Pejman et al. (2019), who showed that individuals in Lithuania were more willing to support restrictive regulations. Interestingly, secondary students in Greece were less worried regarding restrictive regulations toward AW, whereas the greatest support of more restrictive regulations regarding animal welfare was found for university students in Greece. Cultural traditions with a set of beliefs and moral values can profoundly affect the rejection of more restrictive regulations regarding animal welfare (Pejman et al., 2019).

Table 1. Secondary & University students' AW concerns regarding the different animal production systems measured on a scale from 0 (if students are not worried) to 10 (if students are completely worried)

Country		Romania		Italy		Spain		Greece		Lithuania		United Kingdom		Poland		Sweden	
		U	S	U	S	U	S	U	S	U	S	U	S	U	S	U	S
Laying hens		6.23	5.56	5.84	5.63	6.26	6.45	5.69	5.51	4.35	5.00	4.97	4.10	4.25	4.37	4.42	4.80
Milk cows		6.67	5.98	6.36	6.59	6.79	7.27	6.41	5.94	4.79	5.34	4.41	4.01	3.87	4.51	4.35	4.72
Beef for meat		6.31	5.72	6.74	6.82	6.95	7.28	6.75	6.51	5.26	5.44	4.97	4.81	4.23	4.67	4.66	4.57
Broilers for meat		5.57	6.39	5.85	6.90	6.58	7.15	6.29	6.47	4.66	5.05	4.29	5.18	3.65	5.02	3.77	5.19
Pigs for meat		5.95	6.73	6.57	7.47	6.65	7.38	6.53	6.47	5.17	5.57	4.36	4.59	4.23	5.06	5.31	5.10
Goats for milk/meat		5.59	4.45	6.11	5.92	6.52	6.88	5.90	6.11	4.97	5.10	4.66	4.57	3.78	3.83	3.73	3.98
Rabbits for meat		6.48	4.96	6.46	6.60	6.71	6.19	6.83	6.13	5.60	5.37	4.95	4.97	4.67	4.17	5.30	4.38
Sheep for milk/meat		5.54	5.20	6.03	6.55	6.62	6.23	6.54	6.25	5.14	5.11	4.57	4.66	3.84	4.25	3.52	4.62
Laboratory animals		4.61	3.53	5.76	5.96	6.96	6.35	7.36	8.06	5.45	5.74	6.01	5.89	5.06	5.58	5.49	4.90
Opinions regarding the level of animal welfare in their countries		4.87	4.93	5.23	5.24	4.59	5.62	3.95	4.00	5.14	5.79	6.23	6.35	5.66	4.63	5.61	5.25
Opinions if AW regulations should be more restrictive (%)	Yes	76.2	78.5	74.2	22.6	79.4	18.0	90.4	8.8	85.4	25.0	69.6	31.6	60.4	37.5	82.5	20.4
	No	23.8	21.5	25.8	77.4	20.6	82.0	9.6	91.3	14.6	75.0	30.4	68.4	39.6	62.5	17.5	79.6

U: University students. S: Secondary students

3.3.3 Opinions of secondary and university students towards animals' use alternatives

Results of students' opinions regarding the different potential uses of animals are presented in Table 2. On the one hand, results showed that university students assigned the highest overall agreement score (shadowed cells) to kill animals when they are seriously injured or ill. On the other hand, the highest agreement score for secondary students (shadowed cells) was for animal uses in research experiments. Secondary students from Italy, Spain, Greece, Lithuania, and Sweden were more likely to accept animals to be used in experiments for all research types (observing animals in laboratory experiments, improving animals' health by genetic changes, and testing drugs for humans health). This result is supported by France & Birdsall (2015), who reported that secondary students exhibited greater support for animals used in research. Secondary students generally accepted animal use in research to improve human health (Birdsall & France, 2011). However, results showed that secondary students from Poland were more likely to use animals in sports and those from the UK to use animals for work.

The lowest agreement level for secondary and university students was found for the use of animals for cosmetic testing and painful sociocultural traditions. Several studies either fully or partly confirmed the negative attitudes toward animal use in cosmetic production. Chinese university students were in favor of banning the use of animals in the testing of cosmetics and household products (Davey & Wu, 2007). Some studies showed that respondents had a higher likelihood of accepting animals to be used for medical research than testing cosmetics (Henry & Pulcino 2009; Knight & Barnett, 2008). According to Phillips & McCulloch (2005), students in European countries except Spain and Italy are more concerned regarding the use of animals for cosmetic product testing compared to those from Asian countries. Some studies showed that individuals had a higher level of agreement to use animals for medical research than testing cosmetics(Clemence & Leaman, 2016; Ormandy & Schuppli,2014).

Table 2. Summary of the agreement level of secondary & university students' opinions regarding the animal uses

	Romania		Italy		Spain		Greece		Lithuania		United Kingdom		Poland		Sweden	
	U	S	U	S	U	S	U	S	U	S	U	S	U	S	U	S
Do you agree with using animals for entertainment or sports?	7.14 ±2.703	5.69 ±3.593	4.08 ±2.910	3.72 ±3.386	3.84 ±3.150	4.06 ±3.341	2.23 ±2.782	2.00 ±2.511	7.27 ±2.814	4.82 ±3.391	3.98 ±3.123	3.34 ±3.032	7.06 ±3.177	5.70 ±3.635	6.70 ±2.993	4.63 ±3.201
Do you agree that animals are used for work?	6.10 ±3.113	4.90 ±3.501	6.35 ±2,424	4.75 ±3.217	5.59 ±2.733	4.85 ±2.919	5.20 ±3.040	3.97 ±3.107	7.36 ±2.556	4.87 ±3.226	6.46 ±2.795	4.83 ±3.107	7.08 ±3.168	4.65 ±3.689	6.18 ±3,303	4.84 ±3.360
Do you agree with killing animals when they are seriously injured or ill?	6.87 ±3.29	5.22 ±3.98	7.61 ±2.128	5.29 ±3.450	6.90 ±2.207	5.01 ±3.549	6.99 ±2.664	3.94 ±3.169	7.03 ±2.900	4.18 ±3.440	7.00 ±2.869	4.74 ±3.184	7.61 ±2.983	4.26 ±2.978	7.31 ±2.868	4.12 ±2.890
Do you agree that medical experiments use animals to improve human health?	6.36 ±3.192	4.72 ±3.642	6.12 ±3.187	4.54 ±3.417	4.97 ±3.016	5.32 ±3.121	5.28 ±3.240	4.79 ±3.487	5.06 ±3.385	4.42 ±3.448	5.44 ±2.959	3.97 ±3.083	4.96 ±3.549	3.75 ±3.407	2.95 ±2.761	3.08 ±2.497
Do you agree with observing animal behavior in a research experiment?	4.88 ±3.272	4.31 ±3.504	5.43 ±3.230	3.79 ±3.468	5.36 ±3.238	6.48 ±2.883	4.15 ±3.267	3.52 ±3.385	5.00 ±3.447	6.04 ±3.399	5.79 ±2.987	4.70 ±3.184	4.13 ±3.672	3.92 ±3.776	5.40 ±3.159	4.85 ±3.186
Do you agree with increasing animals' health or disease resistance by genetic changes?	4.26 ±3.564	4.33 ±3.597	6.00 ±3.043	5.87 ±3.237	3.91 ±3.156	4.24 ±3.207	4.61 ±3.388	4.54 ±3.410	4.21 ±3.288	5.64 ±3.372	4.19 ±2.890	4.25 ±2.939	3.64 ±3.481	3.82 ±3.617	3.11 ±2.650	2.97 ±2,813
Do you agree with inflicting pain or injury on animals as part of cultural traditions?	2.01 ±2.861	2.62 ±3.221	1.37 ±2.346	1.39 ±2.580	1.09 ±2.249	1.36 ±2.713	0.75 ±1.769	0.81 ±2.189	0.76 ±2.061	1.18 ±2.580	1.25 ±2.194	1.76 ±2.516	1.63 ±3.023	1.05 ±2.519	0.70 ±1.249	0.86 ±2.048
Do you agree with testing cosmetics or household products on animals?	3.20 ±3.069	2.76 ±3.208	2.74 ±2.841	2.28 ±3.052	1.91 ±2.593	3.37 ±3.013	1.50 ±2.475	1.78 ±2.796	2.30 ±3.017	2.08 ±2.836	2.48 ±2.582	2.14 ±2.583	2.40 ±3.186	1.44 ±2.682	1.82 ±2.215	1.23 ±1.680

S: Secondary students U: University students. Shadowed cells represent the highest agreement level. Values in the red lines represent the lowest agreement level

3.3.4 Level of Subjective and Objective knowledge of Animal Welfare

The secondary and university students were asked about their information level (subjective knowledge) of AW. The results (Figures 5 and 6) showed that students in the Mediterranean countries (Italy, Spain, and Greece), as well as students in Romania, believe that they are less informed compared to Northern European (United Kingdom, Sweden) as well as central European countries (Poland and Lithuania). Students in Lithuania showed the highest value of subjective knowledge, and the lowest value was found in Greece. This result is similar to the findings of Diego et al. (2017), who showed respondents from southern European countries exhibit a low level of information on AW.

Analyzing the objective knowledge level as described in the methodological section, results in Figures 7 and 8 showed that secondary and university students exhibited low objective knowledge regarding the current AW regulations with the percentage of correct answers being below 50%. However, significant differences were obtained similarly to those identified for the subjective knowledge except in the UK. The Mediterranean countries (Italy, Spain, and Greece) with Romania exhibited a low objective knowledge level compared to Northern European countries (United Kingdom, Sweden) as well as central European countries (Poland and Lithuania).

Figure 5. Subjective Knowledge level (University Students)

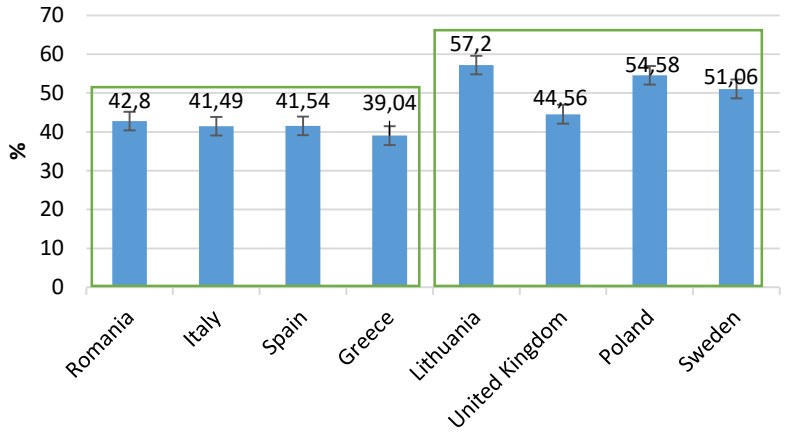


Figure 6.Subjective Knowledge level (Secondary Students)

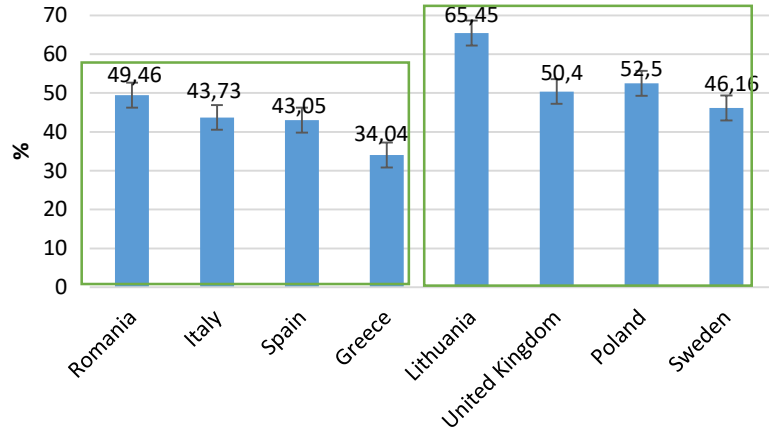


Figure 7. Objective knowledge level (University Students)

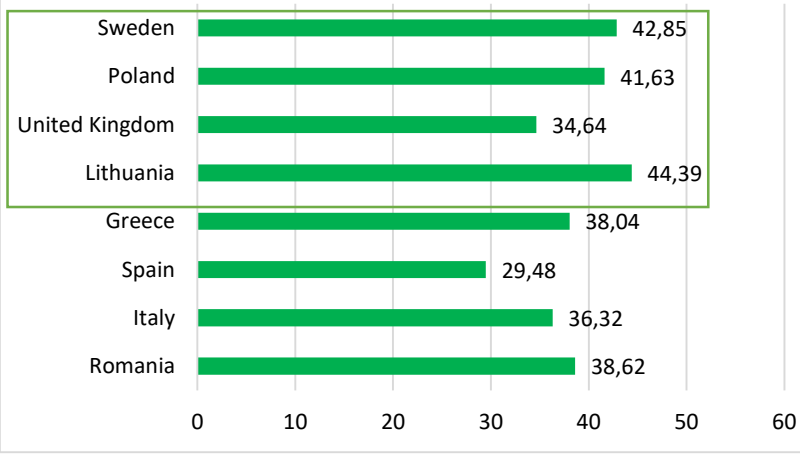
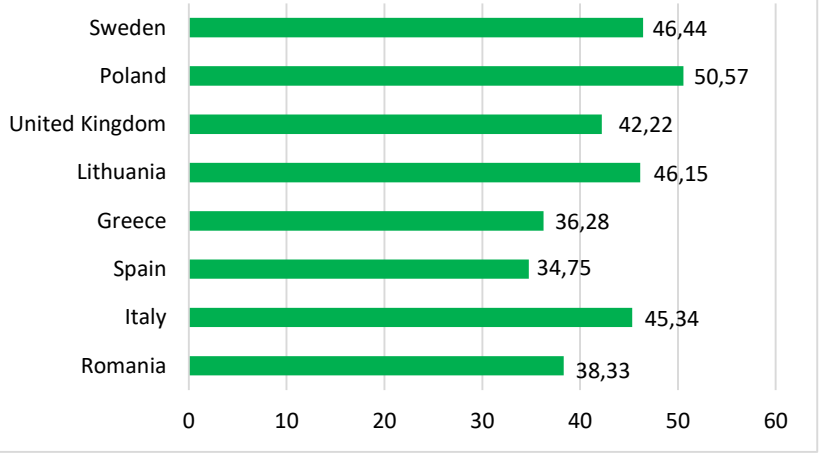


Figure 8. Objective knowledge level (Secondary Students)



Surprisingly, results showed that secondary students were more informed objectively, according to our methodological approach than university one in all countries except for Greece. This divergence was the highest in Poland and Italy. These results could be an indicator of the increasing level of social sensibility to AW aspects and the interest of the new generations in being more informed about the current AW regulations. Furthermore, results highlight the need in Greece for additional effort and policy measures for AW education campaign in secondary school. The same applies to Spain for university students as they showed the lowest level of objective knowledge level.

3.3.5 Factors affecting students' opinions if AW should be included in their educational programs

A logit model was applied to analyze determinants factors affecting respondents' decisions to support educational programs in secondary and university curriculum. The descriptive results (Figure 9 and 10) show that both secondary and university students are more likely to accept AW to be included in their educational programs, as was also highlighted by Sandgren et al. (2019). However, the results show that university students exhibited greater interest in the education of AW in almost all countries compared to secondary students except for the UK. This may be related to the organization of the Royal Society for the Prevention of Cruelty to Animals (RSPCA) within universities and college curricula in England which is dedicated to enhancing students´ attitudes to care for and respect animals.

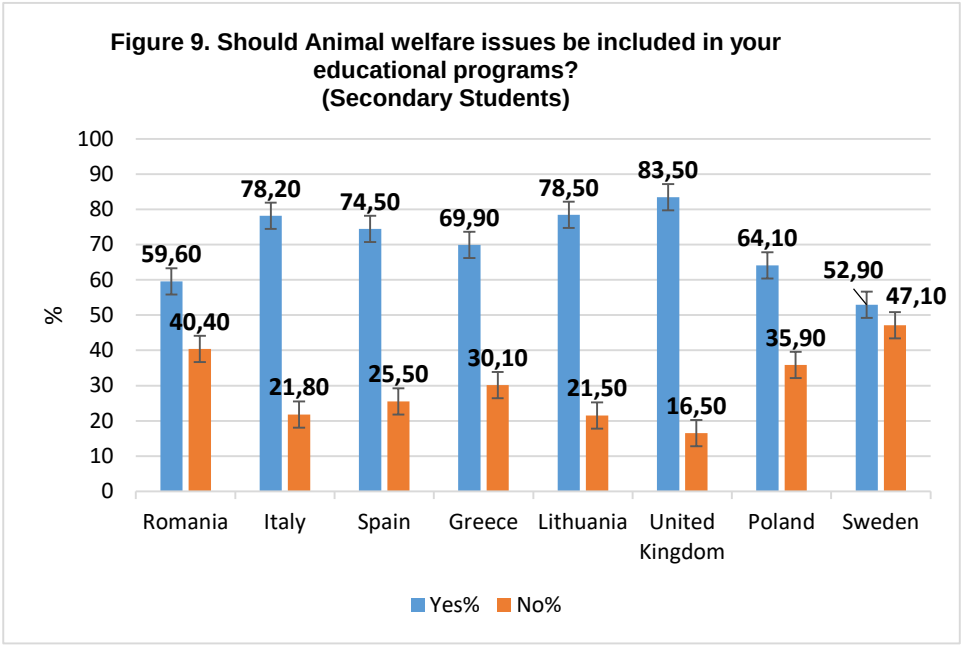


Figure 9. Should Animal welfare issues be included in your educational programs?
(Secondary Students)
100
90
80
70
60
50
40
30
20
10
0
%
59,60
40,40
78,20
21,80
74,50
25,50
69,90
30,10
78,50
21,50
83,50
16,50
64,10
35,90
52,90
47,10
Romania
Italy
Spain
Greece
Lithuania
United Kingdom
Poland
Sweden
Yes%
No%

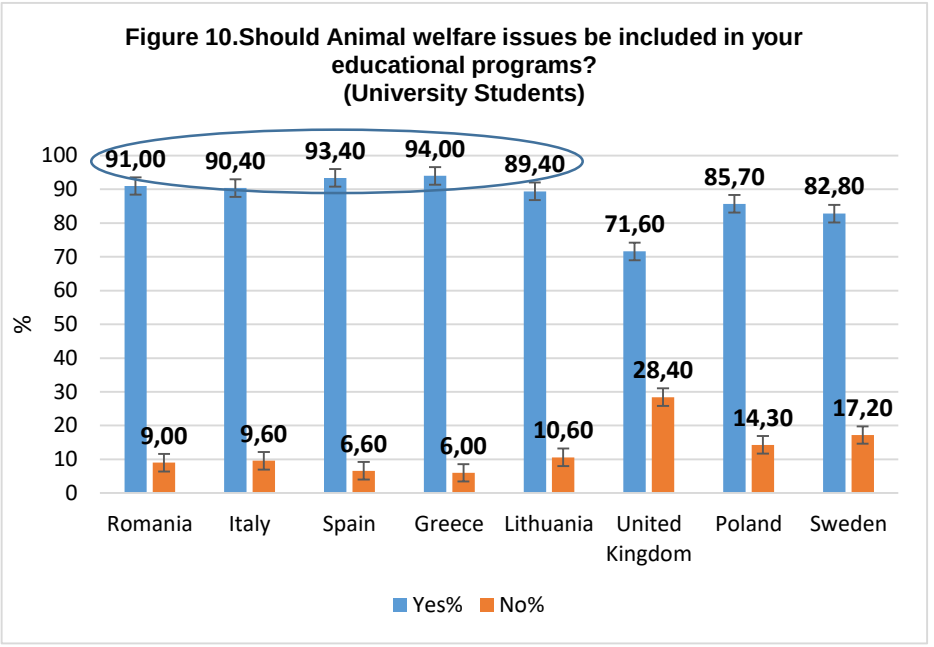


Figure 10.Should Animal welfare issues be included in your educational programs?
(University Students)
100
90
80
70
60
50
40
30
20
10
0
%
91,00
9,00
90,40
9,60
93,40
6,60
94,00
6,00
89,40
10,60
71,60
28,40
85,70
14,30
82,80
17,20
Romania
Italy
Spain
Greece
Lithuania
United Kingdom
Poland
Sweden
Yes%
No%

.

The dependent variable was codified as 1 for the "Yes" answers and 0 for the "no". The model was estimated on the pooled dataset by including a dummy variable for the respondent types (1 for university students and 0 for secondary one). Additional dummy variables were included representing each country. The results are shown in Table 4. As can be seen, a satisfactory rate (78.9%) of correct predictions was obtained.

Table 3. Factors affecting the acceptance to include AW in the students' educational programs

	B	Sig.	Exp(B)
Students' type (University students=1, School students=0)	1,219	0.000	3.385
Subjective Knowledge level about AW? (0 non informed to 10 very informed)	0.007	0.000	1.007
Objective Knowledge level (The percentage of the correct answer of respondents)	0.005	0.038	1.005
Concerns regarding the AW of beef cattle for meat production (0= I am not worried to 10= I am completely worried).	0.057	0.001	1.058
Concerns regarding the AW of Pigs for meat production (0= I am not worried to 10= I am completely worried).	0.034	0.038	1.035
Concerns regarding the AW of Laboratory animals (0= I am not worried to 10= I am completely worried).	0.079	0.000	1.082
Students' opinions if AW regulations should be more restrictive (1=Yes, 0=No)	0.538	0.000	1.69
Italy (1= Italy, 0= Others)	0.343	0.014	1.409
Sweden (1 = Sweden, 0 = Others)	-0.692	0.000	0.501
Do you agree that medical experiments use animals to improve human health? (0=absolutely disagree to 10 totally agree)	-0.028	0.037	0.972
Gender (1= female 0= male))	0.291	0.001	1.337
Correct classification		78.90 %	
Hosmer and Lemeshow Test (Sig.=0 .05)			

The results showed that university students were more likely to accept AW education in their university curriculum than secondary students in schools. This result is in accordance with Mazas et al. (2013), who showed that women and university students have a positive attitude toward AW compared to secondary students. Respondents from Italy as a Mediterranean country were prone to supporting AW educational programs in their curriculum. However, respondents in Sweden as a northern European country were less likely to accept AW education in their university educational programs. This could be related to the system of interactive teaching in northern European countries, which included teamwork, group discussion, and farm visits compared to the Mediterranean European one (Illmann et al., 2014). Ingenbleek et al. (2013) found that AW regulations in northern European countries are more highly organized compared to southern European countries and this could have played a relevant role. In defining respondents' preferences.

Women with a high level of subjective and objective knowledge levels were more concerned about the AW of the pig production systems, laboratory animals, and beef cattle. They were also in favor of supporting the inclusion of AW education in their curricula. This result is consistent with some studies which demonstrate that women were more concerned than men regarding the use of animals in different activities (Signal & Taylor, 2007; Serpell, 2018). Respondents who believe that current AW regulation should be more restrictive showed greater willingness to accept AW education in curricula. Students who agree that medical experiments that use animals to improve human health were less likely to accept to include AW education in their studies 'programs. In this regard, (Knight et al., 2004) believed that respondents experience a mental dilemma when they think about animal use. However, they prefer to ignore the implication of using animals because it makes them feel guilty. As a consequence, they compare the cost of animal use with its benefits, and then they tend to consider animal health is less important than human one.

3.4 Bibliography

Annunziata, A., Vecchio, R., Darnhofer, I., & Grötzer, M. (2010) 'The role of labelling in increasing consumers' sensitivity towards animal welfare: the Italian experience.', in In 9th International IFSA Symposium, p. (pp. 1983-1993).

Averós, X. et al. (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(3), pp. 786–807. doi: 10.3390/ani3030786.

Baumans, V. (2005) 'Science-based assessment of animal welfare: Laboratory animals,' OIE Revue Scientifique et Technique, 24(2), pp. 503–514.

Birdsall, S. and France, B. (2011) 'Attitudes towards using animals in research and teaching: opinions from a selected group of female secondary school students,' Kotuitui: New Zealand Journal of Social Sciences Online, 6(1–2), pp. 15–25. doi: 10.1080/1177083x.2011.614263.

Bjerke, T., Ødegårdstuen, T. S. and Kaltenborn, B. P. (1998) 'Attitudes toward animals among Norwegian children and adolescents: Species preferences.', Anthrozoös, 11, pp. 227–235.

Bradley, A. et al. (2020) 'Some animals are more equal than others: Validation of a new scale to measure how attitudes to animals depend on species and human purpose of use,' PLoS ONE, 15(1), pp. 1–24. doi: 10.1371/journal.pone.0227948.

Broom, D. M. and Fraser, A. F. (2015) 'The welfare of animals kept for fur production.', Domestic animal behaviour and welfare, pp. 308–312. doi: 10.1079/9781845932879.0308.

Burn, C. C., Dennison, T. L. and Whay, H. R. (2010) 'Relationships between behaviour and health in working horses, donkeys, and mules in developing countries', Applied Animal Behaviour Science, 126(3–4), pp. 109–118. doi: 10.1016/j.applanim.2010.06.007.

Campbell, C. (2008) 'Book review: Foucault, psychology and the analytics of power by Hook, Derek. Basingstoke: Palgrave MacMillan, 2007', 16(December 2008), pp. 1–16. doi: 10.1002/casp.

Caracciolo, F., Cicia, G., Del Giudice, T., Cembalo, L., Krystallis, A., Grunert, K. G., & Lombardi, P.

(2016) 'Human values and preferences for cleaner livestock production,' Journal of Cleaner Production, 112, pp. 121–130.

Carenzi, C. and Verga, M. (2009) 'Animal welfare: Review of the scientific concept and definition,' Italian Journal of Animal Science, 8(SUPPL. 1), pp. 21–30. doi: 10.4081/ijas.2009.s1.21.

Cembalo, L. et al. (2016) 'Determinants of Individual Attitudes Toward Animal Welfare-Friendly Food Products', Journal of Agricultural and Environmental Ethics. Springer Netherlands, 29(2), pp. 237–254. doi: 10.1007/s10806-015-9598-z.

Clemence, M. and Leaman, J. (2016) 'Public attitudes to animal research in 2016', (July). Available at: http://www.ipsos-mori.com/terms.

Cornish, A. R. et al. (2020) 'The price of good welfare: Does informing consumers about what on-package labels mean for animal welfare influence their purchase intentions?', Appetite. Elsevier, 148(January), p. 104577. doi: 10.1016/j.appet.2019.104577.

Davey, G. and Wu, Z. (2007) 'Attitudes in China toward the use of animals in laboratory research', ATLA Alternatives to Laboratory Animals, 35(3), pp. 313–316. doi: 10.1177/026119290703500305.

Devolder, K. and Eggel, M. (2019) 'No Pain, No Gain? In Defence of Genetically Disenhancing (Most) Research Animals', Animals, 9(4), p. 154. doi: 10.3390/ani9040154.

France, B. and Birdsall, S. (2015) 'Secondary Students' Attitudes to Animal Research: Examining the Potential of a Resource to Communicate the Scientist's Perspective,' European Journal of Science and Mathematics Education, 3(3), pp. 233–249. Available at: https://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ1107737&site=ehost-live.

Gruzalski, B. (1983) 'The Case Against Raising And Killing Animals For Food,' Ethics and Animals, pp. 251–265. doi: 10.1007/978-1-4612-5623-6_17.

Henry, B. and Pulcino, R. (2009) 'Individual difference and study-specific characteristics influencing attitudes about the use of animals in medical research,' Society and Animals, 17(4), pp. 305–324. doi: 10.1163/106311109X12474622855101.

Van Horne, P. L. M. and Achterbosch, T. J. (2008) 'Animal welfare in poultry production systems: Impact of EU standards on world trade,' World's Poultry Science Journal, 64(1), pp. 40–51. doi: 10.1017/S0043933907001705.

Illmann, G. et al. (2014) 'Mapping farm animal welfare education at university level in Europe,' Animal Welfare, 23(4), pp. 401–410. doi: 10.7120/09627286.23.4.401.

Ingenbleek, P. T. M. et al. (2013) 'The european market for animal-friendly products in a societal context', Animals, 3(3), pp. 808–829. doi: 10.3390/ani3030808.

Keeling, L. J., Rushen, J. and Duncan, I. J. H. (2017) Understanding animal welfare., Animal welfare. doi: 10.1079/9781845936594.0013.

Kellert, S. R. (1984) 'WBI Studies Repository Attitudes Toward Animals : Age-Related Development Among Children ATTITUDES TOWARD ANIMALS : AGE-RELATED DEVELOPMENT AMONG,' 85, pp. 43–60.

Knight, S. et al. (2004) 'Attitudes towards animal use and belief in animal mind,' Anthrozoos, 17(1), pp. 43–62. doi: 10.2752/089279304786991945.

Knight, S. and Barnett, L. (2008) 'Justifying attitudes toward animal use: A qualitative study of people's views and beliefs,' Anthrozoos, 21(1), pp. 31–42. doi: 10.2752/089279308X274047.

Lara De La Casa, E. (2017) 'Intensive Pig Farming: Ethical Considerations', Derecho Animal, pp. 1–8. Available at: https://ddd.uab.cat/pub/da/da_a2017v8n3/da_a2017v8n3a3.pdf.

Magnani, D. et al. (2017) 'Knowledge and opinions of veterinary students in Italy toward animal welfare science and law,' Veterinary Record, 180(9), p. 225. doi: 10.1136/vr.103938.

Magnani, D. et al. (2017) 'Paper Knowledge and opinions of veterinary students in Italy toward animal welfare science and law.' doi: 10.1136/vr.103938.

María, G. A. et al. (2017) 'Animal Welfare, National Identity and Social Change: Attitudes and Opinions of Spanish Citizens Towards Bullfighting,' Journal of Agricultural and Environmental Ethics, 30(6), pp. 809–826. doi: 10.1007/s10806-017-9700-9.

Martens, P., Hansart, C. and Su, B. (2019) 'Attitudes of Young Adults toward Animals—The Case of High School Students in Belgium and The Netherlands,' Animals, 9(3), p. 88. doi: 10.3390/ani9030088.

Mazas, B. et al. (2013) 'Development and Validation of a Scale to Assess Students' Attitude towards Animal Welfare,' International Journal of Science Education, 35(11), pp. 1775–1799. doi: 10.1080/09500693.2013.810354.

Mellor, D. J., and Beausoleil, N. J. (2015) 'Extending the "Five Domains" model for animal welfare assessment to incorporate positive welfare states,' Animal Welfare, 24(3), pp. 241–253. doi: 10.7120/09627286.24.3.241.

Ormandy, E. H., and Schuppli, C. A. (2014) 'Public attitudes toward animal research: A review', Animals, 4(3), pp. 391–408. doi: 10.3390/ani4030391.

Pagani, C., Robustelli, F. and Ascione, F. R. (2007) 'Italian youths'attitudes toward, and concern for, animals,' Anthrozoos, 20(3), pp. 275–293. doi: 10.2752/089279307X224818.

Pejman, N. et al. (2019) 'Should Animal Welfare Regulations Be More Restrictive? A Case Study in Eight European Union Countries', Animals, 9(4), p. 195. doi: 10.3390/ani9040195.

Phillips, C. J. C. et al. (2012a) 'Students' attitudes to animal welfare and rights in Europe and Asia', Animal Welfare, 21(1), pp. 87–100. doi: 10.7120/096272812799129466.

Phillips, C. J. C. et al. (2012b) 'Students' attitudes to animal welfare and rights in Europe and Asia', Animal Welfare, 21(1), pp. 87–100. doi: 10.7120/096272812799129466.

Phillips, C. J. C. and McCulloch, S. (2005) 'Student attitudes on animal sentience and use of animals in society', Journal of Biological Education. doi: 10.1080/00219266.2005.9656004.

Pritchard, J. C. et al. (2005) 'Assessment of the welfare of working horses, mules and donkeys, using health and behaviour parameters,' Preventive Veterinary Medicine, 69(3–4), pp. 265–283. doi: 10.1016/j.prevetmed.2005.02.002.

Randler, C., Ilg, A. and Kern, J. (2005) 'Cognitive and emotional evaluation of an amphibian conservation program for elementary school students,' Journal of Environmental Education, 37(1), pp. 43–52. doi: 10.3200/JOEE.37.1.43-52.

Sandgren, E. P. et al. (2019) 'Assessing undergraduate student and faculty views on animal research: What do they know, whom do they trust, and how much do they care?', PLoS ONE, 14(10). doi: 10.1371/journal.pone.0223375.

Sandgren, E. P. et al. (2020) 'Attitudes toward animals, and how species and purpose affect animal research justifiability, among undergraduate students and faculty,' PLoS ONE, 15(5 May), pp. 1–22. doi: 10.1371/journal.pone.0233204.

Serpell, J. A. (2018) 'Factors Influencing Human Attitudes to Animals and Their Welfare,' (April).

Signal, T. D. and Taylor, N. (2007) 'Attitude to animals and empathy: Comparing animal protection and general community samples,' Anthrozoos, 20(2), pp. 125–130. doi: 10.2752/175303707X207918.

Soare, E. and Chiurciu, I.-A. (2017) 'Study on the Pork Market Worldwide.', Scientific Papers: Management, Economic Engineering in Agriculture & Rural Development, 17(4), pp. 321–326. Available at: https://ezproxy.lib.uconn.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=127579911&site=ehost-live.

Tesfaye, A. and Curran, M. M. (2005) 'A longitudinal survey of market donkeys in Ethiopia', Tropical Animal Health and Production, 37(SUPPL. 1), pp. 87–100. doi: 10.1007/s11250-005-9010-5.

Vogeler, C. S. (2019) 'Why Do Farm Animal Welfare Regulations Vary Between EU Member States? A Comparative Analysis of Societal and Party Political Determinants in France, Germany, Italy, Spain and the UK', Journal of Common Market Studies, 57(2), pp. 317–335. doi: 10.1111/jcms.12794.

CHAPTER 4. IS THERE A POTENTIAL MARKET FOR ANIMAL WELFARE MILK PRODUCTS FOR IRANIAN CITIZENS AND CONSUMERS?

4.1 Materials and Methods

4.1.1 Data Collection and Survey

Data was collected from a survey with a semi-structured questionnaire carried out in June 2020 on 532 respondents over 18 years of age who are partially or fully responsible for purchasing food and milk for the household and who had bought and consumed dairy products in the past week. Data were obtained from an online survey conducted in four regions (north, south, east, and west) using a quota sampling method, with age and gender as stratifying variables. A combination of open and open-ended questions was used. The questionnaire was approved by the ethics committee of the Centre for Agro-food Economy and Development of the Polytechnic University of Catalonia (Castelldefels, Spain). We first conducted a pilot study with 30 responses to adjust the questionnaire's comprehensibility and length. In the first part, a distinguishing criterion was established at the beginning of the questionnaire to determine the role of the respondents as consumers or citizens. Indeed, an individual can differ depending on whether he/she behaves as a consumer or a citizen (Ajzen et al.,1996; Hamilton et al., 2003). A citizen's non-materialistic point of view is based on what is right for the community by focusing on social issues relating to the public health, environmental sustainability and AW(Spooner et al., 2014). However, consumers with the characteristic of independent, individualistic and materialistic could value personal interests. Respondents were first asked whether they wished to answer the questionnaire as a consumer or as a citizen, highlighting the aforementioned distinguishing roles of oriented purchasing behavior for the former and oriented social voting for the latter. Within the consumers' role, respondents were informed that they should be responsible for purchasing milk and had purchased and consumed milk at least once in the last week. In this context, questions should be answered, taking into account their budget constraints and needs. Within the citizens' role, including vegetarians and vegans, respondents were informed that they may not purchase animal products regardless of the AW standards, yet still are interested in animal production systems, AW, and what benefits the community (Alphonce et al., 2014). As a result of this procedure, data were collected from 335 respondents in the role of consumer and 197 respondents in the role of citizen. This divergence may be related to the fact that respondents more often answer surveys as consumers rather than citizens.

The survey was thematically divided into three parts. The first part of the survey begins with an open-ended question to determine the respondents' understanding of the importance of the concept AW to consumers and citizens in Iran. Subjective and objective knowledge levels regarding AW were measured by asking respondents to indicate their perceived knowledge levels (subjective) using an 11-point Likert scale ranging from 0 (respondents without knowledge at all) to 10 (respondents have absolute knowledge). The objective information level was measured by asking respondents to identify eight issues from a group of 13 proposed statements about different aspects of animal welfare that are currently applied at the EU level. For each

respondent, an index that counts the number of correctly classified statements was created. This index ranged from 1 (if a respondent answer only one issue correctly) to 13 (if a respondent answers all the issues correctly). The credibility of the information source was also assessed using an 11-point Likert-type scale ranging from 0 (not credible at all) to 10 (totally credible). The perception of the current level of AW standards was measured using an 11-point Likert-type scale ranging from 0 (absolutely disagree) to 10 (absolutely agree). The second part of the questionnaire analyzes citizens' and consumers' preferences and WTP for AW dairy products using the Discrete Choice Experiment (DCE). The last part also collected the socio-economic characteristics of the respondents. A summary of the main socio-economic variables collected from the sample can be found in Table 1.

The average age of participants was 28 years old. 57.1% of participants were female. The monthly household income of about 43.3% of the respondents was more than IRR 30,000,000 million ($150). Almost more than 50% of the respondents are salaried employees. Also, the education level was a university degree for about half of the sample.

		Respondents
Gender	Female	57.1
	Male	42.9
Marital status	Single	51.6
	Married	46.5
Age categories(%)	16-30	14.9
	31-40	45.5
	41-55	22.8
	More than 55	16.8
Age (average years)		28.64
Household income (%)	Less than 15,000,000 IRR	17.1
	Between 1,5000,000-30,000,000 IRR	37.7
	More than 30,000,000 IRR	45.2
Employment situation (%)	Unemployed	10.2
	Self-employed	10.4
	Salaried	65.6
	Retired	2.7
	Housewife	10.8
Educational level(%)	Diploma	9.0
	Bachelor	47.1
	masters	37.6
	PhD	6.3
Household size (%)	One person	22.8
	Two-person	42.7
	Family with children	34.5

Table 1: Summary of the socio-economic variables of the sample (IRR: The currency of Iran)

4.1.2 *The preferences analysis: The Discrete Choice Experiment (DCE)*

The DCE is one of the most used approaches to simulate purchase scenarios to elicit consumers' and citizens' preferences for AW products (Apostol et al., 2013). This approach is widely used to assess individual preferences and WTP for nutritional claims(Miklavec et al., 2015), Brand (Ares et al., 2010; Wu et al., 2020), traceability label (Bai, Zhang, & Jiang, 2013), and several milk-choice studies(Xu et al.,2020). In

a DCE study, people are asked to choose their preferred scenario from a set of alternatives (choice set) specified by various attributes and levels that provide the highest individual benefit or utility (James & Burton, 2003). If none of the alternatives are of interest, the person can opt-out and choose "none of the options. One of the significant limitations of the DCE approach is rising hypothetical bias due to the differences between what people are willing to pay and what they would actually pay (Yue & Behe, 2008). Several ex-ante and ex-post measures can mitigate these differences. The Cheap Talk script is one of the most common measures used in this study.

4.1.3 The experimental design

Following the original design of (J. L. Lusk & Schroeder, 2004), the construction of the choice sets in our case study is similar to the design of (Kallas et al., 2013). A labeled and optimal D-efficient experimental design was followed to create labeled alternatives using Ngene software (ChoiceMetrics, 2018). In this design, the alternatives (i.e., Milk products) are distinguished only by price, without including other specific attributes. Accordingly, the same products were repeated in all scenarios (i.e., choice sets), and only the prices of the alternatives in the choice sets were varied. Each choice set contained four milk products (1 liter): traditional, industrial, traditional AW, and industrial AW offered at different price combinations. The NONE option (i.e., neither of milk products) was also included to be consistent with the demand theory. As a result, only eight choice sets are needed for estimating RPL models by ensuring price-level balance across the products and using "-0" as a prior for the price. Four price levels were identified for the various products in each case study. The price levels reflect the current average market prices in Iran for industrial and traditional milk. The description of the products can be found in Table 2.

Attribute		**Explanation**	**Price** (l/Rial)
Production Method	Traditional	• livestock farming is generally practiced in rural locations • There are also no regular grazing programs on rural farms(This availability is higher than Industrial) (Kamalzadeh et al.,2008) • Farms are generally small-scale • It is made the old-fashioned way from cows • Cows are fed by crop residues (Kamalzadeh et al., 2008) • Cows are never being injected with hormones to produce more milk, or antibiotics unless necessary(Cardoso et al.,2016) • Should be boiled at home • Not ensured milk safety	(25.000,30.000 ,35.000,40.000)
	Industrial	• Refers to farms that adjust their barns, facilities, management and feeding programme • Production is generally intensive • Have larger herds than the traditional farms • Cows are housed in tie stalls (Kamalzadeh et al., 2008) • The feed is usually not produced locally but purchased from external suppliers (Statistics Centre of Iran, 2020) • Their milk is removed by machines attached to their udders (Amar, 2010) • Process of homogenization, pasteurization and finally packing of milk.	(40.000,45.000 ,50.000,55.00)
Certifications schemes	Traditional AW	• Cows are always have grazing and cow's welfare based on: ▪ Physical well-being; ▪ Mental well-being ▪ Natural living	(40.000,45.000,50. 000,55.000)

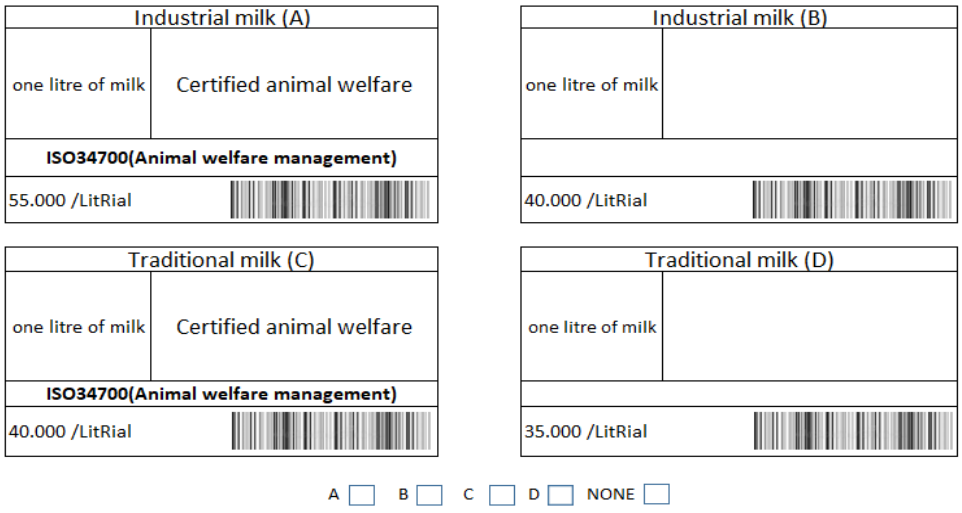
		• No added hormones and antibiotics unless necessary • Should be boiled at home • Not ensured milk safety	
	Industrial AW	• Have access to pasture all year round, with the freedom to choose when they go outside or stay indoors. • Using appropriate bedding materials such as straw, so that cows have access to comfortable, clean spaces to rest • Housing should be well designed and cows should be given enough space for natural social behaviour. • Suitable high-fiber diets • homogenization, pasteurization and finally packing of milk	(55.000,60.000,65.000,70.000)

Table 2. Description of attributes and levels

There are two rates for dollar in Iran. The official rate is unrealistic and only banks have access to it, not the public, and then there is the unofficial rate which is the actual rate. Both these rates are as follows: official rate: 1 Dollar = 42000 Rials and unofficial (Actual) rate: 1Dollar = 50000 Rials

To frame the DCE in a real-life purchasing situation, respondents were asked, " Imagine that you need milk, so you go to the grocery store to pick some up, and the following are the only alternatives available. You will now see a total of 8 choice sets in which you need to choose between four types of milk (Milk A or Milk B or Milk C or Milk D) or no milk (Figure 3). Moreover, to reduce hypothetical bias and remind participants as they would in a real-life shopping situation (in-shop or online), participants were asked to read a cheap talk script before answering the DCE questions as proposed by (Carlsson et al., 2005). Also, a budget constraint was frequently recalled to mitigate hypothetical bias further. Figure 3 shows an example of a choice set used in the experiment.

Figure 3. An example of a choice set



4.1.4 Econometric modelling

DCE is based on the theory of random utility maximization (RUM) (McFadden, 1974), which models individuals' choices between discrete sets of alternatives. Accordingly, the utility (U) of the preferred

alternatives consists of a set of options from a deterministic component (*V*) and a random error component (ε). Mathematically, the utility of an alternative j for a respondent n can be expressed as follows (Engineering and Hall, 2017).

$$U_{jn} = V_{jn} + \varepsilon_{jn} \quad (1)$$

Assuming linear and additive function, the utility can be expressed as:

$$V_{jn} = \beta_j + \alpha_j P_{jn} \quad (2)$$

Where j are the industrial, industrial AW, traditional AW and traditional milk products, P_{jn} is the price of alternative j for consumer n , β_j are the coefficients of the Alternative Specific constant (ASC) for each product relative to the NONE option, α_j are the coefficients representing the effect of the jth product price on utility for the jth product.

The critical assumption is that each individual n will choose the alternative j in the choice set to provide the highest utility (utility-maximizing). When an individual n is facing a choice set, C_i , consisting of J options, the choice probability of choosing alternative j is equal to the probability that the utility of alternative j, U_{ij}, is greater than or equal to the utilities of all other alternatives in the choice set, i.e.

$$Prob_i\{j\ chosen\} = Pr(U_{ij} \geq U_{ik}, for\ all\ K \in C_i\ with\ K \neq j) \quad (3)$$

$$Prob_i\{j\ chosen\} = \Pr(V_{ij} + \varepsilon_{ij} \geq V_{ik}\varepsilon_{ik}, for\ all\ K \in C_i\ with\ K \neq j)$$

Traditionally, the choice experiment data are analysed using the multinomial logit (MNL) model (McFadden, 1974), and consumers are assumed to be homogeneous in terms of taste in the population as follows:

$$\text{Prob}\{j \text{ is chosen}\} = \frac{e^{\mu V_{jn}}}{\sum_{k=1}^{J} e^{\mu V_{jn}}} \quad (4)$$

Where μ is a scale parameter that is inversely related to the variance of the error term. In this context, the modeling extensions to the MNL models to overcome the individual homogeneity lead to the random parameter logit RPL model. The random parameter logit or mixed model (RPL) allows more flexibility and

a continuous form of preference heterogeneity; the utility coefficients vary across individuals according to continuous probability distributions functions (Chang et al., 2009). In the RPL model, the probability that individual i chooses alternative j in a particular choice set, C_i , is represented as:

$$Prob_i\{j\ chosen\} = \int \frac{e^{Vij}}{\sum_{k=1}^{j} e^{vik}} f(\beta_i\ |\theta)\ d\beta, with\ k \in C_i \qquad (5)$$

where $f(\beta_i\ |\theta)$ is the density of the coefficients β_i with referring to parameters of the density function.

According to this model, the coefficient vector for a person n is $\beta_j = \bar{\beta} + \sigma\lambda_n$, where $\bar{\beta}$ is the estimated mean and σ is the standard deviation of the marginal distribution of β and λ_n is a random term assumed normally distributed with mean zero and unit standard deviation. In this study, the β_j (ASC) were assumed independently and normally distributed in the population following (Lusk & Schroeder, 2004). The price coefficients were considered fixed. For the economic interpretation of the model, the WTP of product milk j versus the baseline option NONE is calculated as the ratio of $\bar{\beta}$ to the price coefficient (J. Lusk and Schroeder, 2004). The Krinsky and Robb procedure was used for the confidence interval estimation of the WTP.

$$WTP_{\text{Product j Vs. No-option}} = -\left(\frac{\bar{\beta}_{\text{Product j}}}{\alpha_{\text{price j}}}\right) \qquad (6)$$

To cope with preference heterogeneity regarding citizens and consumers, we estimated a hybrid RPL by including a dummy variable (DUM) representing the respondent role (DUM=1 represents the consumers' role and DUM=0 describes the citizens' role). The DUM variable should interact with the ASC into the utility function since this DUM variable remain constant among the different choice sets that face each respondent (i.e., the individual roles). Therefore, the utility specification in this heterogeneity preference analysis is:

$$V_{jn} = \beta_j + \beta_j \times DUM + \alpha_j P_{jn} + \alpha_j P_{jn} \times DUM \qquad (7)$$

Where:

For the empirical application in our case study, the specification of utility function with DUM takes the following form:

$$V_{in} = \beta_{INDUST} \cdot INDUST_i + \beta_{INDSUT\_AW} \cdot INDUST\_AW_i + \beta_{TRADITIONAL} \cdot TRADITIONAL_i + \beta_{TRDICTIONAL\_AW} \cdot TRADITIONAL\_AW_i + \beta_{PRICE} \cdot PRICE_i + \beta_{INDUST \times DUM} \cdot INDUST_i \times DUM_n + \beta_{INDUST\_AW \times DUM} \cdot INDUST\_AW_i \times DUM_n + \beta_{TRADITIONAL \times DUM} \cdot TRADITIONAL_i \times DUM_n + \beta_{TRADITIONAL\_AW \times DUM} \cdot TRADITIONAL\_AW_i \times DUM_n + \beta_{PRICE \times DUM} \cdot PRICE_i \times DUM_n \quad (8)$$

Once the parameters are estimated, in this case, the "WTP" in this case is obtained as follow:

$$WTP_{\text{Product j Vs. No-option}} = -\left(\frac{\bar{\beta}_{\text{Product j}} + \bar{\beta}_{\text{Product j}} \times DUM_n}{\alpha_{\text{price j}} + \alpha_{\text{price j}} \times DUM_n} \right) \quad (9)$$

4.2 Results

4.2.1 Social stated preferences for AW milk products

Before analyzing the impact of respondents' role as consumers or citizens on AW preferences, we estimated an RPL model for the entire surveyed sample. Table 3 shows the marginal utility of milk alternative-specific constants (ASC) resulting from the RPL model. The null hypothesis that all coefficients are zero is rejected by a highly significant log-likelihood ratio test likelihood ratio test. All the coefficients of the RPL model are significant at 1% significant level. The goodness of fit is assessed through McFadden's pseudo-R2 (0.51), a highly acceptable range for the discrete choice models. A positive/negative sign of the estimates implies a higher/lower level of utility associated with milk alternatives. In this regard, the model estimates show that all milk products included in this study were statistically significant. AW Certified milk had the highest marginal utility compared to the other milk products. Moreover, as expected, the price attribute is negative and significant, indicating that price increases decreased the demand for milk products.

Table 3. Results of a random parameter logit model(RPL) for all respondents

	Estimates
Alternative Specific Constant (ASC_Industrial AW)	4.83***
Alternative Specific Constant (ASC_Industrial)	2.34***
Alternative Specific Constant (ASC_Traditional AW)	3.85***
Alternative Specific Constant (ASC_Traditional)	1.28***
Non-random parameters in utility functions	
Price	-0.05***
Standard deviations of random parameters	
S.D. of ASC_Industrial AW	1.40***
S.D. of ASC_ Industrial	0.2***
SD of ASC_Traditional AW	4.40***

S.D. of ASC_Traditional	0.3***
Wald Chi^2 (9)	6839.12
Log-Likelihood function	-3262.82
Restricted log-likelihood	-6682.38
McFadden Pseudo R-squared	0.51

*** (**) (*) Statistically significant at (1%) (5%) (10%) level; S.D.: standard deviation

The WTP for cow's milk alternatives was calculated using equation 6. The results in Table 4 show differences between AW milk products and the other alternatives and confirm the implications of the utility values in Table 3. The results show that respondents are more willing to pay a premium for industrial AW followed by traditional AW, industrial and traditional milk, respectively. In other words, individuals will prefer to pay 94. 95 and 75.70 thousand IRR/liter for purchasing industrial and traditional with AW certification, respectively. This result is supported by Cardoso et al. (2016), who showed that respondents generally attached more importance to the modernity of the dairy system and preferred a combination of industrial and agricultural views of primary production.

Table 4. Results of a WTP for the different types of milk products (All respondents)

	WTP
Industrial AW	94.95***
Industrial	46.14***
Traditional AW	75.70***
Traditional	25.16***

*** (**) (*) Statistically significant at (1%) (5%) (10%) level

4.2.2 Preferences' heterogeneity between citizens and consumers' roles

Table 5 shows the marginal utilities of the constant for milk alternatives (ASC) for both citizens and consumers resulting from the hybrid RPL model (i.e., the RPL by introducing the interaction between the ASC and the dummy variable as explained in Equation 7). The result showed a very acceptable adjusted pseudo-R2 of milk-specific constants (0.64), indicating the high goodness of fit of the model.

Focusing on the citizen groups, the results showed that the industrial and traditional milk-specific constants were not statistically significant. In other words, traditional AW milk had the highest marginal utility, followed by industrial AW. However, the insignificant coefficients for industrial and traditional milk imply that citizens do not benefit from choosing these dairy products, which underlines the importance of the AW label for citizens. According to Cardoso et al.(2016), most citizens showed preferences for traditional AW milk and less industrialized farms due to zero-grazing and separation of cow and calf. Our result indicates that Iranian citizens support FAW in their civic role, similar to the attitudes of European Union (EU) Citizens toward Animal Welfare (Carter, 2017; Hötzel et al., 2017).

Table 5. Results of a random parameter logit model(RPL) for citizens & consumers

	Estimates
Alternative Specific Constant (ASC_Industrial)	-0.14
Alternative Specific Constant (ASC_Industrial AW)	6.91***
Alternative Specific Constant (ASC_Traditional)	-0.81
Alternative Specific Constant (ASC_Traditional AW)	7.86***
Alternative Specific Constant (ASC_Industrial_DM)	4.79***
Alternative Specific Constant (ASC_Industrial AW_DM)	3.14***
Alternative Specific Constant (ASC_Traditional_DM)	1.01
Alternative Specific Constant (ASC_Traditional AW_DM)	-0.014
Non-random parameters in utility functions	
Price	-0.06***
Price_DM	-0.02*
Standard deviations of random parameters	
S.D. of ASC_Industrial	3.30***
S.D. of ASC_ Industrial AW	4.89***
S.D. of ASC_Traditional	2.80***
S.D. of ASC_Traditional AW	6.35***
SD of ASC_Industrial_DM	2.73***
SD of ASC_ Industrial AW_DM	5.18***
S.D. of ASC_Traditional_DM	4.50***
S.D. of ASC_Traditional AW_DM	4.84***
Wald Chi^2 (18)	8497.52
Log-Likelihood function	-2330.61
Restricted log-likelihood	-6579.38
McFadden Pseudo R-squared	0.64

*** (**) (*) Statistically significant at (1%) (5%) (10%) level; S.D.: standard deviation

Dummy variables: (DM=1 represents the consumers' role and DUM=0 represents the Citizens' role).

In this context, the analysis of consumer preferences (using equation 7 and the example in equation 8) shows that the positive coefficients obtained from the summation of benefits indicate that consumers are more likely to choose all types of milk, but with a marked preference for the industrial AW by summing the marginal benefits of ASC_Industrial AW (6.91) + the ASC_Industrial AW _DUM (3.14), followed by the traditional AW milk. These results are also reflected in the WTP estimate in Table 6.

Table 6. Willingness to pay for the different types of milk products (Citizens& Consumers)

	WTP	
	Citizens	**Consumers**
Industrial	-2.20	50.03***
Industrial AW	108.26***	108.19***
Traditional	-12.70	2.08
Traditional AW	123.17***	84.45***

Our results show that citizens are willing to pay a premium of 123.17 and 108.26 thousand IRR /liter for cow's milk with AW certification, respectively, indicating a higher preference for "traditional" compared to "industrial" production systems when AW certification is included. This result is supported by (Vanhonacker et al., 2010), who showed that citizens, including vegetarians and vegans, do not purchase animal products regardless of AW standards. Moreover, respondents are more concerned about antibiotics for farm animals and are more likely to buy organic food (Zanoli & Naspetti, 2002). This result is supported

by Cardoso et al. (2017), who showed that citizens' preferences are more influenced by systems with some access to pasture in which animals can better express natural behaviors such as grazing.

On the other hand, consumers are willing to pay 108.19 thousand IRR /liter and 84.45 thousand IRR/liter to purchase industrial AW and traditional AW, respectively. In general, the positive and significant coefficient of milk with AW certification indicates that AW and eco-labels can positively influence consumers' preferences, which is also supported by the results of (Eldesouky et al., 2020).

Some studies showed that consumers are more concerned about AW and their preferences for organic milk are positive and significant (Forbes-Brown et al., 2016; Grunert et al., 2018b). According to the results of Clark et al. (2016) the highest WTP relating to cattle and dairy cows, while the lowest WTP would be paid for pigs. This result is supported by Kühl et al. (2020), who showed that consumers value access to the outdoors and the opportunity to graze in dairy production.

Our results showed differences in heterogeneity between consumers' and citizens' WTP for choosing AW milk (i.e., industrial AW and traditional AW). While consumers prefer industrial AW, citizens are more likely to purchase traditional AW. According to Bennett (1997), consumers are more willing to pay more for manufacturer brands when making purchase decisions

Moreover, consumers described an ideal dairy farm based on modernization and technologies to increase efficiency (Cardoso et al., 2016). Consumers perceive a positive relationship between AW and food safety (Kehlbacher, Bennett, & Balcombe, 2012). According to Headrick et al. (1997), consumers showed more concern about the dangers of consuming raw milk, possibly due to food safety incidents and disease epidemics. This result may also be related to the increasing consumers´ demand for milk with added vitamins and minerals such as vitamin A, D, and Ca, which can be added during milk production (Xu et al., 2020). This was also highlighted by Akaichi et al. (2012), who showed that health issues and AW are key factors influencing consumers' WTP for organic milk. Another reason could be related to the shelf life of industrial milk due to the sterilization effect that gives additional time to be kept unrefrigerated for many months (Akaichi et al., 2012). Our result showed that the coefficients of standard deviations are large and significant for both citizens and consumers, suggesting that citizens and consumers, on average, have additional unobserved heterogeneous preferences for purchasing milk with the AW label (Owusu-Sekyere et al., 2014). This diversity of results could be related to the complexity of the AW concept, which is highly dependent on consumers' and citizens' perceptions at different AW levels (de Jonge & van Trijp, 2014).

4.2.3 Preferences heterogeneity with socio-economic variables

The results of including individual characteristics in the utility function to examine the heterogeneity of preferences for different types of milk are presented in Table 7. According to these results, citizens' women are more likely to pay for milk with AW certification. In addition, women are generally more concerned about AW and more likely to consider foods produced under the AW label (Clark et al., 2016; Pejman et

al., 2019). Conversely, citizens below 55 years of age were more reluctant to pay a premium to choose industrial and traditional milk without AW certification, which is consistent with the findings (Amirnejad & Tonakbar, 2015).

According to Clark et al.(2016), older people who are retired or about to retire may not have the financial means to pay a premium for the more expensive AW products. Moreover, young people have a more positive attitude towards AW due to their better access to media such as the Internet, affecting their WTP. The results also showed that Internet websites are considered important media, significantly affecting citizens' attitudes towards choosing traditional AW milk (Evans & Miele, 2007; N. Pejman et al., 2019). This result is supported by Akaichi et al. (2012), who showed that respondents who assign high credibility to the Internet as an information source exhibited greater WTP for organic foods. Hötzel et al. (2017) showed that citizens are more influenced by the Internet, TV, friends, and family as their main sources of information.

Table 7. Factors Affecting the Purchasing Frequency of Milk products (Citizens &Consumers)

Random parameters in utility functions	
	Estimates
(ASC_Industrial)	0.73
(ASC_Industrial AW)	1.89**
(ASC_Traditional)	0.68
(ASC_Traditional AW)	2.67***
(ASC_Industrial_DM)	3.76***
(ASC_Industrial AW_DM)	2.98***
(ASC_Traditional_DM)	2.66***
(ASC_Traditional AW_DM)	4.16***
Non-random parameters in utility functions	
Price	-0.06***
Price_DM	-0.03**
Traditional AW * Gender (1= Women; 0= men)	1.59***
Industrial AW* Gender (1= Women; 0= men)	2.50***
Industrial* Age (1=under 55; 0= above 55)	-1.41***
Traditional * Age (1=under 55; 0= above 55)	-1.57***
Traditional AW*Internet What is for you the credibility of this source of information? (0=absolutely disagree to 10 totally agree)	0.38***
Industrial AW_D_Gender (1= women 0= men)	0.52***
Industrial AW_D*Family (without children)	2.74***
Industrial_D*Sport Do you agree with using animals for entertainment or sports? (0=absolutely disagree to 10 totally agree)	0.11**
Industrial AW_D* Television What is for you the credibility of this source of information? (0=absolutely disagree to 10 totally agree)	-0.46***
Derived standard deviations of parameter distributions	
S.D. of ASC_Industrial	3.75***
S.D. of ASC _Industrial_AW	2.78***
S.D. of ASC _Traditional	1.90***
S.D. of ASC _Traditional AW	4.27***
S.D. of ASC _Industrial_DM	2.63***
S.D. of ASC _Industrial AW_D	7.69***
S.D. of ASC _Traditional_DM	3.84***

S.D. of ASC _Traditional AW_D	6.32***
Wald Chi^2 [27] (P= .000)	8603.30
Log-Likelihood function	-2380.73
Restricted log-likelihood	-6682.38
McFadden Pseudo R-squared	0.643

Dummy variable: (DM=1 represents the consumers' role and DUM=0 represent the Citizens' role)

*** (**) (*) Statistically significant at (1%) (5%) (10%) level

Consumers' socio-demographic variables can also influence their choice and WTP for dairy products. As shown in Table 7, consumers' women and those who have a family without children were more willing to pay for AW milk, which is supported by the findings of (Riccioli et al., 2020). Households without children are more inclined to pay a premium for milk than a large family with children. This could be related to families with children being more financially burdened (Bozoglu et al.,2019). Consumers who supported animals for sports and entertainment purposes were more likely to choose industrial milk without AW certification. Also, consumers who rely on the TV were less likely to pay a premium for AW-certified industrial milk. This result is supported by Falahi et al. (2012), who showed that radio and television programs in Iran have less impact on consumers' behavior and food consumption.

4.3 Bibliography

Akaichi, F., Nayga, R. M. and Gil, J. M. (2012) Assessing Consumers' Willingness to Pay for Different Units of Organic Milk: Evidence from Multiunit Auctions, Canadian Journal of Agricultural Economics. doi: 10.1111/j.1744-7976.2012.01254.x.

Ajzen, I., Brown, T.C. and Rosenthal, L.H. (1996), "Information bias in contingent valuation: effects of personal relevance, quality of information, and motivational orientation", Journal of Environmental Economics andManagement, Vol. 30 No. 1, pp. 43-57

Alphonce, R., Alfnes, F. and Sharma, A. (2014) 'Consumer vs. citizen willingness to pay for restaurant food safety,' Food Policy. Elsevier Ltd, 49(P1), pp. 160–166. doi: 10.1016/j.foodpol.2014.06.009.

Amirnejad, H. and Tonakbar, P. (2015) 'The Willingness to Pay for Organic Milk by Consumers in Tehran,' 17, pp. 1685–1694.

Apostol, L., Rebega, O. L. and Miclea, M. (2013) 'Psychological and Socio-demographic Predictors of Attitudes toward Animals', Procedia - Social and Behavioral Sciences. Elsevier B.V., 78, pp. 521–525. doi: 10.1016/j.sbspro.2013.04.343.

Ares, G., Giménez, A. and Deliza, R. (2010) 'Influence of three non-sensory factors on consumer choice of functional yogurts over regular ones,' Food Quality and Preference, 21(4), pp. 361–367. doi: 10.1016/j.foodqual.2009.09.002.

Bai, J., Zhang, C. and Jiang, J. (2013) 'The role of certificate issuer on consumers' willingness-to-pay for milk traceability in China,' Agricultural Economics (United Kingdom), 44(4–5), pp. 537–544. doi: 10.1111/agec.12037.

Bennett, R. M. (1997) 'Farm animal welfare and food policy,' Food Policy, 22(4), pp. 281–288. doi: 10.1016/S0306-9192(97)00019-5.

Bozoglu, M. et al. (2019) 'Urban households' willingness to pay for milk safety in Samsun and Trabzon provinces of Turkey,' British Food Journal, 121(10), pp. 2379–2395. doi: 10.1108/BFJ-03-2018-0174.

Cardoso, C. S. et al. (2016) 'Imagining the ideal dairy farm,' Journal of Dairy Science, 99(2), pp. 1663–1671. doi: 10.3168/jds.2015-9925.

Carlsson, F., Frykblom, P. and Lagerkvist, J. C. (2005) 'Using cheap talk as a test of validity in choice experiments,' Economics Letters, 89(2), pp. 147–152. doi: 10.1016/j.econlet.2005.03.010.

Carter, E. (2017) Reports and comments, Animal Welfare. doi: 10.2875/884639.

Chang, J. B., Lusk, J. L. and Norwood, B. F. (2009) 'How closely do hypothetical surveys and laboratory experiments predict field behavior?', American Journal of Agricultural Economics, 91(2), pp. 518–534. doi: 10.1111/j.1467-8276.2008.01242.x.

ChoiceMetrics (2018) 'USER MANUAL & REFERENCE GUIDE Ngene1.2'.

Clark, B. et al. (2016) 'A Systematic Review of Public Attitudes, Perceptions and Behaviours Towards Production Diseases Associated with Farm Animal Welfare,' Journal of Agricultural and Environmental Ethics. Springer Netherlands, 29(3), pp. 455–478. doi: 10.1007/s10806-016-9615-x.

Eldesouky, A., Mesias, F. J. and Escribano, M. (2020) 'Consumer assessment of sustainability traits in meat production. A choice experiment study in Spain', Sustainability (Switzerland), 12(10), pp. 1–16. doi: 10.3390/su12104093.

Evans, A. and Miele, M. (2007) WQ Consumers' views about farm AW P1 Natl reports based on focus group research.

Falahi, E., Ebrahimzadeh, F. and Anbari, K. (2012) 'Determination of the causes of tendency toward red meat and meat products in the west of Iran,' Journal of Research in Medical Sciences, 17(4), pp. 373–377.

Forbes-Brown, S., Micheels, E. T. and Hobbs, J. E. (2016) 'Consumer Willingness to Pay for Dairy Products With the 100% Canadian Milk Label: A Discrete Choice Experiment', Journal of International Food and Agribusiness Marketing, 28(3), pp. 203–224. doi: 10.1080/08974438.2015.1054542.

Grunert, K. G. et al. (2018) 'Consumer interest in environmental impact, safety, health and animal welfare aspects of modern pig production: Results of a cross-national choice experiment,' Meat Science. Elsevier, 137(November 2017), pp. 123–129. doi: 10.1016/j.meatsci.2017.11.022.

Hamilton, S.F., Sunding, D.L. and Zilberman, D. (2003), "Public goods and the value of product quality regulations: the case of food safety", Journal ofPublic Economics, Vol. 87 Nos 3/4, pp. 799-817

Headrick, M. L. et al. (1997) 'The Epidemiology'.

Hötzel, M. J. et al. (2017) 'Citizens' views on the practices of zero-grazing and cow-calf separation in the dairy industry: Does providing information increase acceptability?', Journal of Dairy Science. American Dairy Science Association, 100(5), pp. 4150–4160. doi: 10.3168/jds.2016-11933.

James, S. and Burton, M. (2003) 'Consumer preferences for GM food and other attributes of the food system,' Australian Journal of Agricultural and Resource Economics, 47(4), pp. 501–518. doi: 10.1111/j.1467-8489.2003.t01-1-00225.x.

de Jonge, J. and van Trijp, H. (2014) 'Heterogeneity in consumer perceptions of the animal friendliness of broiler production systems,' Food Policy. Elsevier Ltd, 49(P1), pp. 174–185. doi: 10.1016/j.foodpol.2014.07.008.

Kallas, Z. et al. (2013) 'Effect of tasting and information on consumer opinion about pig castration,' Meat

Science. Elsevier Ltd, 95(2), pp. 242–249. doi: 10.1016/j.meatsci.2013.05.011.

Kamalzadeh, A., Rajabbaigy, M. and Kiasat, A. (2008) 'Livestock production systems and trends in livestock industry in Iran,' Journal of Agriculture and Social Sciences, (January 2008), pp. 183–188.

Kehlbacher, A., Bennett, R. and Balcombe, K. (2012) 'Measuring the consumer benefits of improving farm animal welfare to inform welfare labelling', Food Policy, 37(6), pp. 627–633. doi: 10.1016/j.foodpol.2012.07.002.

Koik, Y., Thiele, H. and Enneking, U. (2019) 'Animal welfare attributes in dairy production in Europe : Lessons learned from representative German consumer panel data and discrete choice analysis', pp. 1–15.

Kühl, S., Flach, L. and Gauly, M. (2020) 'Economic assessment of small-scale mountain dairy farms in South Tyrol depending on feed intake and breed,' Italian Journal of Animal Science. Taylor & Francis, 19(1), pp. 41–50. doi: 10.1080/1828051X.2019.1691064.

Lusk, J. L. and Schroeder, T. C. (2004) 'Are choice experiments incentive compatible?', American Journal of Agricultural Economics, 86(May), pp. 467–482.

Lusk, J. and Schroeder, T. (2004) 'ARE CHOICE EXPERIMENTS INCENTIVE COMPATIBLE?ATEST WITH QUALITY DIFFERENTIATED BEEF STEAKS', American Agricultural Economics Association, 86(2), pp. 467–482.

Miklavec, K. et al. (2015) 'The influence of health claims and nutritional composition on consumers' yoghurt preferences', Food Quality and Preference, 43, pp. 26–33. doi: 10.1016/j.foodqual.2015.02.006.

Owusu-Sekyere, E., Owusu, V. and Jordaan, H. (2014) 'Consumer preferences and willingness to pay for beef food safety assurance labels in the Kumasi Metropolis and Sunyani Municipality of Ghana', Food Control. Elsevier Ltd, 46, pp. 152–159. doi: 10.1016/j.foodcont.2014.05.019.

Pejman, N. et al. (2019) 'Should animal welfare regulations be more restrictive? A case study in eight european union countries', Animals, 9(4). doi: 10.3390/ani9040195.

Riccioli, F. et al. (2020) 'Willingness to pay in main cities of Zheijiang provice (China) for quality and safety in food market,' Food Control. Elsevier, 108(May 2019), p. 106831. doi: 10.1016/j.foodcont.2019.106831.

Spooner, J. M., Schuppli, C. A., & Fraser, D. (2014). Attitudes of Canadian citizens toward farm animal welfare: A qualitative study. Livestock Science, 163(1), 150–158. https://doi.org/10.1016/j.livsci.2014.02.011

Statistics Centre of Iran (2020) 'Consumer Price Index in the Month of Esfand of the Year 1398', pp. 1–20. Available at: https://www.amar.org.ir/english/SCI-News-Archive/ID/12789/Consumer-Price-Index-in-the-Month-of-Esfand-of-the-Year-1398.

Vanhonacker, F. et al. (2010) 'Citizens' Views on Farm Animal Welfare and Related Information Provision: Exploratory Insights from Flanders, Belgium,' Journal of Agricultural and Environmental Ethics, 23(6), pp. 551–569. doi: 10.1007/s10806-010-9235-9.

Wu, X., Hu, B. and Xiong, J. (2020) 'Understanding Heterogeneous Consumer Preferences in Chinese Milk Markets: A Latent Class Approach,' Journal of Agricultural Economics, 71(1), pp. 184–198. doi: 10.1111/1477-9552.12327.

Xu, L., Yang, X. and Wu, L. (2020) 'Consumers' willingness to pay for imported milk: Based on Shanghai, China', International Journal of Environmental Research and Public Health, 17(1), pp. 1–16. doi: 10.3390/ijerph17010244.

Yue, C. and Behe, B. K. (2008) 'Estimating U.S. consumers' choice of floral retail outlets,' HortScience, 43(3), pp. 764–769. doi: 10.21273/hortsci.43.3.764.

Zanoli, R. and Naspetti, S. (2002) 'Consumer motivations in the purchase of organic food: A means-end approach,' British Food Journal, 104(8), pp. 643–653. doi: 10.1108/00070700210425930.

5. General conclusion and recommendations

Factors affecting society concerns and policy perspectives regarding animal welfare were identified in two different political regions: EU and Iran.

Firstly, we identified factors affecting consumer and citizen opinions regarding whether animal welfare regulations should be more restrictive in eight EU countries. These factors were categorized into the understanding of animal welfare-related issues, subjective and objective knowledge level regarding animal welfare, the credibility of information sources, the perception of the current level of animal welfare standards in each country, concerns regarding specific animal species, and socio-economic characteristics. Our results showed two clearly differentiated behaviors: respondents in southern EU countries (Italy and Spain) exhibited significant reluctance to the implementation of more restrictive regulation and those in northern EU countries (Poland and Sweden) exhibited the opposite opinions.

The respondent type played a relevant role in explaining the respondents' preferences for accepting more restrictive regulations beyond the minimum requirements. Respondents in the citizen role showed greater willingness to accept more restrictive regulations compared with those in the consumer role. Respondents with a higher level of subjective knowledge on animal welfare, women, and those who assign high credibility to the Internet as an information source exhibited greater preferences for adopting more restrictive legislation. The results showed that having more concerns regarding pig production systems and laying hens increases the likelihood that a respondent will accept more restrictive regulations on animal welfare. These results are in accordance with the special attention that European authorities are paying to these two types of production systems. In 2013, the EU partially banned the use of individual sow stalls in pig production, and in 2012, the EU banned the use of barren battery cages for laying hen production. Thus, these results highlight the importance of policymakers adopting reforms that are in accordance with societal preferences and concerns to create more effective and acceptable animal

welfare policies. Respondents who perceive that the level of current animal welfare standards in their country is high were less likely to accept more restrictive regulations.

Secondly, factors affecting the secondary and university student's attitudes from eight EU countries regarding whether animal welfare should be included in educational programs were analyzed. The most important factors identified were: understanding of animal welfare-related issues, subjective and objective knowledge level, the opinions regarding the current level of AW regulation in their country, the perception if AW regulations should be more restrictive, concerns regarding the welfare of farmed animal's species, the opinions towards the use of animals in different activities, countries and cultures and socio-economic characteristics.

The results demonstrated clear evidence of two differentiated behaviors: university students in a southern EU country (Italy) exhibited significant agreement to the implementation of AW programs in their curriculum compared to a northern EU country (Sweden). Results showed that university students place higher values to support AW educational programs in their curriculum compared to secondary students' roles. Respondents with a high level of subjective and objective knowledge, women, and those who perceive that AW regulations should be more restrictive for the welfare of beef cattle, pigs, and laboratory animals, were more likely to accept AW education. Respondents who perceive the medical experiments that use animals to improve human health were less likely to accept AW education.

Thirdly, a comparative view was carried out between a developing country Iran and EU. We explored Iranian citizens' and consumers' willingness to pay (WTP) for cow's milk produced under different production systems and animal welfare (AW) certification systems: industrial, industrial AW, traditional and traditional AW. Results showed that the AW-certified milk had the highest utility compared to the other milk products. Moreover, the price is the most important factor indicating that an increment in its value will decrease respondents' utility. Results also showed that individuals who purchased milk were more likely to pay a premium for purchasing industrial and traditional AW milk, respectively. The result showed a high level of unobserved heterogeneous preferences for purchasing milk with the AW label.

Focusing on the citizen role, the results showed that traditional AW milk had the highest utility. However, consumers, unlike citizens, were more likely to choose all types of milk, but with a considerable preference for industrial AW. This could be related to the consumer attitudes regarding the safety of the industrial milk compared to the traditional where the shelf life of

industrial milk can be kept unrefrigerated for many months. Our results also revealed differences in heterogeneity between consumers' and citizens' WTP for choosing AW milk. Citizens were willing to pay a premium, indicating a higher preference for "traditional" over "industrial" production systems when AW certification is included. However, the premium paid by consumers was higher for “industrial” compared to “traditional” when the AW certification is applied. The results also have shown wide heterogeneity in demand for AW milk products, depending on certain socio-economic characteristics of the respondents. Citizens' women were more concerned with dairy cows' welfare and were more likely to pay a premium for milk with AW certification. Citizens below 55 years of age were more reluctant to pay a premium to choose industrial and traditional milk without AW certification. Also, citizens who rely on the Internet exhibit a higher preference towards choosing traditional AW milk. On the other hand, consumers' women and households without children were more likely to pay for AW milk. Consumers who agree with using animals for sports were more likely to purchase industrial milk without AW certification. Also, consumers who rely on the TV were less likely to pay a premium for industrial AW milk.

Our study highlights the importance of teaching the AW concept as a comprehensive teaching tool at universities and schools’ programs as it may constitute a starting point for a more sustainable society toward improving animal living conditions, mainly in the Mediterranean countries in secondary schools. Also, information campaigns using the Internet as a credible media source to promote current animal welfare standards can be used to affect public opinion in Mediterranean countries to increase animal welfare knowledge to justify to their citizens the need for increasingly restrictive EU regulations. Attempting government to encourage dairy producers to find out what kind of dairy products they should be growing and selling and what prices are appropriate in developing countries can affect all stages of a farm animal’s life. Also, our study highlights to policymakers the importance of implementing and monitoring more restrictive regulations toward the education of AW along with informed teachers that will enable students to enhance ethical understandings of animal sentience.

Finally, the hypothetical bias is one of the major drawbacks when analyzing consumers’ perceptions, opinions, and WTP towards ethical issues such as animal welfare. Respondents tend to behave as they would like to be and not as they really are. Therefore, despite the measure we take to reduce the hypothetical bias (cheap talk script included), results should be taken with care.

Thus, further research that accounts for the hypothetical bias by allowing the survey to be consequential is needed.