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Teachers' views on 'food' animals for sustainability education: an exploratory study

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Abstract

Sustainability education can assume a major role in teaching students how to deal with current health and environmental challenges through dietary choices. This article aims to provide an understanding of how the teachers surveyed ($n=416$, 85% female; 58% teaching natural sciences) view the importance of the following interrelated topics for the sustainability agenda: (1) the viability of diets for tackling environmental challenges and natural resource management; (2) the health benefits of traditional versus plant-based diets; (3) the impacts of factory farming on animals and animal sentience. Overall, the results suggest that most participants recognize the importance of a sustainable education model that encourages reducing the consumption of meat, while also adopting healthy plant-based diets. Furthermore, the large majority recognize animal sentience and agree that schools ought to address the negative impacts of factory farming on animals and the environment. The results are striking as they show that most teacher views contrast with the traditionalist and instrumental portrayal of animals in national core curricula.

Keywords: teachers; views; diets; sustainability; animals; environment; education.

Introduction

Particularly during the last two decades, both in developing and most developed countries, there has been increasing awareness on sustainability knowledge and actions that can help tackle profound contemporary challenges. Growing levels of consumption, social inequality, the rise in population and, consequently, the production of waste and depletion of natural resources, are central constituents of sustainability policies (Reisch et al., 2013). Although food consumption is an essential activity for all human individuals, current policies are embedded in controversies that enable chronic hunger of the poorest, while some developed countries continue to produce a surplus of food (Wu et al., 2014). There is growing consensus on the fact that the steady rise in the consumption of animal-based products in most developed countries (Ritchie, H.; Roser, 2017) is a major factor of social inequality, environmental crisis and human health decay (Abid et al., 2014; Clonan et al., 2015; Weis, 2013). Animal agriculture is one of the main competitors for natural resources (Müller et al., 2015) and is closely linked to deforestation, coastal flooding, soil contamination and degradation (Hecht, 2013; Stoll-Kleemann & O'Riordan, 2015; Young, 2010), therefore contributing to global warming (Gerber et al., 2013; IPCC, 2019; Koneswaran & Nierenberg, 2008). Additionally, factory farming raises serious concerns about animal welfare

(Pluhar, 2010), from animal tethering and confinement (Europe, 1979; Williams, 2008) or even castrations and mutilations without anaesthesia (Council of the European Union, 2008; Font-i-Furnols & A.; Guerrero, L.; Dalmau, 2022). These and other health and animal welfare problems indicate that animals do experience different types of physical and emotional pain (Underwood, 2002; D'Silva, 2006; Algers et al., 2009) during their short lifespan. Therefore, moving away from animal-based products and progressively shifting towards healthy plant-based diets is an efficient way of improving public health, tackling environmental degradation and reducing animal suffering.

To attain meaningful progress in changing current food systems requires a commitment from all stakeholders (governance, private sector, media and citizens, including educational institutions and teachers). Relevant measures, that are essential for promoting critical thinking and a sustainability drive in youth, are being integrated into the national core curricula of numerous European countries and, accordingly, into teaching models and school textbooks. Although there is an general acknowledgment that education for sustainability can be highly significant for an ecological, social and economic development model, it is also well established by published literature that mainstream concepts and orientations on sustainability in educational settings tend to be anthropocentric (Tracana, 2009), silencing and marginalising the interests of animals, thus framing them as resources for human use (Banschbach & Lloro-Bidart, 2019; Pedersen, 2010). Education for sustainable development tends not to establish any holistic relationship with animal ethics (Twine, 2010; Weldemarian, 2017). Furthermore, schools – through classes, textbooks and canteens – play an active regulatory role in animal commodification, encouraging the consumption of animal products, while marginalising plant-based diets as a healthy and viable alternative (Cole and Stewart, 2014)

Due to increased awareness in contemporary societies, many educational institutions are incorporating into their teaching programmes initiatives in line with the United Nations Sustainable Development Goals (Johnston, 2016). Aligning education programmes with sustainability objectives is an important step for learners to be informed about biodiversity and be proactive in reversing climate change and environmental degradation. As in other countries, the Portuguese national core curriculum (Câmara et al., 2018) includes specific sustainability guidelines, which are the main reference in the editorial criteria for school textbooks, particularly in subjects like natural sciences, biology and geography, which traditionally address topics related to the environment, sustainability, animals, diets and human health. Although school textbooks are essential guides for teaching (Reichenberg, 2016), playing a significant role in defining what knowledge should (or should not) be disseminated in classrooms, teachers also have their own personal views and beliefs about science, teaching and learning (Bryan & Abell, 1999). In addition, teachers construct their knowledge and teaching content in a school setting and through their social context (Mulholland & Wallace, 2005). Although many educational actors focus on getting through the programme, adopting a hermetic approach, others bring their concepts, values and beliefs into the classroom in an attempt to prepare students to interpret, analyse and discuss information that can often be seen as controversial (Reis & Galvão, 2004).

Reframing diets and animals in sustainability education through ecocentrism, ecofemism and CAS

The repercussions of traditional diets in the environment, natural resources and animals do have a high ethical relevance, and sustainability education curricula should be reflective of these challenges. The theoretical framework of this [exploratory](#) research is in line with ecocentric theories, whose key ideias consist in envisioning the environment as a aggregate system in where animals should possess intrinsic value (Leopold, 1949; Taylor, 1996; Thompson, 1994). Other ecocentric scholars (Jamieson, 1998; Ross, 2020) argue that particularly animals used for food are explored under a instrumentalist view of nature, with direct consequences for environmental degradation and an inefficient food system.

The ecofemist theoretical legacy enabled to disrupt the conventional scientific and cultural thinking that traditionally conceives humans as the only subjects (Houde, 1999; Noske, 1989), and consistently defines other animals as mere resources to be explored (Noske, 1989; Plumwood, n.d.). Furthermore, parallel (patriarchal) forms of oppression of minorities and other animals are intertwined, and preserved by institutions and dominant groups (D'Eaubonne, 1974; Kheel, 2008; Plumwood, 1993). Ecofeminists (Gaard, 2002; Gaard & Murphy, n.d.; Noske, 1989) also emphasizes the role of livestock sector corporations in environmental degradation and in the commodification of non-human animals. Carol Adams (1990) suggests that in most urbanized

cities animals are conceived as “absent referents” (e.g. meat and analogues), that enables emotional detachment and moral absense towards them. For Lloro-Bidart & Banschbach (2019) and Houde & Bullis (1990) ecofeminism can be applied in pedagogies for interrupting the hegemonic discourses that reproduce the oppression of other animals, and maximize caring for others than humans.

This study is also rooted in the analytical lenses of critical animal studies (CAS), that also enables an intersectional understanding about forms of opression linked to humans (e.g.: gender, class, race), other species and the planet (Dinker & Pedersen, 2016; Harper, 2010). Particularly Taylor and Twine (2014) value the using of other scientific domains (e.g.: veterinary sciences, ethology, etc.) to disentangle the antropocentric status of other animals reproduced in sociocultural practices. In the educational realm, the research work of several academics from CAS (e.g.: Cole, Mattew; Stewart, 2015; Dinker, Karin Gunnarsson; Pedersen, 2016; Lloro-Bidart, & Banschbach, 2019; Lloro-Bidart & Banschbach, 2019; Lupinacci & Happel-Parkins, 2016; Pedersen, 2010) also facilitates a deep understanding on how the exploitation of other animals used for food is neutralized, constantly reinforced, and dissociated from environmental degradation.

Aim, objectives and hypotheses

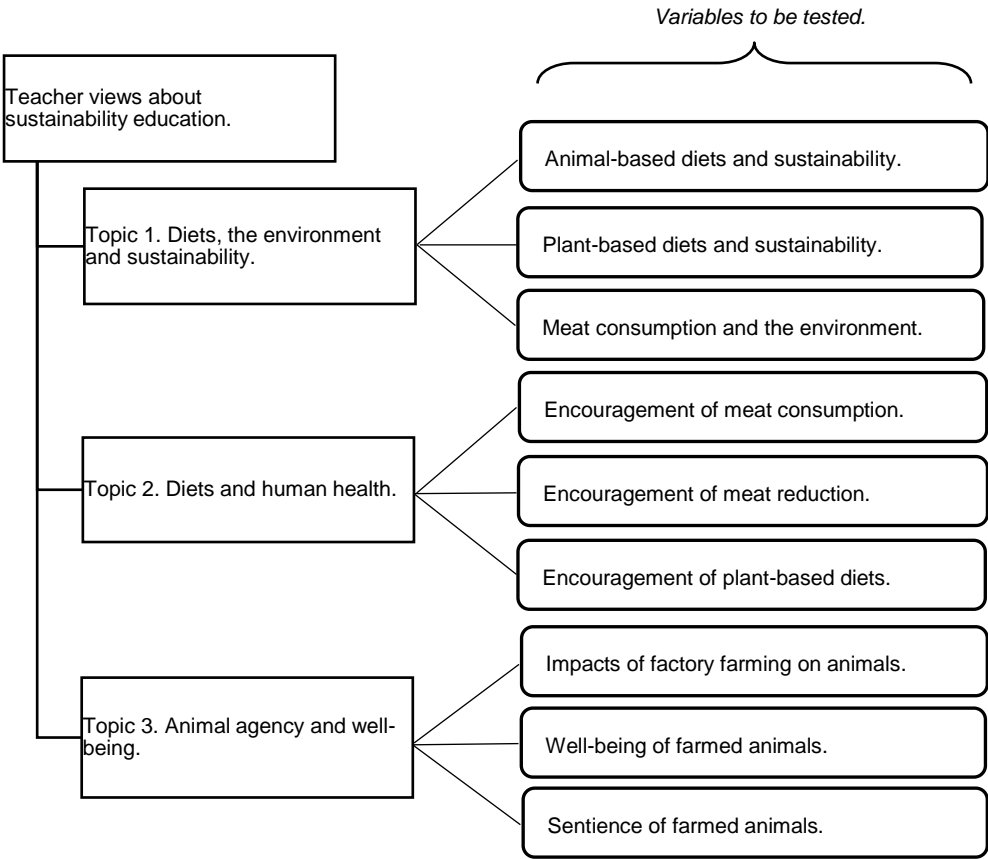
Particularly in Portugal, the educational guidelines are established by the Directorate-General for Education (Direção Geral da Educação), through a public document entitled “Portugal’s Frame of Reference for Environmental Education” that ignores the negative impacts of animal agriculture on animals, environment and management of natural resources (Câmara et al., 2018). Consequently, Portuguese school textbooks tend to present an utilitary framework of animals: their agency and wellbeing is not attended; they are potrayed as essential for economic activities and human nutrition; and the recommendations on reducing the consumption of animal-based products in consideration of the environment, sustainability and human health are very scarce (Fonseca, 2022).

Environmental education and educational actors can have an important role in challenging the anthropocentric framings of other animals that conventionally occurs in schools. Considering the tensions around education for sustainability and personal views of the ‘facts’, the general aim of this study is to contribute for a debate by exploring what are school teachers views about diets, animals and the impacts of animal agriculture (**Figure 1**). Three main interconnected objectives follow from this general aim. The first is to understand how teachers view the repercussions of meat and plant-based diets on the environment and natural resources management. The second is to investigate how teachers view the reduction of meat consumption and the viability of plant-based diets in schools. The third and final objective is to understand how teachers perceive the agency, well-being and sentience of factory-farmed animals (**Figure 1**).

Several hypotheses can be drawn if we take into account that all participants are, besides teachers, culturalised individuals who might present foreseeable views on diets (animal- or plant-based), animals and the impacts of factory farming. Evidence increasingly suggests that taste preferences, culinary traditions (Sanchez-Sabate & Sabaté, 2019), hedonism, affinity, privilege (Graça et al., 2015) and gender (De Backer et al., 2020; Love & Sulikowski, 2018) are key factors in meat still occupying a central role in contemporary diets (Fiddes, 1992). Consequently, we hypothesised a relative degree of indifference towards the environmental impacts of animal agriculture and meat consumption (Sanchez-Sabate & Sabaté, 2019), particularly by men and teachers of other subjects, and a disregard for the efficiency of plant-based diets to tackle the environmental crisis. High rates of meat consumption in Western societies (Ritchie, H.; Roser, 2017) can come with lack of knowledge on animal production (Tomasevic et al., 2020) or the avoidance to even think about the upsetting farming processes involved (Knight & Barnett, 2008a). Likewise, as meat consumption often appears reinforced in sustainability education guidelines (Câmara et al., 2018) and school settings, due to internalised traditional oppressive human-animal domination structures (Banschbach & Lloro-Bidart, 2019; Pedersen, 2004), we also hypothesised that participants would not be open to making the impacts of factory farming on animals visible. Gender and sex role orientation are also significant factors influencing attitudes towards animals. Evidence shows that women (and girls) tend to be more concerned about animal walfare (Herzog et al., 1991; Tawse, 2010; Clark et al., 2016; Tomasevic et al., 2020; Almeida et al., 2014). A final hypothesis was that teachers might present an instrumentalised and utilitarian view of factory-farmed animals (Lloro-Bidart and Banschbach, 2019; Pedersen, 2016; Dinker and Gunnarsson, 2016), and might even devalue their sentience when compared to that of pets as a

(discriminatory) strategy for reducing empathy towards farmed animals for enabling meat attachment (Bastian et al., 2012; Loughnan et al., 2010).

Figure 1. Teacher views of diets and animals in sustainability education.



Materials and Methods

Survey construction

The three main three topics (1. Diets, the environment and sustainability.; 2. Diets and human health; 3. Animal agency and well-being) (**Figure 1**) defined for this *exploratory* study are interconnected, and can potentially can be addressed by teachers during classes for sustainable education. It needs to be stressed that animals (used for food) are a common denominator in all previous three main topics. In order to measure teachers' views on animals used for food were created other nine items (variables) with five-point Likert scale of measure that allowed a scale ranging (agreement, neutral, disagreement) of views about the outlined topics by this research. The first group of three topics are related to which diets (plant-based, or meat based) participants consider more sustainable and environmental friendly, and therefore addressable in sustainability education and applicable in schools settings (**Figure 1**) (see **Appendix A**). The second group of three topics are linked to diets and human health, and participants were incited to provide their agreeability or disagreeability about if it's up to schools to incentive meat consumption, meat reduction or plant-based diets for enhancing the health of students (**Figure 1**) (see **Appendix A**). In the third group of three items participants shared their views about how schools should frame animals used for food: if animal production impacts on animals should be addressed; if their wellbeing should be addressed; and to what extent the surveyed teachers consider sentience of animals used for food when compared to pets (**Figure 1**) (see **Appendix A**).

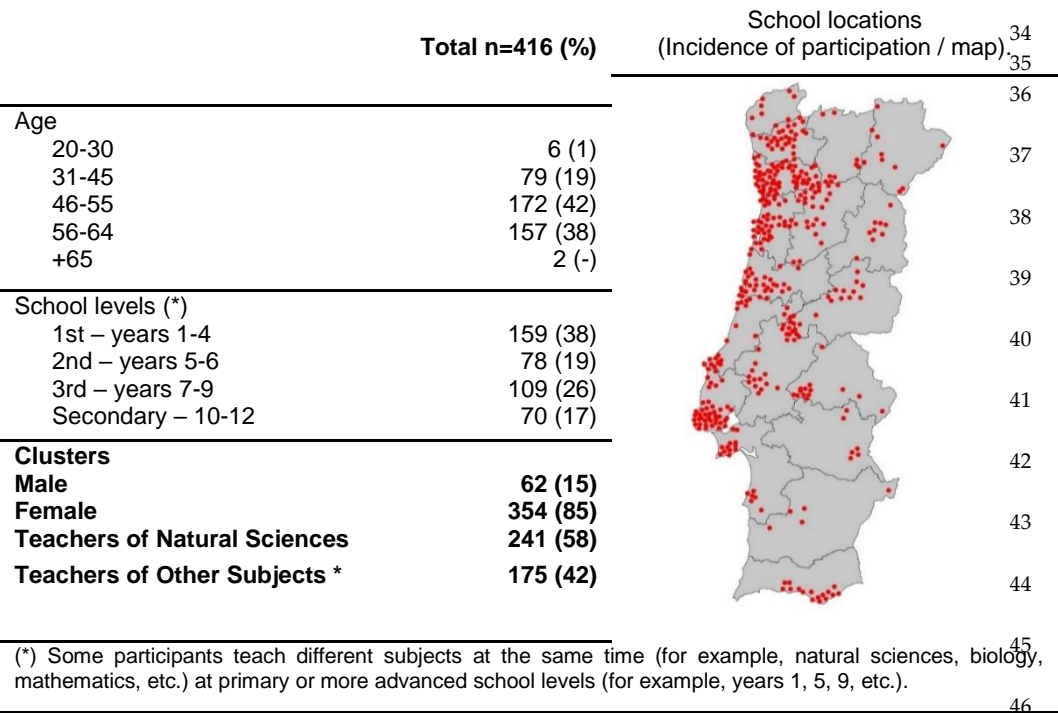
Recruitment and sampling of participants

Following an institutional approach, emails were sent to Portuguese schools encouraging their directors and members of the teaching board to share a link that allowed teachers on contract to access an online survey. The survey (hosted by Google Forms) was preceded by a brief introduction that mentioned the funding entity, goals and estimated time for the survey to be completed. During data collection there was no contact between authors and participants. Adequate provisions were made to protect the privacy of participants and maintain the confidentiality of data. All participants ($n=416$) voluntarily agreed to take part in the study and the anonymity of their responses was ensured. The information was gathered over approximately six months (between January and June 2021). Convenience sampling for this study was divided into four clusters: gender (males 15% + females 85%) and field of teaching (natural sciences 58% + other subjects 42%). The group of natural sciences includes teachers responsible for the subjects of natural sciences, biology and geography, which tend to address topics related to sustainability, diets and animals. The group of other subjects mainly includes teachers responsible for a variety of subjects, usually at primary level (i.e. 1st to 4th year), who can teach natural sciences, biology or geography, as well as other subjects such as Portuguese or mathematics.

Demographic data

Out of all 416 participants, 85% are female. The predominant age group is 46-55 (42%) and primary education is the most frequent teaching level (38%). 241 participants (58%) only teach subjects related to natural sciences, while 175 (42%) teach different subjects, some related to natural sciences but also others (such as mathematics or Portuguese) (**Figure 2. Demographic profiles of participants.**). Although the sample is heterogeneous, the participation incidence was higher in the northern and coastal areas of the Portuguese territory (**Figure 2. Demographic profiles of participants.**). The gender bias in our convenience sample (85% females) is higher than the average rate (71.8%) of women teaching at primary and secondary school level in Portugal (Pordata, 2020).

Figure 2. Demographic profiles of participants.



Data analysis

Data was measured on a five-point Likert-type scale (ranging from 1 = totally disagree to 5 = totally agree) and involved the use of variables / topics related to three interlinked subjects: (a) 'diets, the environment and sustainability' (**Table**); (b) 'diets and human health' (**Table**); (c) 'animal agency and well-being' (**Table**). Diets and animals used for food are a common denominator in all of these topics, whether they are directly or indirectly evoked (**Figure 1**).

Concerning topic (a) '*diets, the environment and sustainability*', we measured the level of agreement with the following related statements: 1. 'Animal-based diets are more sustainable'; 2. "Plant-based diets are more sustainable and environmentally friendly"; 3. "For the environment, it is important to reduce the consumption of meat". This group of questions showed how participants view the negative impacts of meat production on the environment / sustainability, and their receptiveness towards plant-based diets as way of tackling these impacts (**Figure 1**). Considering this topic (a), higher agreeability rates in reducing meat or adopting plant-based diets as more sustainable and environmentally friendly would indicate more ecocentric (and less anthropocentric) views about diets and animals. Inversely, higher agreeability rates in considering meat and animal-based diets as more sustainable and environmental friendly could be interpreted as more anthropocentric (and less ecocentric) views about diets and animals.

Regarding topic (b) '*diets and human health*', we measured participants' level of agreement in regard to the following related statements: 1. 'Schools ought to encourage meat consumption'; 2. 'Schools ought to encourage the reduction of meat consumption'; 3. 'Healthy plant-based diets ought to be encouraged in schools'. Through this group of questions, it was possible to understand the views of participants on schools maintaining / reducing meat consumption, or transitioning to plant-based diets, and whether these options are viable for child health (**Figure 1**). Within topic (b), higher rates in valuing meat reducing and adopting plant-based diets could be interpreted as low attachment to meat and indicate more trust in plant-based foods for health motifs.

Within topic (c) '*animal agency and well-being*', the following statements were tested: 1. 'Schools ought to teach about the impacts of factory farming on animals'; 2. 'It is unnecessary to teach about the importance of animal well-being'; 3. 'Pets (cats, dogs) are more prone to suffer than "food animals"'. Based on these questions, respondents provided their views whether schools should make the impacts of factory farming on animals visible, whether children should be concerned about the well-being of animals, and whether they find that farmed animals (by comparison with pets) have the ability to suffer, experience happiness, etc. (**Figure 1**). For topic (c), higher agreeability rates about the protection of farmed animals and in recognizing they are as sentient as other species might be interpreted as more inclusive (and less discriminatory) attitudes towards other animals used for food. The criteria for dividing four clusters for this convenience sampling (males; females; teachers of natural sciences; teachers of other subjects) is substantiated by the hypothesis of this **exploratory** study (in the section Aim, objectives and hypotheses). In short, gender is a demographic factor that usually plays a major role of influence in attitudes towards animals, diets (including meat and plant-based). Teachers of natural sciences (that include biology and geography) might present a substantiated knowledge about the topics of sustainability, diets and animals, compared to teachers that teach other subjects (e.g.: Portuguese and mathematics). Responses might differ within these four clusters. Mean comparisons were performed in order to understand the differences between comparable clusters (gender and fields of teaching). Significant effects were only found in two variables / topics: (1) '*diets, the environment and sustainability*' and (2) '*plant-based diets are more sustainable and environmentally friendly*'. Cronbach's Alpha of overall nine scale items (\approx three distinct topics) suggested an acceptable result (0.675).

Results

Diets in environmental education

Overall, the results on the preliminary question - whether *diets ought to be addressed in environmental education* show a clear positive response by most teachers (87% \equiv $n=166 + n=197$), mainly from women (90% \equiv $n=155 + n=165$), followed by teachers of natural sciences (89% \equiv $n=99 + n=115$). No men totally disagreed with this statement.

Diets, the environment and sustainability

Data in **Table** indicates that 65% ($n=133 + n=137$) of participants do not agree with statement (1) *animal-based diets are more sustainable*. Although all clusters present balanced results, teachers of natural sciences (74% $\equiv n=91 + n=86$) and males (70% $\equiv n=21 + n=22$) scored higher in disagreeing about the claim that animal-based diets are more sustainable. Teachers of other subjects in particular (35% $\equiv n=61$), followed by women (29% $\equiv n=103$) were the clusters with the highest incidence of uncertainty regarding this topic.

Concurrently, 66% ($n=136 + n=134$) of participants support statement (2) *plant-based diets are more sustainable and environmentally friendly*. Showing balanced scores, women (66% $\equiv n=111 + n=121$) and teachers of natural sciences (65% $\equiv n=83 + n=75$) are the groups that most agree with the statement that plant-based diets are more sustainable and less harmful to the environment.

Concerning statement (3) *for the environment, it is important to reduce the consumption of meat*, results show there is a general agreement (74% $\equiv n=127 + n=178$). Teachers of natural sciences (77% $\equiv n=32 + n=45$) and women (74% $\equiv n=105 + n=157$) in particular acknowledge the benefits of reducing the consumption of meat for the environment.

Mean comparisons were performed for all variables to provide a better understanding of the differences between clusters, although significant effects were only identified in two. It was found that teachers of natural sciences disagreed less with statement (1) *animal-based diets are more sustainable* ($M = 2.37$, $DP = 1.05$) than teachers of other subjects [$M = 1.94$, $DP = 0.90$; $t(332.43) = -4.34$, $p < .001$]. Regarding gender, the difference in sample size of the groups prevented the use of independent samples t-test. Therefore, the mean for women, the largest group, was used as a reference of comparison for the mean for men, through a one sample t-test. The results show that female teachers agree more with statement (2) *plant-based diets are more sustainable and environmentally friendly* ($M = 3.91$, $DP = 0.99$) than male teachers [$M = 3.56$, $DP = 1.14$; $t(61) = -2.39$, $p = .020$].

Table 1. Diets, the environment and sustainability.

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1. Animal-based diets are more sustainable.					
	Totally disagree (%)	Disagree (%)	Uncertain (%)	Agree (%)	Totally agree (%)
Male (n=62)	21 (34)	22 (36)	13 (21)	4 (6)	2 (3)
Female (n=354)	112 (32)	115 (32)	103 (29)	19 (5)	6 (2)
Teach Nat Sci (n=241)	91 (38)	86 (36)	54 (22)	8 (3)	2 (1)
Teach Oth Sub (n=175)	42 (24)	51 (29)	61 (35)	15 (9)	6 (3)
Total (n= 416)	133 (32)	137 (33)	115 (28)	23 (5)	8 (2)
2. Plant-based diets are more sustainable and environmentally friendly.					
Male (n=62)	3 (5)	10 (16)	11 (18)	25 (40)	13 (21)
Female (n=354)	5 (1)	21 (6)	97 (27)	111 (32)	121 (34)
Teach Nat Sci (n=172)	6 (3)	16 (7)	61 (25)	83 (34)	75 (31)
Teach Oth Sub (n=241)	2 (1)	15 (9)	46 (26)	53 (30)	59 (34)
Total (n= 416)	8 (2)	31 (8)	107 (26)	136 (33)	134 (33)
3. For the environment, it is important to reduce the consumption of meat.					
Male (n=62)	4 (7)	5 (8)	10 (15)	22 (36)	21 (34)
Female (n=354)	6 (2)	17 (5)	70 (19)	105 (30)	157 (44)
Teach Nat Sci (n=172)	5 (2)	14 (6)	36 (15)	77 (32)	109 (45)
Teach Oth Sub (n=241)	5 (3)	8 (5)	43 (25)	50 (28)	69 (39)
Total (n= 416)	10 (2)	22 (5)	79 (19)	127 (31)	178 (43)

Diets and human health.

Table displays the opinions of participants on whether schools should endorse meat- (maintenance or reduction) or plant-based diets for human health. Concerning statement (1) *schools ought to encourage meat consumption*, most participants (44% $\equiv n=185$) expressed uncertainty about the claim, mainly teachers of other subjects (46% $\equiv n=80$) and females (45% $\equiv n=161$). Disagreement (43% $\equiv n=66 + n=111$) is the second most dominant view concerning this statement, particularly from teachers of natural sciences (43% $\equiv n=43 + n=62$).

As for statement (2) *schools ought to encourage the reduction of meat consumption*, data again show a high prevalence of neutrality (34% $\equiv n=140$), particularly from women (36% \equiv

$n=129$). Men ($66\% \equiv n=23 + n=18$) score higher in accepting the claim, while simultaneously presenting the highest rates for disagreeing with it (16%). Teachers of natural sciences ($58\% \equiv n=70 + n=70$) tend to agree more with schools encouraging a reduction in meat consumption for human health.

Statement (3) *healthy plant-based diets ought to be encouraged in schools* prompted a general (32%) degree of uncertainty, mostly from female participants (34%). The groups that most supported encouraging plant-based diets in schools were males ($58\% \equiv n=22 + n=14$) and teachers of natural sciences ($50\% \equiv n=72 + n=48$). Males also stand out as the group that most disagreed (23%) with schools encouraging plant-based diets.

Table 2. Diets and human health.

1. Schools ought to encourage meat consumption.					
	Totally disagree (%)	Disagree (%)	Uncertain (%)	Agree (%)	Totally agree (%)
Male ($n=62$)	9 (15)	20 (32)	24 (39)	5 (8)	4 (6)
Female ($n=354$)	57 (16)	92 (26)	161 (45)	39 (11)	6 (2)
Teach Nat Sci ($n=172$)	43 (18)	62 (26)	105 (43)	28 (12)	3 (1)
Teach Oth Sub ($n=241$)	23 (13)	49 (28)	80 (46)	16 (9)	7 (4)
Total ($n=416$)	66 (16)	111 (27)	185 (44)	44 (11)	10 (2)
2. Schools ought to encourage the reduction of meat consumption.					
Male ($n=62$)	6 (10)	4 (6)	11 (18)	23 (37)	18 (29)
Female ($n=354$)	6 (2)	32 (9)	129 (36)	93 (26)	95 (27)
Teach Nat Sci ($n=172$)	7 (3)	17 (7)	77 (32)	70 (29)	70 (29)
Teach Oth Sub ($n=241$)	5 (3)	19 (11)	63 (35)	45 (26)	43 (25)
Total ($n=416$)	12 (3)	36 (9)	140 (34)	115 (27)	113 (27)
3. Healthy plant-based diets ought to be encouraged in schools.					
Male ($n=62$)	5 (8)	9 (15)	12 (19)	22 (35)	14 (23)
Female ($n=354$)	13 (4)	55 (15)	120 (34)	101 (28)	66 (19)
Teach Nat Sci ($n=172$)	8 (3)	38 (16)	75 (31)	72 (30)	48 (20)
Teach Oth Sub ($n=241$)	10 (6)	26 (14)	56 (31)	51 (30)	32 (19)
Total ($n=416$)	18 (4)	64 (15)	131 (32)	123 (30)	80 (19)

Animal agency and well-being

The data in **Table** displays the views of participants on how (and whether) schools should address the topic of animals used for food during classes. Most teachers ($79\% \equiv n=143 + n=188$) agree that (1) *schools ought to teach about the impacts of factory farming on animals*. Men ($82\% \equiv n=20 + n=31$) and teachers of natural sciences ($80\% \equiv n=75 + n=118$) are the groups that are more open-minded about making the impacts of factory farming on animals visible to students.

Most respondents ($78\% \equiv n=207 + n=117$) oppose the claim that (1) *it is unnecessary to teach about the importance of animal well-being*. Men ($83\% \equiv n=30 + n=21$), followed by teachers of other subjects ($79\% \equiv n=85 + n=52$), are the groups that more strongly oppose the idea that students should be kept from learning about animal well-being. It is noteworthy that women and teachers of other subjects did not totally disagree with this statement.

75% of teachers ($n=216 + n=98$) do not agree with the belief that (3) *pets are more prone to suffer than animals used for food*. Teachers of natural sciences ($78\% \equiv n=131 + n=57$) and women ($76\% \equiv n=181 + n=88$) are those who most disagree with the notion that pets are more sentient than other species conventionally used for food.

Table 3. Animal agency and well-being.

1. Schools ought to teach about the impacts of factory farming on animals.					
	Totally disagree (%)	Disagree (%)	Uncertain (%)	Agree (%)	Totally agree (%)
Male (n=62)	1 (2)	1 (2)	9 (14)	20 (32)	31 (50)
Female (n=354)	-	6 (2)	68 (19)	124 (35)	157 (45)
Teach Nat Sci (n=172)	1 (0.4)	4 (2)	43 (18)	75 (31)	118 (49)
Teach Oth Sub (n=241)	-	3 (2)	34 (19)	68 (39)	70 (40)
Total (n= 416)	1 (0.2)	7 (2)	77 (19)	143 (34)	188 (45)
2. It is unnecessary to teach about the importance of animal well-being.					
Male (n=62)	30 (49)	21 (34)	7 (10)	3 (5)	1 (2)
Female (n=354)	177 (50)	97 (27)	62 (18)	12 (3)	7 (2)
Teach Nat Sci (n=172)	122 (51)	65 (27)	42 (17)	8 (3)	4 (2)
Teach Oth Sub (n=241)	85 (49)	52 (30)	27 (15)	7 (4)	4 (2)
Total (n= 416)	207 (50)	117 (28)	69 (16)	15 (4)	8 (2)
3. Pets (cats, dogs) are more prone to suffer than “food animals”.					
Male (n=62)	36 (58)	10 (16)	12 (19)	4 (7)	-
Female (n=354)	181 (51)	88 (25)	69 (20)	15 (4)	2 (0.6)
Teach Nat Sci (n=172)	131 (54)	57 (24)	46 (19)	6 (3)	1 (0.4)
Teach Oth Sub (n=241)	85 (49)	41 (23)	35 (20)	13 (7)	1 (0.6)
Total (n= 416)	216 (52)	98 (23)	81 (19)	19 (6)	2 (0.5)

Discussion

This exploratory study aimed to understand what are the teachers views about the suitability of three interrelated topics for the sustainability education agenda: (1) the viability of diets for tackling environmental challenges and natural resource management; (2) the health benefits of traditional versus plant-based diets; (3) the impacts of factory farming on animals and animal sentience. Some data on how participants view these topics seem to confirm the results of other published literature and the above-mentioned hypotheses. However, most results were not expected and they do not confirm most of outlined hypothesis, indicating broad acceptance of a less anthropocentric view of animals and an openness to meatless or even plant-based diets.

One of the findings of this study is that most participants, mainly women (90%) and teachers of natural sciences (89%), are open to addressing the topic of diets in environmental education. It is a noteworthy finding, considering the national core curriculum for sustainability in Portugal (Câmara et al., 2018) seems to disregard these and other related topics tested in this study. The expressed openness from the inquired educational agents in teaching about the importance of diets is an optimistic indicator for (an hypothetical) future addressing the interconnectedness of human food systems with current sustainability and environmental challenges. [A limitation of this study that could be explored in future research is to investigate teachers' opinions about specific interrelated topics in the current guidelines for sustainable education, such as: the moral value of animals explored for food; and their views about the negative impacts of factory farming on animals, human health, the environment and natural resource management.](#)

The first contribution of this [exploratory](#) study is to show the potential orientations of surveyed teachers, in educational settings, on the relevance of animal or plant-based diets for a more sustainable food system. Similar to previous research (Pedersen, 2010; Twine, 2010), we found that male teachers were more reluctant than their female counterparts to acknowledge and endorse the reduction of meat consumption and the adoption of plant-based diets as ways of tackling environmental degradation (**Figure 3**). This finding confirms that women, compared to men, exhibited stronger implicit associations between meat and environmental impacts (Sanchez-Sabate & Sabaté, 2019). Contrary to one of our hypothesis, which was a relative degree of indifference towards the negative impacts of animal agriculture on the environment, our findings show that teachers of natural sciences tend to be more concerned about this matter (Banyte et

al., 2022; Bryant, 2021) and more open to valuing the reduction of meat consumption and transitioning to meatless or plant-based diets in educational settings (**Figure 3**). Animal agriculture is a main factor causing environmental degradation. Therefore reducing meat and transitioning to plant-based diets is key to mitigate climate change and several environmental issues (Bouwman et al., 2013; Mbow et al., n.d.). In contrast with current model of environmental education in Portugal, whose educational material don't provide students with necessary tools to cope with impacts of animal agriculture in environment and sustainability (Fonseca, 2022), the results of this study suggest the surveyed natural sciences teachers do recognize the importance of more suitable diets for tackling with such challenges. This openness about teaching about these topics, that contrasts with current mandatory guidelines in Portugal and in many other countries, suggests participants openness in developing educational experiences with future students for mitigating impacts through diets. A limitation of this study that could be explored by future research would be to survey teachers on the suitability of specific varied diets (e.g. traditional, pescatarian, flexitarian, vegetarian, vegan, etc.) that they consider schools should accommodate, both through different food options in canteens and in school curricula, for being environmentally friendly and more sustainable.

The second contribution of this study was to identify what teachers think about the role of animal or plant-based diets in attending to human health in educational settings. Education for sustainability in Portugal continues to predominantly frame animals as available food resources, as the most viable sources of protein, while marginalizing plant-based diets (Fonseca, 2022). Cultural factors play a major influence in fostering utilitarian attitudes towards other animals. Additionally, neoliberalism and the compulsive pursuing for economic growth and increasing demands for natural resources paradoxically continues to influence the discourse on sustainable development (Kopnina, 2012, 2020). Deeply inscribed within the humanist project, and in the thinking that we can 'improve' upon nature and exploit the earth's resources with impunity (Taylor, 2017), the anthropocentric framing of animals as natural resources is an hegemonic belief system transversal to several socialization institutions in the Western world (Cole, Matthew; Stewart, 2015; Pedersen, 2010; Twine, 2010). Although most participants (44%) in this study, particularly females (45%), and teachers of other subjects (46%), surprisingly present a high disagreement rate (43%) on schools encouraging the consumption of meat, this results should be interpreted with caution due to possible implicit conflicts about diets. *In other words, although these participants might recognize the nutritional benefits, ecological evidences, and ethical values, which support reducing meat and opting for plant-based diets, their sociocultural values can still support meat-based diets as the "default" option (Jiménez-Aleixandre & Brocos, 2017) to be adopted in schools. Although participants' present less anthropocentric attitudes towards animals in comparison with the national educational guidelines (Fonseca, 2022), this study can't grasp if this general positive feedback matches teachers' actual behaviour as citizens / consumers that (are willing to) adhere to meatless or plant-based diets. Any hypothetical inconsistency of values could be an expression of the perceived attitudes of culturalized agents (e.g. teachers, parents), or as a conflict with the view that the educational system is not neutral in conveying animal agricultural impacts and conventional dietary guidelines.*

Our findings suggest a relevant degree of uncertainty in opinion rates regarding the encouragement of meat consumption. For health reasons, men (66%) and teachers of other subjects (58%) are those who most support reducing the consumption of meat and those who most agree with healthy plant-based diets being encouraged in schools. At the same time, considering the topic 'diets and human health', males are the group that most disagree with schools encouraging plant-based diets. The correlation between masculinity and meat consumption found in other studies (De Backer et al., 2020; Love & Sulikowski, 2018; Ruby & Heine, 2011), together with beliefs around protein deficiency (Reipurth et al., 2019) and other health concerns associated with plant-based diets (Corrin & Papadopoulos, 2017), do not seem to appear in this study. It is worth noting that, according to this study, males (58%) are those who most support schools encouraging plant-based diets. Nevertheless, these results are limited to participant views on the topic; they were not crossed with other variables such as individual dietary choices, intake patterns or personal beliefs about educational orientations on the topic 'diets and health'. Future research can look into the dietary options of educational agents and find out whether they are barriers or drivers of potential endorsements of plant-based diets in educational settings. Even though the implementation of plant-based diets is highly recommendable in school canteens, with respective reinforcement in educational curricula, further emotional tensions about diets (Jiménez-Aleixandre & Brocos, 2021) could hypothetically include teachers (students, and parents), particularly those with more reservations about meat reduction and plant-based diets

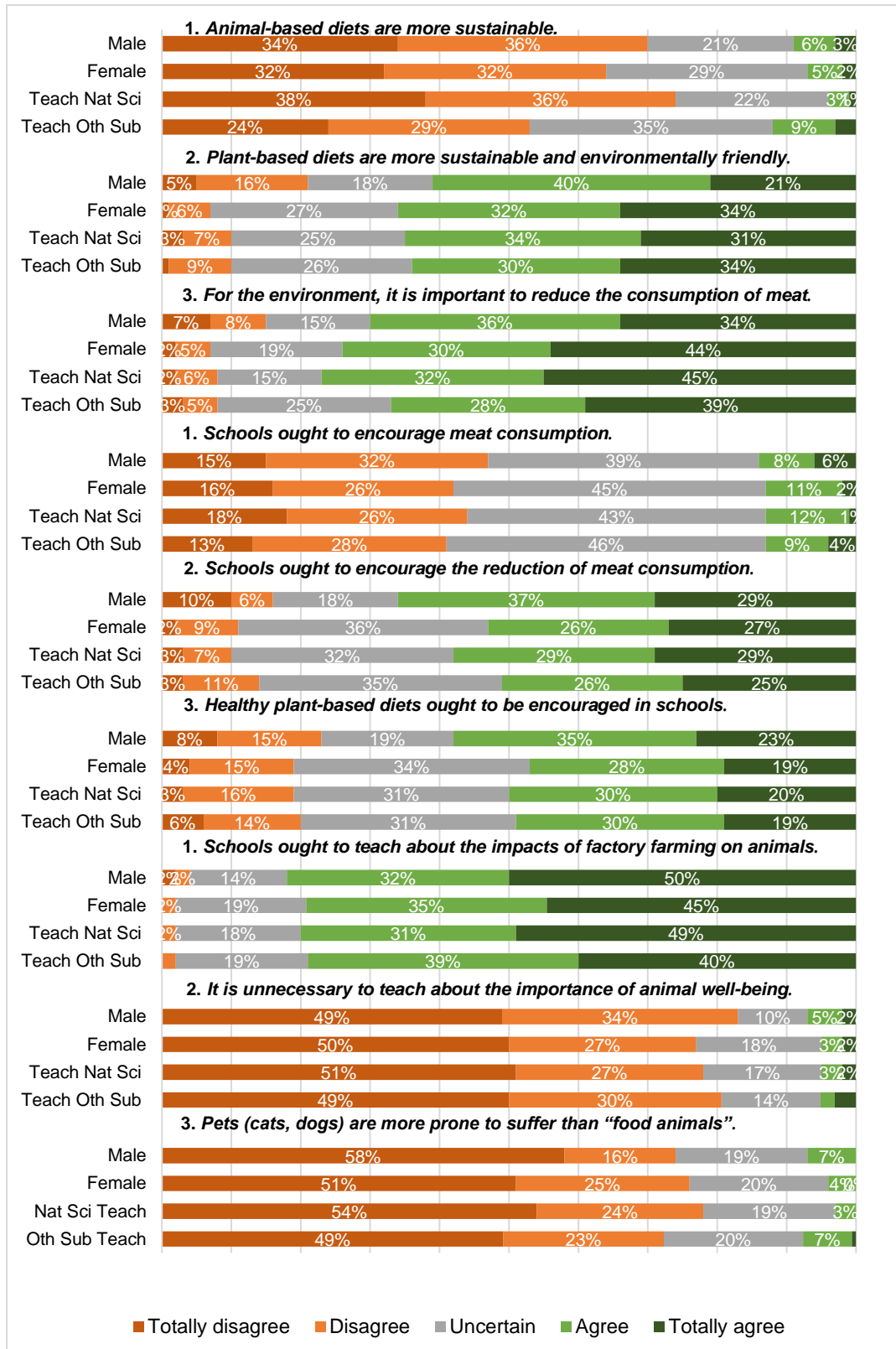
1 adoption. As previously mentioned, acculturation practices play a major role in decision-making
2 related to food choices for families (Ayadi & Bree, 2010; Bowen & Devine, 2011). Combining
3 health and environmental appeals about the negative impacts of meat (Kwasny et al., 2022),
4 could enable more substantial dietary changes in school settings. Another limitation of this study
5 future research can explore, is to inquire teachers about schools providing students and parents
6 with combined health and environmental appeals, to arrange competence training and support
7 for habit change (counselling with educational materials on healthy lifestyles; to provide cooking
8 courses to assist in the preparation of vegetarian food); to increase the visibility of vegetarian food
9 (e.g. by labelling a vegetarian meal as “dish of the day”) (Kwasny et al., 2022), or to elucidate
10 about adequate proteins being also available in plant-based diets. Moreover, we hypothesize that
11 results from other experiments with participants that expressed more willingness to reduce meat
12 intake, and more caring attitudes towards animals (see Palomo-Vélez et al., 2018), can similarly
13 be replicated with educational agents that teach environmental education. In this sense, is highly
14 recommended teachers to participate in experiments with meat-animal association, where
15 animals are presented alive (Earle et al., 2019), (Piazza et al., 2018), (Kunst & Palacios
16 Haugestad, 2018), more cute (e.g.: in baby condition) (Zickfeld et al., 2018), through animal
17 anthropomorphizing (Johnson et al., 2021), through changing culinary terms that commodify
18 animals (e.g.: replacing terms like “beef/pork” with “cow/pig”) (Kunst & Hohle, 2016), or presented
19 as being taken care in animal sanctuaries.

20 The third contribution of this article was to look at how teachers view animals used for food
21 as a topic of environmental education. Among other published findings, there is a growing
22 consensus that mainstream concepts and orientations in the education agenda are
23 anthropocentric, marginalising the interests of animals and seeing them mainly as commodities
24 for human consumption (Banschbach & Lloro-Bidart, 2019; Dinker, Karin Gunnarsson; Pedersen,
25 2016; Kopnina, 2012; Spannring, 2017). As a result, we hypothesised intolerance and indifference
26 among most participants regarding the inclusion of this topic in school settings. Surprisingly, taken
27 as a whole, 79% of the participants – mostly men (82%) and teachers of natural sciences (80%)
28 – agree with including the impacts of factory farming on animals in the education agenda. In
29 addition, most views, with the highest prevalence among males (83%) and teachers of other
30 subjects (79%), reflected open-mindedness towards teaching about the importance of animal
31 well-being in educational settings.

32 Considering the rigid classifications of species (i.e. as edible versus non-edible),
33 traditionally inculcated in Western socio-cultural and educational matrices, consequently enabling
34 dissociation (Kupsala, 2018) and emotional distancing (Te Velde et al., 2002), the teachers' views
35 of animals used for food seem surprising. We also did hypothesise that most participants could
36 devalue the sentience of “food-animals” when compared to that of pets, interestingly, the findings
37 of this study suggest an overall (75%) cognisance of the sentience of animals used for food,
38 particularly by women (76%) and teachers of natural sciences. A pertinent aspect that was left
39 out of this study, and future research can explore, is to measure the views of teachers on specific
40 farming practices in most developed countries (such as animal tethering, castration without
41 anaesthesia, debeaking, intensive farming, etc.) and understand whether they deem these
42 practices can fall into the category of animal well-being (or welfare). Additionally, teachers could
43 be surveyed on whether these animal farming practices should continue to be made invisible in
44 national core curriculums (Pedersen, 2004, 2010; Spannring, 2017; Banschbach and Lloro-Bidart,
45 2019), dissociated from the consumption of meat (Knight & Barnett, 2008b; Tomasevic et al.,
46 2020) and other animal-based products. For reversing the tendency in framing animals as “absent
47 referents” (Adams, 2003), future research can directly inquire teachers about more ecocentric
48 pedagogy grounded in the ethic of care that could enable students to think more ethically about
49 the animals (Castano Rodriguez, 2016; Lloro-Bidart & Semenko, 2017). Ultimately, future work
50 needs to be done with teachers about the appropriate place of animals within the realm of
51 environmental education: if they should continue to be framed as mere food products to be served
52 in school canteens or, rather, important moral subjects and stakeholders (Dinker et al., 2016) for
53 more efficient sustainability policies. Because animal production represents a key factor for
54 deforestation, climate change, an unsustainable food system and the suffering of billions of
55 animals, the receptivity of educational agents in promoting among students the moral protection
56 to other species, while encouraging the viability of nutritious plant-based diets, could contribute for
57 an imperative social transformation in order to mitigate these global challenges. In conjunction,
58 educational programmes and policy makers in Portugal and in other high income countries ought
59 to adopt transparent guidelines that convey accurate information about animal agriculture
60 impacts, and to adopt more ecocentric attitudes towards other species while ascribing their

1 intrinsic value. Overall, would be valuable to promote interspecies relations where humans are
 2 not seen as the only sentient individuals (Gaard, 2002; Kheel, 2008).
 3

Figure 3. Teacher views (by clusters) of diets, sustainability and animals.



Conclusions

This study was conducted to explore (416) teachers' views on the importance of the following interrelated topics for the sustainability education agenda: (1) the viability of diets for tackling environmental challenges and natural resource management; (2) the health benefits of traditional versus plant-based diets; (3) the impacts of factory farming on animals and animal sentience. The findings are surprising, contrasting with an anthropocentric view of animals and omissions on the impact of diets from the Portuguese guidelines on environmental education for sustainability. The results of this study show a very high acceptance rate for the topic of diets in environmental education. Furthermore, most teachers seem not have a strong anthropocentric view of animals and tend to be open-minded about reducing the consumption of meat and adopting plant-based diets. Among the findings of this study, men tend to be more resistant to endorsing plant-based diets as a way of tackling environmental degradation. However, for health reasons, they scored higher in advocating a reduction in meat consumption, while also supporting plant-based diets. Additionally, most men and teachers of natural sciences are open to including animals used for food as a topic in the sustainability education agenda, including the impacts of factory farming on animals. Teachers of other subjects are more supportive of reducing the consumption of meat, defending the suitability of plant-based diets for children at schools and teaching about animal well-being. Women and teachers of natural sciences are the groups that most recognise the sentience of factory-farmed animals.

In short, the surveyed teachers seem to be more aware of the several consequences around meat consumption compared to what policy makers and other educational agents outline in Portuguese national curricula. The cultural hegemonic legacy of anthropocentric framings about other animals, the neoliberal pursue for economic development, and the strong influence of livestock sector in schools and school curricula are structural causes for concern about current discourses in education for sustainable development. It's up to all stakeholders, including teachers, to provide students with relevant and accurate information on how to tackle contemporary challenges like climate change, environmental degradation, human health, unsustainable food-systems and animal suffering triggered by animal agriculture. Although this is an exploratory study, its findings may contribute to the discussion of the importance of diets and the framings of non-human animals in the education for sustainable development - which potentially continues to instigate teachers, and consequently students, to adopt instrumental views of animals. The experimental design, the findings and directions for future research and interventions provided by this [exploratory](#) study can be useful to all academics, teachers and students interested in and committed to enhancing sustainability education programmes, namely by shedding light on animals as beings with intrinsic value and important stakeholders for tackling environmental degradation, food insecurity, climate change and speciesism.

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Informed consent statement

All participants were informed about the objectives of the project and their participation was voluntary.

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Notes on contributors

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