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

by Niloofar Pejman, Zein Kallas, Lourdes Reig, Antonio Velarde, María Moreno, Diego Magnani, Vicky Protopapadaki, Vytautas Ribikauskas, Daiva Ribikauskienė, and Antoni Dalmau

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Abstract: Animal Welfare (AW) educational programs aim to promote positive attitudes of future generations towards 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 towards such a decision were analysed. 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.

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1. Introduction

In parallel with growing public attitudes toward the current level of animal welfare (hereafter, AW) (Weijden & Verhave, 2013; Miranda-de la Lama et al., 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). 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 towards informed food choices (WHO,1996) that may include AW as a relevant credence factor.

In the last decade, a large number of studies have focused on what should be taught about AW in veterinary schools and how it should be done (Molento & Calderon,2009; IIImann et al., 2014; Broom, 2005). However, only a few studies have analyzed the perception towards AW of high school students as well as university students in bachelor' degrees not related to animal science such as engineering, communication, education, and economics majors (Phillips et al., 2012; Szafrańska & Matysik-Pejas, 2018; Phillips & McCulloch, 2005; Ronto et al., 2016). In the majority of the schools and universities, AW aspects are not formally included in general education curricula as also highlighted by Ronto et al. (2016) who confirmed the lack of knowledge among secondary school students regarding aspects that deal with food ethics, AW, and environmental sustainability. Therefore, educational organizations, government agencies, health care organizations, and curriculum developers are giving more importance to information, workshops, and tasks that could deliver students with knowledge about AW. In this

regard, the International Fund for Animal Welfare (IFAW) has implemented an Animal Action Education program to empower young people and communities to take positive action for animals and aims at inspiring young people to understand, respect, and protect animals (EDUCAWEL, 2016). Moreover, the European Commission (EC) has created the first European Union reference centre to ensure the implementation of AW along the EU countries (European Court of Auditors, 2018). The centre stated new strategies to establish training courses on AW and developing educational programs to improve citizens' knowledge towards the current level of AW(Hawkins, Ferreira, & Williams, 2019). The Conference of the Regional Commission of the World Organization for Animal Health (OIE) also encourages to create AW courses among students (Woodford et al., 2008).

It can be said that AW is a multidimensional public policy issue. Thus, a major step in addressing this societal need is to understand what AW means to society as well as the set of criteria that are relevant for this concept (Mason & Mendl, 2007; Bouyssou, 1990). The term AW that expresses ethical concerns regarding the quality of life experienced by animals can vary among the audience (citizens and consumers oriented individuals), veterinarians, politicians, and cooperation (Pejman et al. 2019; Tuyttens et al. 2010).

Besides, understanding the AW concept requires determining the maindimensions that it encompasses. The five freedoms approach (5 Fs) is one of theframeworks that identify the main dimensions of AW which are: Animal freedom from hunger and thrust, freedom from discomfort, freedom from pain and injury, freedom from fear and distress and freedom to express natural behavior (Webster, 2001).

In this context, understanding the relative importance of AW in education institutions, concerning changing knowledge and behavior, may help policymakers to

better design AW training courses and efficiently focus on the knowledge gap at schools and universities (FAWC, 2011; MacKay, 2020; Unti & Derosa, 2003). Langford (2006) showed that higher education programs could make a conducive environment for shaping student's behavior and preparing them for adult life and their responsibilities as citizens, consumers, and members of a family or community.

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 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, student 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 pet's abandonment (Mariti et al., 2011).

In this context, the main objective of this study is twofold: Firstly, to assess whether secondary and university students in the majors not related to AW issues believe that the AW concept should be included in their educational programs. Secondly, to analyze the determinant factors affecting students' attitudes towards such a decision. To reach the above-mentioned objectives, a semi-structured questionnaire was distributed

and analyzed in eight European Union (EU) countries (Greece, Italy, Poland, Romania, Spain, Sweden, Lithuania, and the United Kingdom) with 1,952 secondary students and 1,929 graduate students. These countries were selected due to the best geographical coverage including Mediterranean European countries (Greece, Italy, and Spain), Central European countries (Romania, Poland, and Lithuania), and Northern European countries (the United Kingdom and Sweden).

2. Materials and Methods

2.1. 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.

2.2. 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 variables (Y) is defined as 1 if a respondent answers "yes" for implementing AW in the curriculum of school and university and a value of 0 if a respondent answers "no". The independent variables were presented according to the following categories:

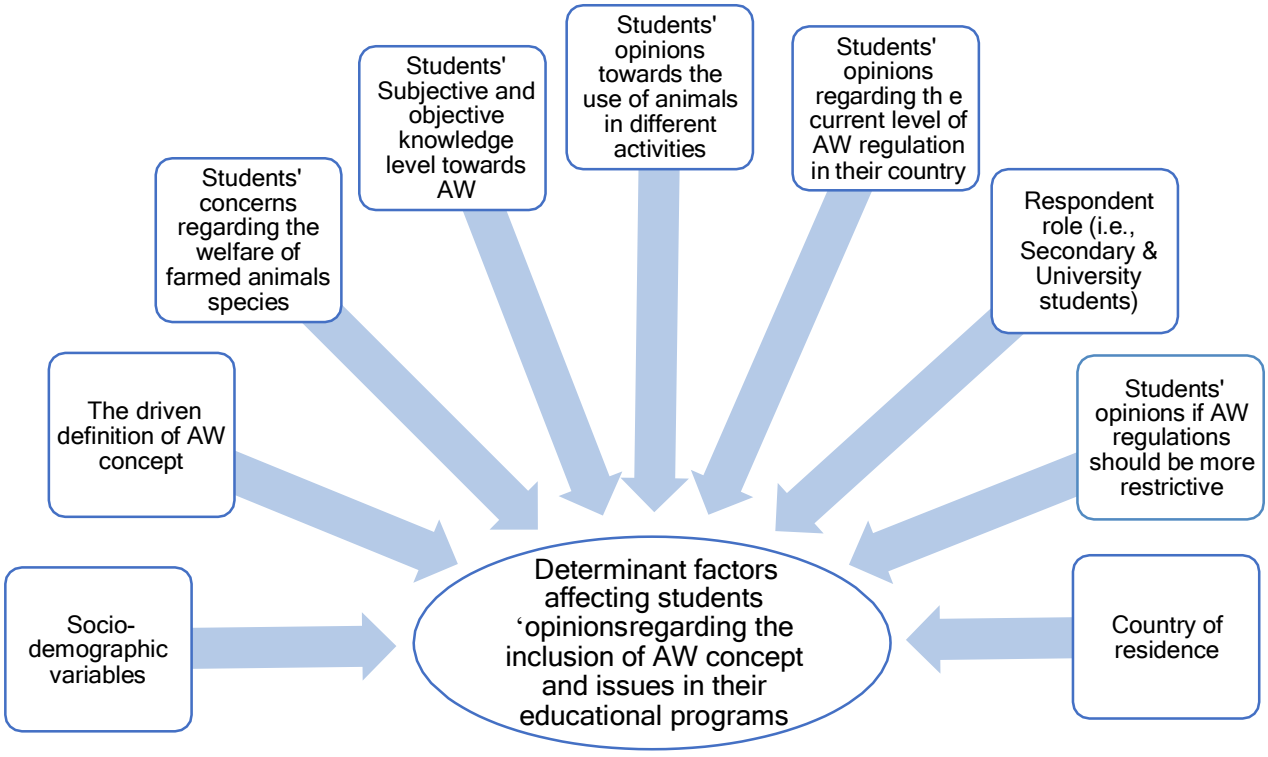


Figure 1: Set of the dependent variables included in the modeling approach

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 modelled 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 were measured.

2.3.1. 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.

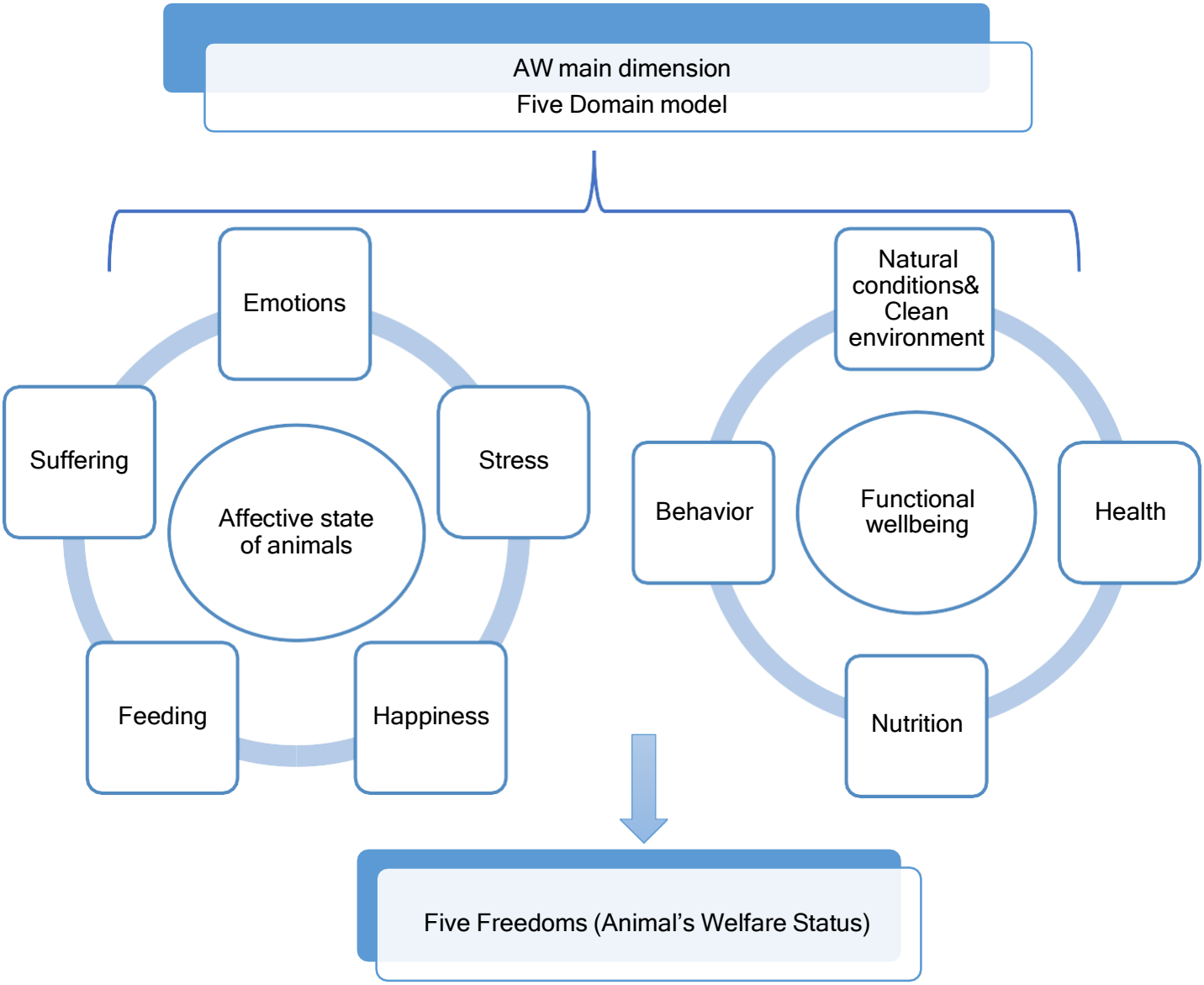


Figure 2: The Five Domains Model for identifying AW aspects in this research (Adapted from Mellor & Beausoleil, 2015)

2.3.2. 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, Mennie, Bibby, & Cassaday, 2020). Some studies showed that there is a significant positive relationship between knowledge about specific animal species and responsible environmental' attitudes (Bjerke et al. 2001; 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.

2.3.3. 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:

- Do you agree that animals are used for work? (Tesfaye & Curran, 2005; Pritchard et al., 2005; Burn et al., 2010).
- Do you agree that animals are used for entertainment or sports? (Keeling et al., 2017; Martens et al., 2019; Cembalo et al., 2016).
- Do you agree with keeping animals for the production of fur? (Broom & Fraser, 2015; Phillips et al., 2012b).
- Do you agree with keeping animals for the production of food? (Gruzalski, 1983; Phillips et al., 2012b).

- Do you agree with observing animal behavior in an experiment? (Sandgren et al., 2020; Phillips et al. 2012c).
- Do you agree that medical experiments use animals to improve human health? (Sandgren et al., 2020; Phillips et al. 2012b)
- Do you agree with testing cosmetics or household products on animals? (Sandgren et al., 2020; Cornish et al., 2020; Phillips et al. 2012b).
- Do you agree with improving animals' health through genetic changes?(Ormandy & Schuppli, 2014; Devolder & Eggel, 2019).
- Do you agree with inflicting pain or injury on animals as part of cultural traditions? (María et al., 2017).

2.3. 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:

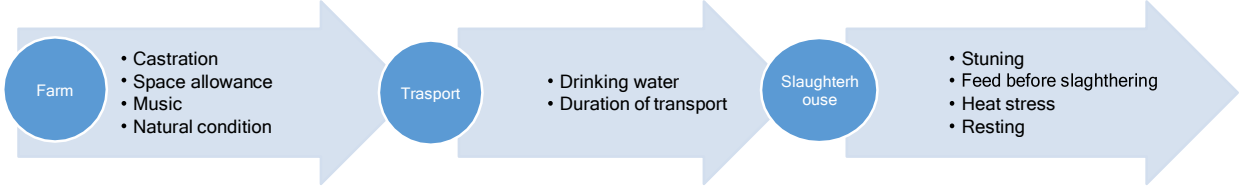


Figure 3: Understanding the aspect of AW issues currently regulated in a common policy framework at the EU level

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).

2.4. 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. Results and Discussions

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.

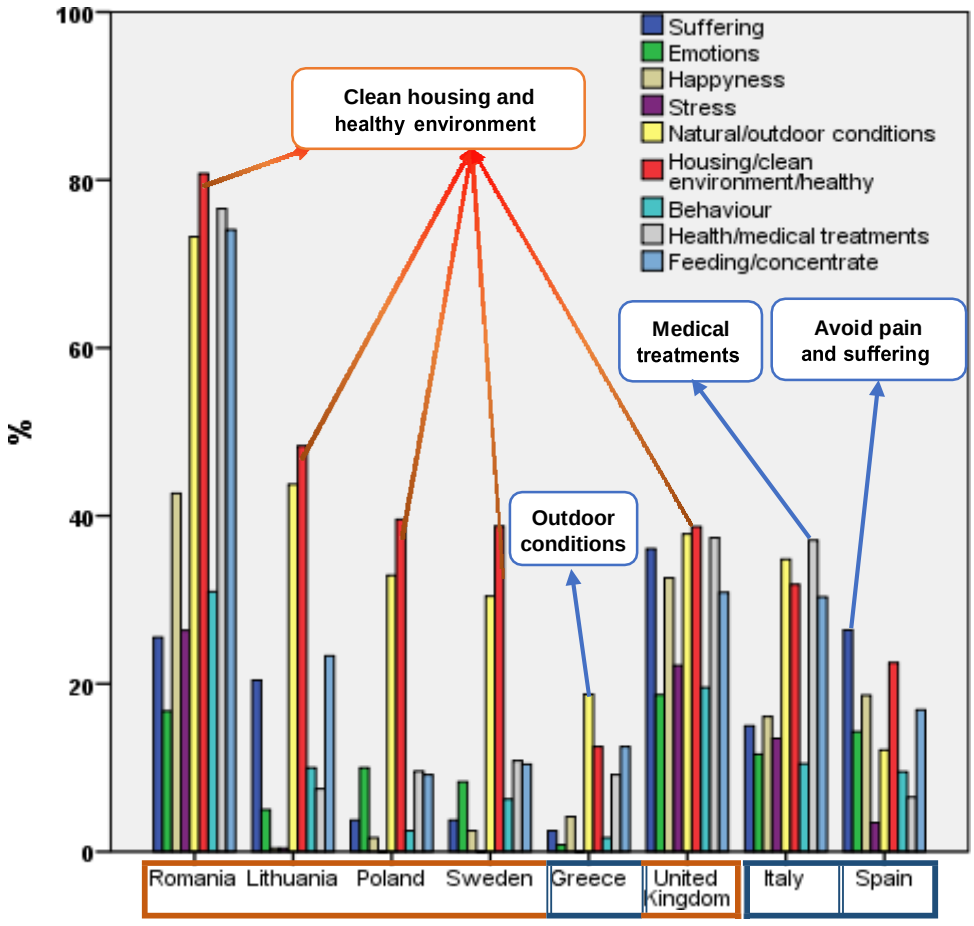


Figure 4. Animal welfare understanding of secondary and university students

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, A., Vecchio, R., Darnhofer, I., & Grötzer, 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, F., Cicia, G., Del Giudice, T., Cembalo, L., Krystallis, A., Grunert, K. G., & Lombardi, 2016) who mentioned that outdoor access in Greece was evaluated as the most positive aspect for a cleaner livestock production system.

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 student's 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, T., Ødegårdstuen, T. S., and Kaltenborn 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 positively respondent's trust towards AW level (Van Horne & Achterbosch, 2008). 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 its 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. 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 human 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. Clemence and Leaman (2016), and Ormandy and

Schuppli (2014) showed that individuals had a higher level of agreement to use animals for medical research than testing cosmetics.

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

3.4. 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 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)

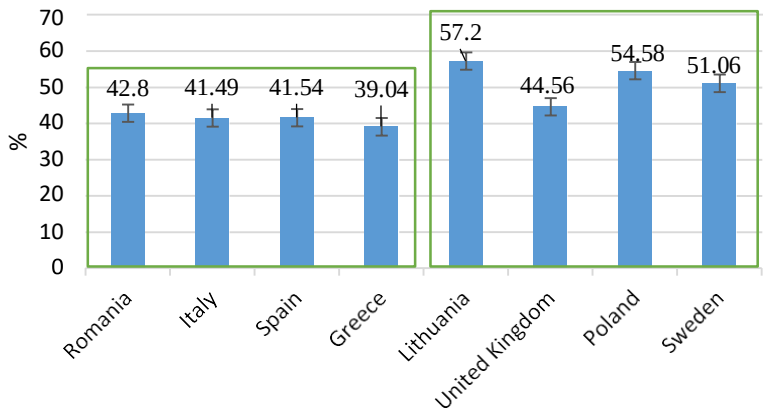


Figure 6.Subjective Knowledge level (Secondary Students)

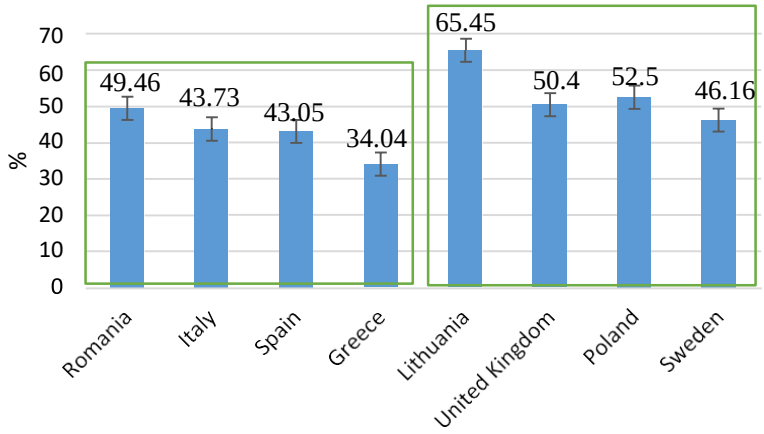


Figure 7. Objective knowledge level (University Students)

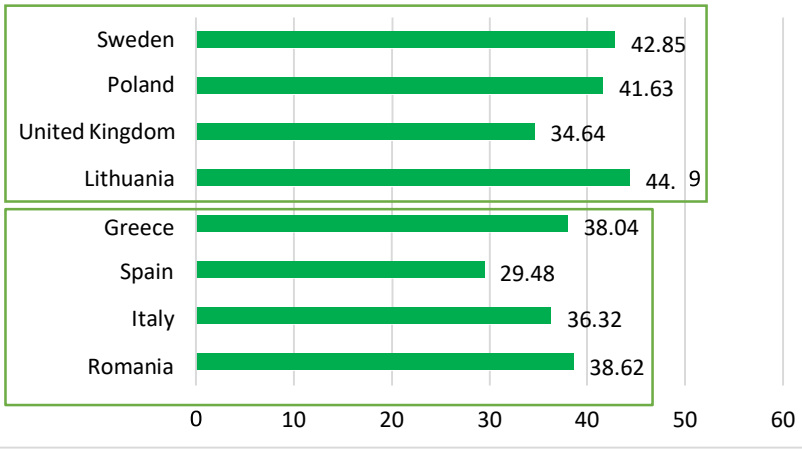
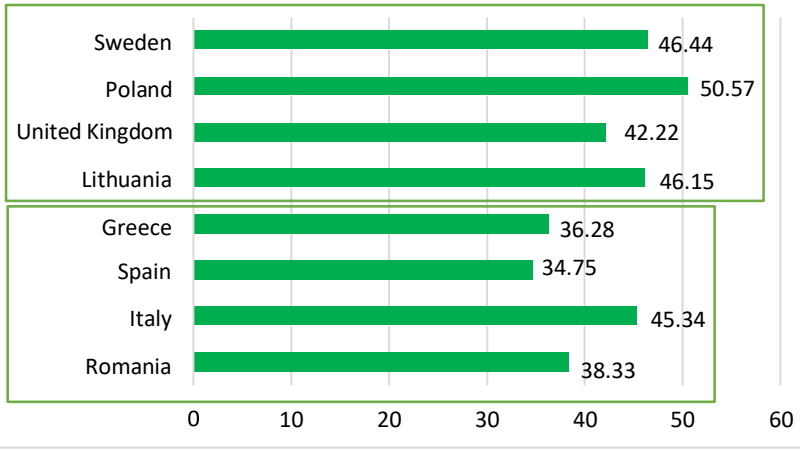


Figure 8. Objective knowledge level (Secondary Students)



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.

3.5. 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 highlighted also by Sandgren et al. (2019). However, the results show that university students exhibited a 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 andcollege curricula in England which is dedicated to enhancing student´s attitudes to care for and respect animals.

Figure 9. Should Animal welfare issues be included in your educational programs?
(Secondary Students)

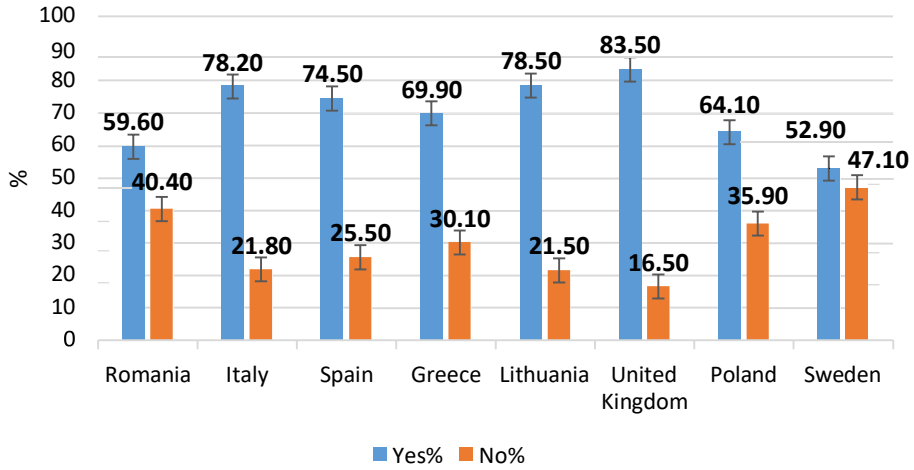
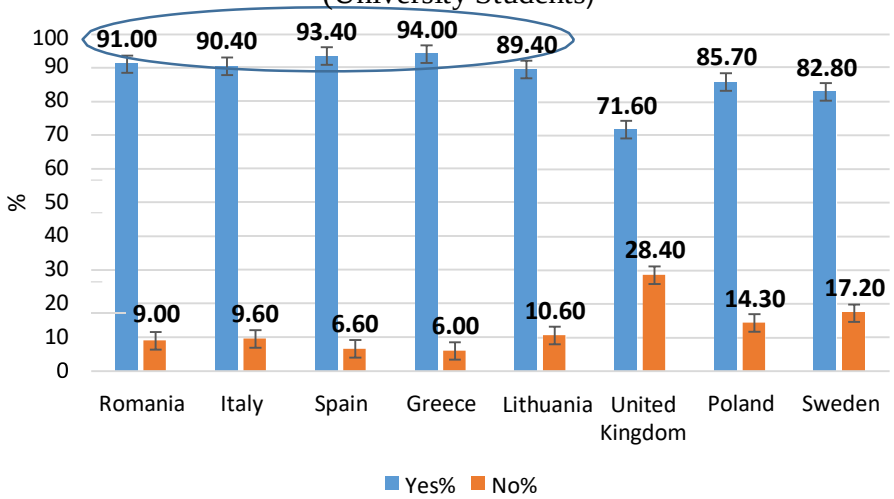


Figure 10.Should Animal welfare issues be included in your educational programs?
(University Students)



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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 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. Lack of knowledge is considered as one of the factors that determines people's attitude and perceptions towards animal welfare. Higher education can be related to the greater support for animal

research (Navarro et al.,2001). This result is supported by Martens et al., (2019) who showed that highly educated people from urban areas have more positive attitudes towards animals. 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 the 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., (2003) 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 the human one.

4. Conclusion

Factors affecting 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 present study 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 student's roles. This result is in accordance with Broom (2005), who showed that university students were more likely to support the education of AW programs in their curriculum compared to secondary student's roles. The country and culture played an important role in influencing students' attitudes to accept the inclusion of AW education in their curricula as pointed out by Phillips et al. (2012c), that national and continental differences had a major influence on students' attitudes towards animal welfare. 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 (Hagelin et al.,2003; Phillips & McCulloch 2005; Herzog et al.,2009). These results highlight the importance of the development of restrictive AW legislation for the intensive animal production system.

Respondents who perceive the medical experiments that use animals to improve human health were less likely to accept AW education. Results highlight the importance of teaching 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. Thus, educating young people to understand animal welfare issues and concepts can help them as future consumers to choose and eat more sustainable food consumption behavior. With the lack of education on animal welfare at schools and universities, young generations would become less sustainable (Jones, 2020). This 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.

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