How meat reduction differs from other personal climate actions: Distinct concerns and cultural barriers among EU consumers

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Food Quality and Preference

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ABSTRACT

Meat reduction might become a new extension of the personal climate actions in the European Union (EU), but this development is not without challenges. Focusing on consumers, this paper investigates 1) how meat reduction is related to other climate actions and 2) how adopters of meat reduction and those who just take other actions differ in concerns about world problems and sociocultural characteristics. The data are from Eurobarometer 95.1 (Spring 2021). The analyses revealed that the adoption of meat reduction was related to the adoption of other climate actions, but that it was not on par with mainstream pro-environmental actions. Participants who incorporated meat reduction in their climate actions were more than the others motivated by broad environmental, social and public health concerns. Those who did not incorporate meat reduction scored lower on these concerns and might have been negatively affected by incongruences between the cultural meaning of meat reduction and their cultural identities in terms of right-wing positions, masculinity or social class. The results showed that meat reduction is part of an adoption process and that the Northwestern countries were somewhat further on in this process than the Southern and Eastern countries.

1. Introduction

Meat reduction and similar dietary shifts from animal-based foods to plant-based foods are key points of urgent policies to fight climate change (Wynes & Nicholas, 2017; Ivanova et al., 2020) as well as biodiversity loss (Machovina, Feeley, & Ripple, 2015; Selinske et al., 2020), and health problems (Willett et al., 2019), in particular in high-income countries (Sun et al., 2022). In the European Union (EU), the shifts are associated with the new Farm to Fork strategy aimed at promoting a fair, healthy and environmentally-friendly food system (European Commission, 2020a). In this context, the reduction of meat consumption will become even more important, as the EU was recently criticized by its European Court of Auditors (2021) that it fails to achieve its own objectives. These require a substantial reduction of livestock production in the EU, which should go together with reductions in meat consumption to prevent that the impacts of the reduced production level will be offset by higher imports (European Court of Auditors, 2021). As a result, policy-makers have to address urgent questions about how major shifts in diet can be supported, taking due account of the various sensitivities of this topic (see below). The present paper aims to get better insight into the factors that promote or hamper the adoption of meat

reduction by EU consumers through investigating how this behavior matches other personal actions to fight climate change (henceforth climate actions) and how it is associated with their concerns and characteristics. More specifically, it considers, firstly, how meat reduction is related to other climate actions about food, household energy use, transport and waste, and, secondly, whether meat reduction is distinctly related to potential explanatory variables of personal climate actions, such as consumers' environmental, social and public health concerns, and particular sociocultural characteristics. The paper addresses these topics based on survey data (Eurobarometer 95.1, Spring 2021) collected by the EU.

Data that shows how various environmentally and climate friendly actions are related to each other and to potential explanatory variables may improve the understanding of the nature of these behaviors and inform interventions that aim at behavioral change among individuals and households (Kaiser, Hartig, Brügger, & Duvier, 2013; Bratt, Stern, Matthies, & Nenseth, 2015; Whitmarsh, Poortinga, & Capstick, 2021). This work may be helped by studying large samples from general populations in different countries, such as the Eurobarometer. The EU often uses questions in these surveys for policy development purposes (Haverland, De Ruiter, & Van de Walle, 2018). A key reason to examine

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and analyze Eurobarometer 95.1 is that it is the first in a series of surveys about consumer beliefs and actions related to the environment, climate change and biodiversity loss (e.g. European Commission, 2008, 2015a, 2015b, 2019, 2020b, 2020c) to give consumers the opportunity to report meat reduction as one of their actions. The survey includes consumers' appraisal of climate change and climate mitigation behavior (European Commission, 2021) and their evaluations of EU corona virus responses (not reported here, see European Parlement, 2021). After the question whether they personally had taken any action to fight climate change over the past six months, "buying and eating less meat" was one of the 15 climate actions they could choose.

In analyzing the correlates of this action, this paper used the analytical and strategic value of the distinction between two groups of EU countries with regards to how they are performing on the Sustainable Development Goals of the United Nations (UN SDGs) (Cling, Eghbal-Téhérani, Orzoni, & Plateau, 2020). Cling et al. (2020) used a broad set of indicators adapted to the EU context and applied principal component analysis as well as hierarchical cluster analysis to examine distances in performance between the countries. These analyses revealed a split between countries of Northwestern (henceforth NW) Europe and the Southern and Eastern (henceforth S&E) countries. The first group was relatively homogeneous and consisted of the 11 (in 2019) richest countries in the EU, with the highest scores on economic and social sustainable development indicators. However, their indicators relating to the environment in a broad sense (i.e. energy, climate, life on land), such as household final energy consumption per capita, were more heterogeneous (Cling et al., 2020). The latter is remarkable as the Northwest has a longer history in environmental awareness and action (Rootes, 2004), but it can be related to the environmental repercussions of higher incomes (Girod & de Haan, 2010). With regard to food, the North had traditionally a high animal protein and low plant protein diet, although the other regions, in particular the South, have recently shown an increased demand for animal protein (de Boer & Aiking, 2018). Taking the results of Cling et al. (2020) as a starting point, all the analyses were done separately for consumers in NW countries and S&E countries. The next section presents some theory-based insights on how consumer decisions on meat reduction can be related to other climate actions and explanatory variables, followed by the hypotheses of the present study.

2. Theory: Meat reduction and other climate actions

2.1. Decisions about environmentally and climate friendly actions

Theoretically, it may be assumed that protecting climate and the environment have—to a certain extent—become "principle goals" (Powers, 1973; DeShon & Gillespie, 2005) that serve consumers as guides for clusters of behavior with comparable, socially recognized environmental repercussions, the reduction of which may become a goal of some personal importance that influences choices. While consumers may vary in the importance they assign to these goals, their actual decision about a potential "green" action is strongly influenced by the degree of confidence generated in the action's environmental benefits (or effectively avoided repercussions) and the degree of compromise involved in making this particular choice (e.g. additional costs, time and efforts versus co-benefits) (Peattie, 2001, 2010). Over the past decades consumers' knowledge on the environmental repercussions of their food consumption has increased; ten years ago, many consumers believed that the environmental repercussions of food consumption were limited to the material flow of packaging waste, which they could personally experience (Van Dam, 1996; Tobler, Visschers, & Siegrist, 2011). Partly as a result, recycling has turned into a normalized form of pro-environmental behavior (Gould, Ardoin, Biggar, Cravens, & Wojcik, 2016). Through various symbolic processes (e.g. education and policy development), consumer beliefs about food's environmental repercussions have evolved to include criticism of pesticide use (Ditlevsen,

Sandøe, & Lassen, 2019; Hansmann, Baur, & Binder, 2020) and, to a certain extent, carbon emissions (Bostrom et al., 2012; Wynes, Zhao, & Donner, 2020).

In the case of meat, both the perceived benefits of reductions and the compromises used to be problematic. Consumers appeared to have low confidence in the potential of meat reduction to achieve environmental benefits (Tobler et al., 2011), in general, or more specifically to fight climate change (de Boer, de Witt, & Aiking, 2016). Moreover, the embeddedness of meat consumption in people's daily routines (Graça, Godinho, & Truninger, 2019; Päivärinta et al., 2020) means that the choice of meat-free alternatives may involve various compromises and costs in, for example, taste, effort, time and/or money. Since 2015, however, at least some segments of the EU population have shown "slight tendencies" to decrease the consumption of animal products and to increase the consumption of healthful plant-based foods (Brunin et al., 2021; Stewart, Piernas, Cook, & Jebb, 2021; Verain, Dagevos, & Jaspers, 2022).

Although some consumers may now place (industrially produced) meat eating in the same cultural category of carbon emitters as driving a car or flying for holidays (Wynes et al., 2020), the role of technical notions of environmental repercussions should not be overestimated. For instance, earlier studies based on Eurobarometer data and other population samples show that buying seasonal and local products has become a reasonably accepted, food-related climate action, which could be seen in relation to carbon emissions (Pirani & Secondi, 2011; Whitmarsh, Seyfang, & O'Neill, 2011; Hoolohan, Berners-Lee, McKinstry-West, & Hewitt, 2013). In recent Eurobarometers, however, the survey option of buying seasonal and local products was replaced by an option purely formulated in terms of reducing the carbon footprint of one's food purchases, which appears to be much less popular (de Boer & Aiking, 2022). Hence, instead of focusing on carbon footprints, consumers may use less technical notions of environmental repercussions and also use other than strictly environmental concerns and values to make more sustainable choices (Gifford & Nilsson, 2014; Meyer, 2015; de Boer & Aiking, 2021).

2.2. Behavioral consistencies and inconsistencies

The interrelationship of behaviors may generally be affected by principle goals and more specifically by focal goals and various circumstances (Kruglanski et al., 2015). As many consumers tend to behave in a manner that matches their past decisions or behaviors (Guadagno & Cialdini, 2010), prior "green" actions may help the adoption of subsequent ones. This general process (commonly called "behavioral spillover") can be linked to more specific factors, such as preferences, knowledge, skills or external constraints (Jones et al., 2019). For instance, a positive correlation between eating organic food and eating less meat may be attributed to congruent preferences for organic production and for lower shares of meat in one's meal (Clonan, Wilson, Swift, Leibovici, & Holdsworth, 2015; Christensen, Denver, & Bøye Olsen, 2020) and / or to external constraints, such as the higher prices of organic meat (which may result over time in a correlation between consumers' increasing organic budget shares and decreasing meat budget shares (Heerwagen, Andersen, Christensen, & Sandøe, 2014)). Jamison (2003) suggests that eating "green" can become an important part of one's identity and a way to internalize ecological principles and values, which is attractive to some people (see also Whitmarsh & O'Neill, 2010; Van der Werff, Steg, & Keizer, 2014). However, Jamison (2003) also notes that a "green" identity is basically a very complex concept, filled with ambiguities. For instance, combining different eco-friendly goals often requires compromises, such as between organic and local food, the specifics of which may vary across products, across markets and over time (Zepeda & Nie, 2012; Denver & Jensen, 2014).

Obviously, some behavioral inconsistencies (combining "green" and "red" behaviors) draw more attention than other ones. The more apparent behavioral inconsistencies are often related to practical

problems and a lack of social support from one's peers (Dubuisson-Quellier & Gojard, 2016). A remarkable exception is the current popularity of waste sorting, which is being facilitated in many countries, where it has become a socially accepted practice in combination with waste reduction (Thomas & Sharp, 2013; Dubuisson-Quellier & Gojard, 2016). Apart from this, however, many "green" actions may be perceived as less practical and identified with groups that demonstrate things ordinary people would not do (Dubuisson-Quellier & Gojard, 2016). Some psychological processes may also be important for explaining inconsistencies, such as the way consumers may use "moral balancing" to license meat-eating morally, for example, by making the argument that they have already taken other (perceived as self-sacrificing) "green" actions (Khan & Dhar, 2006; Sörqvist & Langeborg, 2019). The literature also reports deliberate inconsistencies of consumers who state that they eat meat because either technological or political changes are more important than what they personally do (Scott, Kallis, & Zografos, 2019). Less deliberate inconsistencies may result from consumers' different perceptions of the effectivity of food-related and household-energy-related climate actions, of which the latter were often rated higher (de Boer et al., 2016).

2.3. Broader concerns and cultural identities

The literature indicates that it can be very informative to study the interrelationship of climate actions, but that different lists of actions and different populations might yield a different structure (Bratt et al., 2015), in particular if the list of actions is relatively short (Kaiser et al., 2013). Therefore, it is additionally important to consider the ways in which meat reduction and other climate actions are related to environmental and broader concerns as well as to relevant cultural identities. Theoretically, the contributions of broader concerns may have their roots in well-known universalistic (or pro-social) values, which reflect an individual's motivation to contribute to the welfare of the wider society, including nature (Schwartz, 1992). In the approach of Schwartz et al. (2012), environmental protection, nature conservation, social concern, social justice and social tolerance are subtypes of universalistic values. As to the first two subtypes, concerns about climate change (i.e. environmental protection) and nature conservation are distinctly related to intentions to reduce meat eating (de Boer, Schösler, & Boersema, 2013). In the context of the Eurobarometer, the subtypes may form the basis of the participants' answers to the question about "the most serious problems facing the world as a whole". That is, awareness of the seriousness of problems can be understood as concern. A classic example is concern about the prevalence of poverty and hunger in the world, which forms the background of the sustainable food concept (Brundtland, 1987; Langhelle, 2000). Earlier work showed that consumers' reported diet changes to "more sustainable food" (as they see it) were correlated with variables that are themselves connected with broader welfare concerns, such as being female, having an urban (vs. rural) background, having political interest, having a longer education and placing oneself as being higher class or higher middle class (de Boer & Aiking, 2021).

In particular, decisions on food are also guided by the degree of (in) congruence between the cultural meaning of particular food choices and one's cultural identity (Douglas, 1972; Carrus, Cini, Caddeo, Pirchio, & Nenci, 2011; Oleschuk, Johnston, & Baumann, 2019). This affects, what the decision theorist Beach (1990) calls, a person's routine tests to screen out the "unacceptable". Today, this screening has become important in relation to both climate change and meat eating. Although in the 1970s and early 1980s environmental issues were seen as neither left nor right (Rootes, 2004; Dalton, 2009), climate policies and mitigation issues are nowadays topics of cultural controversies (McCright, Dunlap, & Marquart-Pyatt, 2016; Czarnek, Kossowska, & Szwed, 2021). The recognition of climate change as a political issue has become associated with leftist positions rather than rightist ones in many countries where the left–right identification has more or less the same meaning (i. e. not in former Communist countries) (McCright et al., 2016).

Regarding meat consumption, it is further important that consumers with political right-wing ideologies tend to have a social dominance orientation, characterized by a hierarchical view of society and human superiority over animals, which also affects their consumption of meat (Dhont & Hodson, 2014; Monteiro, Pfeiler, Patterson, & Milburn, 2017). Depending on the sociocultural context, consumers may have a repertoire of accepted explanations to justify meat eating, related to particular cultural and religious identities that are reinforced by meat eating or to peoples' sense of their right to make independent consumer choices (Oleschuk et al., 2019). Overall, meat reductions may be less acceptable in combination with certain cultural identities related to left–right political position (Dhont & Hodson, 2014), gender (Sloan, Gough, & Conner, 2010), and social class (Bourdieu, 1984).

2.4. Hypotheses of the present research

The present study is guided by the general hypothesis that meat reduction is gradually being adopted as a climate action by many EU consumers, but that this development is not without challenges. It may be somewhat faster and more easily identifiable in the NW countries than in the S&E countries, which agrees with their different performances on the UN SDGs. The hypothesis is based on analyses of earlier Eurobarometers, mentioned in the previous sections. Although the studied situation is complex and changing, these sections also offer some hypotheses to guide the analyses for both research questions.

Research question 1 was how meat reduction is related to other climate actions about food, household energy use, transport and waste. In view of the climate actions that were part of the Eurobarometers, a distinction was made between continuous actions (e.g. recycling) and single actions (e.g. installed solar panels) (see also Bratt et al., 2015). As noted by Meyer (2015), grouping all climate actions into the same set would neglect that some of the actions deliver cost savings and some are costly (but could be subsidized). Therefore, the analysis focused on continuous actions. It was hypothesized that meat reduction would be related to the other two food items (eating foods with a low carbon footprint (as far as the participants were familiar with the technical term) and eating organic food) and that the food-related items would be related to some continuous energy-related items. However, it was not anticipated that meat reduction would already be in line with the mainstream pro-environmental actions of recycling and waste reduction.

Research question 2 focused on assessing differences and similarities between the explanatory variables of meat reduction and those of other personal climate actions. This involved four categories of consumers: 1) those who reported to have personally taken any actions to fight climate change over the past six months and also reported meat reduction (i.e. yes-yes answers), 2) those who reported to have personally taken any action but did not report meat reduction (yes–no), and 3) those who did not take climate action and did not report meat reduction (no-no), and, finally, 4) those who did not take climate action but did report meat reduction (no-yes). It was hypothesized that those who combine climate action and meat reduction would be different from the others, including those who just take climate action or just reduce meat consumption, in relation with more serious concerns about climate change and about nature, as well as higher scores on variables that are connected with broader welfare concerns (being female, having an urban background, having political interest, having a higher education and placing oneself as being higher class or higher middle class). However, meat reduction may be negatively associated with cultural identities related to gender, social class and left–right political position. Hence, it was also taken into account whether and how the participants placed themselves on the left–right political dimension, but this variable was expected to only play a role in NW countries where the left–right identification has more or less the same meaning (McCright et al., 2016).

As some of the items in Eurobarometer 95.1 (2021) were also included in Eurobarometer 91.3 (2019), some comparisons with the

earlier data were made (without the data from the United Kingdom). There were no hypotheses about changes over time. In addition, it was taken into account that the results might have been affected by country differences, potential interview mode effects, and reported income effects due to the pandemic, which were used as control variables.

3. Method

3.1. Fieldwork and data collection

The survey, covering the European population of 15 years and older, was carried out by research firm Kantar in the 27 Member States of the EU between 15 March and 14 April 2021 among 26,669 European citizens. A description of the fieldwork and the questionnaire are included in the report of the European Commission (2021). The normal procedure is that the participants (around 1000 in each country, 500 in the three smallest countries) are interviewed face-to-face at home in their mother tongue, based on a multi-stage, random (probability) design, providing a representative sample at the regional and national levels. However, because of the corona virus pandemic, alternative interview modes to face-to-face were necessary as a result of the situation in some countries. In these countries, participants were interviewed online, mostly after recruiting them in a probabilistic way by telephone. For all face-to-face interviews, hygiene and physical distancing measures have always been respected, and whenever possible, interviews were conducted outside homes, on doorsteps, to remain in open air and maintain social distance. The numbers of participants split out by interview mode (online or face-to-face) and region (NW, S&E) are presented in Table 1.

In the analysis, potential interview mode effects will be taken into account (Hox, De Leeuw, & Zijlmans, 2015). The literature on mixed method research (online and face-to-face) shows that differences between the modes are partly related to recruitment, as persons with a high education level (tertiary education) tend to be over-represented in online panels while persons with a low and/or persons with a middle level of education are under-represented (Luijkx et al., 2021). Another difference is the presence of an interviewer who can motivate respondents to answer and help when a question is hard to answer, but whose presence might also lead to interviewer effects, such as socially desirable responding.

The variables were derived from the archived data file (European Commission and European Parliament, 2021), which included a weight variable based on gender, age, region and size of locality for each country. Some comparisons are made with the results of Eurobarometer 91.3, conducted in April 2019. This information was also taken from the data file (European Commission, 2019), after excluding the data from the United Kingdom. The number of participants was 26,603.

3.2. Measures

World problems. The module on climate change was opened with the question "Which of the following do you consider to be the single most serious problem facing the world as a whole?" (Question B1, European Commission, 2021). The 11 options, presented in rotating order, referred to environmental, societal and world peace issues. After the first response, there were at maximum three other responses ("Which others do you consider to be serious problems?"). This resulted in 11 binary variables that were either selected or not.

Climate actions. Data on climate actions were derived from the set of responses to one general item ("Have you personally taken any action to fight climate change over the past six months?") and, independent of their response, 15 binary items on specific actions (Questions B5 and B6, European Commission, 2021). Based on a rotating response list, all were asked: "Which of the following actions, if any, apply to you?" The options were related to food, household energy use, transport and waste. It should be noted that consumers may have had different reasons for taking these actions. As a result, for each of the actions, there were participants who had taken them, while they had earlier said they had not taken action to fight climate change in the last six months. This may be because they did not associate the action with tackling climate change, or because it had been more than six months since they took the action, or because the specific question actually reminded them of something they had done. To check the characteristics of those who had not taken action and reported meat consumption, this combination was included as a distinct category of the dependent variable.

Covariates. The covariates in the analyses were based on standard variables of the Eurobarometer. They include *gender, age* (six categories from 15 to 24 years to 65 years or over), *level of education* (nine categories, from primary, secondary to long tertiary level), *area of living* (average of how the participant and the interviewer scored the situation in terms rural area or village, small or middle sized town, or large town), *social class self-placement* ("Do you see yourself and your household belonging to…? the working class of society, the lower middle class, the middle class, the upper middle class, the higher class."), *level of political interest* (see below) and *left–right political position* ("In political matters people talk of "the left" and "the right". How would you place your views on this scale?" (ten categories, plus don't know or refusal)). In the analyses, a *political placement* dummy was created to separate the participants who placed themselves on the 10 pts scale from those who refused or did not know what to choose. The political interest index with four levels (not at all; slightly; moderately; strongly) was part of the archived data file as a sum of three items based on the question "When you get together with friends or relatives, would you say you discuss frequently, occasionally or never about 1) national political matters, 2) European political matters, 3) local political matters?

In addition, one item was taken from the set of questions on evaluations of EU corona virus responses. The item was "Thinking about your personal income, which one of these statements comes closest to your current situation?" (Question A8, European Commission and European Parliament, 2021). The three statements were: "Corona virus has already impacted on my personal income," "corona virus has not yet impacted on my personal income, but I expect it to in the future," and "corona virus will have no impact on my personal income.".

3.3. Data analyses

All calculations were made by SPSS 26 for Windows. The nested structure of the country-based sample design means that the 10,235 participants in the NW countries and the 16,434 participants in the S&E countries cannot be treated as two sets of independent observations. The nested structure can be incorporated by multilevel models (Timmerman, 2006; Sommet & Morselli, 2017). However, modelling differences at the country level is not the key aim of the present study, as we focus on distinctions between the groups of NW and S&E countries instead (Cling et al., 2020). According to the literature (Bryan & Jenkins, 2016), analysts can reliably estimate individual-level effects when there are large sample sizes of individuals within each country but only a small number

Table 1
Numbers of participants in NW and S&E countries who were interviewed in online or face-to-face mode.

Interview mode	Numbers of participants	
	NW[1]) countries	S[2]) & E[3]) countries
Online mode	6,007	6,567
Face-to-face mode	4,228	9,867
Total	10,235	16,434

[1])NW Europe consists of Sweden, Finland, Denmark, Ireland, Belgium, the Netherlands, Luxembourg, Germany, Austria, and France.
[2])The S European countries include Portugal, Spain, Italy, Malta, Republic of Cyprus, Greece, Croatia, and Slovenia.
[3])The E European countries include Estonia, Latvia, Lithuania, Poland, Czechia, Slovakia, Hungary, Bulgaria, and Romania.

of countries. The present study takes this into account by following the strategy to pool the data within each region and calculate the analyses, while controlling for additional country differences by including a categorical variable for country or country-specific intercept dummy variables.

To examine how meat reduction matches other climate actions (*research question 1*), the interrelatedness of the climate actions was analyzed, using a principal component analysis (PCA). Instead of standard PCA, an optimal-scaling approach, Categorical Principal Components Analysis or CATPCA, was applied, which is also appropriate for nominal variables (Meulman, Van der Kooij, & Heiser, 2004; Linting & van der Kooij, 2012). The analysis aims to reduce the fifteen actions (plus the question on whether any action was taken) into a smaller set of uncorrelated components that explain as much as possible of the variance in the data. CATPCA output is comparable to PCA output (see Linting & van der Kooij, 2012) and includes (a) eigenvalues, indicating the variance accounted for (VAF) by each principal component; (b) component loadings, reflecting correlations between the quantified variables and the principal components; (c) communalities, reflecting the contributions of the quantified variables to the total VAF (Linting & van der Kooij, 2012). The number of components to be retained in the solution was derived from the scree criterion (Linting & van der Kooij, 2012). The analysis also used the feature that CATPCA allows for passive (supplementary) variables. Passive variables do not influence the components but are projected into the variance space created by the active variables. In this way, it was possible to inspect whether the categorical variable for country and the interview mode could have made a significant difference. The item on the impacts of the corona virus on personal income was also used as a passive variable.

To examine the differences and similarities between the explanatory variables of meat reduction and those of other climate actions (*research question 2*), multinomial logistic regression (logit model) was used. This method estimates odds ratios (*OR*) to describe the magnitude of each variable's impact on the odds of being in a particular category rather than in the reference category due to a unit change in the independent variable, given the other variables. The dependent variable was based on the four combined answers to the binary questions about personally taking any actions to fight climate change and about buying and eating less meat (i.e. no-no, no-yes, yes–no or yes-yes). The regression was carried out with the no-no answers as the reference category. In addition to the country dummies, the independent variables were the 11 items on world problems and the covariates. The contribution of each variable was checked by univariate analysis (*Chi square* test or ANOVA). Multicollinearity was checked by tolerance diagnosis performed by SPSS and inspection of the correlation matrix. In agreement with the literature (Chen, Cohen, & Chen, 2010), ORs of 1.68 and higher have been made bold, because they are equivalent to Cohen's d = 02 (small effect size).

4. Results

4.1. First research question

The first research question focused on the correlations between meat reduction and the other (continuous) climate actions. Table 2 shows the reported climate actions in the NW and the S&E countries, making a distinction between continuous and single actions. The former, including the three food-related items, were reported more often than the latter, which will not be examined further here. Overall, more than half of the participants reported that they had personally taken any action to fight climate change. The two waste-related actions were mentioned even more often (up to 82% in NW countries). A general tendency was also that many (but not all) actions were mentioned more frequently in the NW countries than in the S&E countries. This also applied to meat reduction, which was reported by 43% in the NW countries and 20% in the S&E countries. The results of the two other food-related items showed that the organic food item scored at the same

Table 2
Reported climate actions (%) in 2021 (and 2019, between brackets) per region.

Action	Percentage in region	
	NW countries (*N* = 10,235)	S&E countries (*N* = 16,434)
Has personally taken action to fight climate change over the past six months	70% (70%)	57% (55%)
Continuous actions		
Buys and eats less meat	43%	20%
Considers the carbon footprint of food purchases and sometimes adapts choices	29% (31%)	12% (8%)
Buys and eats more organic food	40%	25%
Chooses energy efficient household appliances	48% (56%)	47% (45%)
Considers the carbon footprint of longer distance travel	19% (21%)	6% (4%)
Uses environmentally-friendly alternatives to private car	39% (48%)	26% (26%)
Reduces waste and separates it for recycling	82% (81%)	68% (67%)
Uses less disposable items (e.g. plastic bags)	69% (72%)	58% (53%)
Single actions		
Insulated home better	21% (27%)	22% (23%)
Bought low-energy home	5% (7%)	4% (3%)
Switched energy supplier to one with a greater share of renewable sources	16% (18%)	6% (4%)
Installed energy saving equipment in home (e.g. smart meter)	15% (21%)	9% (9%)
Installed solar panels in home	12% (8%)	7% (5%)
Bought electric car	3% (2%)	1% (1%)
Bought low fuel consumption car	11% (17%)	8% (9%)

level and that the item on the carbon footprint of food purchases scored lower. The items on household energy use, transport and waste that were already part of the Eurobarometer in 2019 do not reveal considerable changes over recent years. For instance, both items on carbon footprints were not popular in 2019 and this was not different in 2021. Similarly, the popularity of the waste-related items had remained quite high.

The results obtained by the CATPCA on the climate actions are presented in Table 3. A two dimensional solution appeared to be the most appropriate. In the NW countries, the two components accounted for about 40% of the variance in the meat reduction item (sum of the squared loadings or VAF = 0.44), which is good; the VAF of this item was slightly lower in the S&E countries (0.39). The three food-related actions and the energy-related actions had positive loadings on the first component, but the percentage of shared variance was not very high (e. g. lower than 30%). This dimension separated the participants into those who had taken none or just a couple of actions and those with a relative high number of actions. The second dimension accounted for about 10% of the variance and showed both positive and negative loadings. It separated the participants who had primarily taken the waste reduction actions from those who also included one or more food-related actions. The results in both regions were highly comparable (although the positive and negative signs on the second dimension were mirrored). Also, in the S&E countries, the passive country variable had a low loading on the first component, which indicates that there were more differences between these countries in the average level of actions taken. The item about the impact of the corona virus on income did not load on the components. In sum, the food-related actions loaded together and shared some variance with the energy-related items, but the interrelationship of the climate actions could not adequately be represented by a single dimension, and meat reduction was not in line with the mainstream pro-environmental actions.

Table 3

CATPCA on the climate actions: Component loadings (without rotation) in each region.

Actions	NW countries (N = 10,189)		S&E countries (N = 16,341)	
	Components		Components	
	1	2	1	2
Has personally taken action to fight climate change over the past six months	0.56	0.01	0.61	−0.22
Buys and eats less meat	0.58	−0.33	0.41	0.47
Considers the carbon footprint of food purchases and sometimes adapts choices	0.63	−0.27	0.50	0.43
Buys and eats more organic food	0.55	−0.32	0.48	0.38
Chooses energy efficient household appliances	0.42	0.32	0.47	−0.25
Considers the carbon footprint of longer distance travel	0.54	−0.29	0.33	0.44
Uses environmentally-friendly alternatives to private car	0.50	−0.01	0.48	0.00
Reduces waste and separates it for recycling	0.47	0.62	0.56	−0.47
Uses less disposable items (e.g. plastic bags)	0.58	0.47	0.59	−0.38
Passive variables				
Country variable	0.16	0.11	0.37	−0.08
Interview mode	0.00	−0.06	−0.24	0.01
Impact corona virus on income	−0.03	−0.05	−0.02	0.05
Eigenvalue	2.62	1.07	2.26	1.22
% of Variance	29.1%	11.8%	25.0%	13.6%

4.2. Second research question

The second research question was how consumers who reported different combinations of climate action and meat reduction differed from each other in their concerns about various world problems and in socio-cultural characteristics. Table 4 shows the four combinations of taking climate action and reporting meat reduction. The category who did not take action but reported meat reduction was less than 10%; the combination of climate action and meat reduction was reported by 36% and 14% in the NW and S&E countries, respectively.

The degree to which the various issues were chosen as serious world problems is shown in Table 5, using table headings that represent the vision of the authors, which is not necessarily shared by the participants. Two issues were mentioned by about half of the participants: 1) Climate change and 2) Poverty, hunger and lack of drinking water. Spread of infectious diseases was also chosen frequently, but less so in the NW countries than in the S&E countries. The same difference was found for the issue of The economic situation. Deterioration of nature was chosen about equally in the two zones. Comparison with the results of 2019

Table 4

Combinations of taking climate action and reporting meat reduction in each region.

Combinations	Percentages in region	
	NW countries	S&E countries
Did not take action and reported no meat reduction (no-no response)	22%	37%
Did not take action but reported meat reduction (no-yes response)	8%	6%
Took action but reported no meat reduction (yes–no response)	34%	43%
Took action and reported meat reduction (yes-yes response)	36%	14%
Total	100% (N = 10,234)	100% (N = 16,434)

Table 5

Chosen[1]) world problems (%) in 2021 (and 2019, between brackets) per region.

World problems	Percentages in region	
	NW countries (N = 10,235)	S&E countries (N = 16,434)
Environmental world problems		
Climate change	61% (69%)	41% (50%)
Deterioration of nature	37%	37%
Spread of infectious diseases	34% (23%)	51% (34%)
Health problems due to pollution	22%	27%
The increasing global population	29% (35%)	16% (21%)
Societal world problems		
Poverty, hunger and lack of drinking water	56% (75%)	50% (66%)
The economic situation	28% (27%)	49% (46%)
Deterioration of democracy and rule of law	35%	26%
World peace problems		
International terrorism	28% (52%)	20% (56%)
Proliferation of nuclear weapons	10% (24%)	11% (27%)
Armed conflicts	26% (41%)	24% (42%)

[1]) Maximal 4 choices out of 11 options in 2021 and maximal 4 choices out of 8 options in 2019.

reveals that World peace issues had become less prominent and Spread of infectious diseases more so. Both Climate change and Poverty, hunger and lack of drinking water had lower percentages in 2021 than in 2019, but this may at least partially be explained by the larger number of issues presented in 2021.

Table 6 displays the *OR*s and confidence intervals for the relationships between the combinations of climate action and meat reduction and the independent variables. The latter may account for differences in the likelihood of taking climate action (yes–no and yes-yes vs. no-no) and in the likelihood of combining climate action and meat reduction (yes-yes vs. yes–no). In addition, the first column may reveal whether the small group who reported meat reduction but no climate action (no-yes) had any special characteristics. The *OR*s show that choosing Climate change as a world problem had significant positive impacts on the odds of taking action and, in particular, on the odds of being in the yes-yes category in comparison with being in the yes–no category (3.46 vs.1.91 in the NW countries and 2.84 vs. 2.00 in the S&E countries). At a slightly lower level, about the same difference was found for those who choose Nature deterioration (1.83 vs.1.20 in the NW countries and 1.90 vs. 1.41 in the S&E countries). Two other issues showed similar differences, although they were not in each region significant. In the NW countries, choosing Poverty, hunger and lack of drinking water had positive impacts on the odds of taking action and, in particular, of reporting meat reduction (1.62 vs. 1.21), just as Deterioration of democracy and rule of law (1.32 vs. 0.99). In in the S&E countries these differences were in the same direction but were not significant. The same applied to those who chose Health problems due to pollution; the likelihoods of being in the yes-yes categories were somewhat higher than those of being in the yes–no category. Some of the associations revealed a negative impact. In the NW countries, choosing The Economy or choosing International terrorism lowered the odds of taking climate actions in combination with meat reduction.

The covariates had several significant coefficients in the model. In the NW countries, being female, having a higher level of education, having a left-wing orientation, and living in an urban area had positive impacts on the odds of being in the yes-yes category and these odds were almost all significantly higher than the odds of being in the yes–no or no-yes category. In this analysis, the impacts of left–right political position were represented by a combination of the political placement dummy (0 = no, 1 = yes) and the left vs. right political position. Inspection of the frequency table showed that the percentages of yes-yes responses varied from 52% among the most left-leaning participants to 23% among the

Table 6

Results of the multinomial logistic regression on the combinations of taking climate action and reporting meat reduction: Odds ratios and 95% confidence intervals of the odds ratios in each region.

Independent variables	NW countries (N = 10,207)1)			S&E countries (N = 16,411)2)		
	No-yes: Did not take action but reported meat reduction (8%)	Yes-no: Took action but reported no meat reduction (34%)	Yes-yes: Took action and reported meat reduction (36%)	No-yes: Did not take action but reported meat reduction (6%)	Yes-no: Took action but reported no meat reduction (43%)	Yes-yes: Took action and reported meat reduction (14%)
Country dummies (not shown)						
Environmental world problems						
Climate change	**1.84 [1.52, 2.22]**[***]	**1.91 [1.69, 2.17]**[***]	**3.46 [3.02, 3.98]**[***]	1.35 [1.16, 1.58][***]	**2.00 [1.84, 2.17]**[***]	**2.84 [2.52, 3.19]**[***]
Deterioration of nature	1.32 [1.08, 1.60][**]	1.20 [1.05, 1.37][**]	**1.83 [1.59, 2.11]**[***]	1.30 [1.11, 1.51][***]	1.41 [1.30, 1.54][***]	**1.90 [1.69, 2.14]**[***]
Spread of infectious diseases	0.74 [0.61, 0.91][**]	0.97 [0.85, 1.11]	0.99 [0.86, 1.14]	0.86 [0.73, 1.00]	1.23 [1.13, 1.34][***]	1.06 [0.93, 1.19]
Health problems due to pollution	1.09 [0.88, 1.37]	1.31 [1.13, 1.52][***]	1.65 [1.41, 1.93][***]	1.00 [0.84, 1.18]	1.27 [1.16, 1.39][***]	1.49 [1.31, 1.70][***]
The increasing global population	0.97 [0.79, 1.20]	1.02 [0.89, 1.17]	1.24 [1.06, 1.43][**]	1.03 [0.84, 1.27]	1.25 [1.12, 1.40][***]	1.37 [1.17, 1.60][***]
Societal world problems						
Poverty, hunger and lack of drinking water	1.23 [1.02, 1.48]*	1.21 [1.06, 1.36][**]	1.62 [1.42, 1.85][***]	1.05 [0.91, 1.22]	1.29 [1.19, 1.40][***]	1.43 [1.27, 1.60][***]
The economic situation	0.72 [0.58, 0.89][**]	0.89 [0.77, 1.02]	0.79 [0.68, 0.92][**]	0.93 [0.80, 1.09]	1.12 [1.02, 1.22]*	0.96 [0.84, 1.08]
Deterioration of democracy and rule of law	0.90 [0.73, 1.10]	0.99 [0.87, 1.13]	1.32 [1.14, 1.52][***]	1.00 [0.84, 1.20]	1.39 [1.26, 1.52][***]	1.62 [1.42, 1.85][***]
World peace problems						
International terrorism	0.90 [0.73, 1.10]	0.89 [0.78, 1.02]	0.77 [0.67, 0.90][**]	0.87 [0.72, 1.04]	1.00 [0.90, 1.10]	0.90 [0.78, 1.04]
Proliferation of nuclear weapons	1.21 [0.91, 1.60]	1.06 [0.87, 1.28]	1.15 [0.93, 1.42]	1.11 [0.90, 1.38]	1.32 [1.17, 1.48][***]	1.36 [1.14, 1.62][***]
Armed conflicts	0.92 [0.75, 1.14]	0.91 [0.79, 1.05]	1.01 [0.87, 1.18]	0.93 [0.78, 1.11]	1.15 [1.04, 1.26][**]	1.05 [0.92, 1.21]
Covariates						
Age	1.13 [1.07, 1.19][***]	1.00 [0.97, 1.04]	0.98 [0.95, 1.02]	1.14 [1.09, 1.19][***]	0.93 [0.91, 0.95][***]	0.94 [0.91, 0.97][***]
Being female	**1.99 [1.68, 2.36]**[***]	1.42 [1.27, 1.59][***]	**2.73 [2.42, 3.08]**[***]	**1.80 [1.56, 2.07]**[**]	1.05 [0.97, 1.13]	**1.93 [1.73, 2.15]**[***]
Level of education	1.09 [1.04, 1.14]*	1.05 [1.02, 1.08][**]	1.16 [1.12, 1.20][***]	1.05 [1.01, 1.09]*	1.08 [1.06, 1.11][***]	1.14 [1.10, 1.17][***]
Political placement dummy	1.92 [1.15, 3.18]*	1.46 [1.05, 2.02]*	**4.23 [2.94, 6.10]**[***]	**1.74 [1.18, 2.56]**[**]	1.04 [0.87, 1.25]	1.24 [0.95, 1.61]
Left-right political position	0.87 [0.79, 0.95][**]	0.90 [0.85,0.95][**]	0.72 [0.68, 0.77][***]	0.97 [0.91, 1.04]	1.01 [0.97, 1.05]	0.93 [0.89, 0.99]*
Political interest	1.11 [1.00, 1.22]*	1.44 [1.35, 1.54][***]	1.58 [1.47, 1.69][***]	1.11 [1.02, 1.20]*	1.30 [1.24, 1.36][***]	1.46 [1.37, 1.56][***]
Rural – urban community	1.02 [0.96, 1.08]	0.94 [0.90, 0.97][**]	1.06 [1.02, 1.11][**]	1.06 [1.01, 1.11]*	0.99 [0.96, 1.01]	1.10 [1.06, 1.14][***]

*$p <.05$, ** $p <.01$, *** $p <.001$.

1) Reference category: No climate action or meat reduction (22%). Statistics of the final model: likelihood ratio $chi^2 = 2390.817$ df 87 $p <.001$ Nagelkerke $R^2 = 0.227$.

2) Reference category: No climate action or meat reduction (37%). Statistics of the final model: likelihood ratio $chi^2 = 3591.767$ df 105 $p <.001$ Nagelkerke $R^2 = 0.217$.

ORs of 1.68 and higher are highlighted in bold; they are equivalent to Cohens d = 02 (small effect size).

most right-leaning ones. In the S&E countries, comparable differences were found for being female, level of education, level of political interest and living in urban area; however, age lowered the odds of taking action.

For each participant, the coefficients of the multinomial model were used to calculate the probability of all four answer combinations and to identify the combination with the highest predicted probability. Cross-classifying the observed combination by the predicted combination in the NW countries revealed that the no-no combination was correctly predicted in 35% of cases, the no-yes combination in 0%, the yes–no combination in 51% and the yes-yes combination in 66%. In the S&E countries, the no-no combination was correctly predicted in 61% of cases, the no-yes combination in 0%, the yes–no combination in 68% and the yes-yes combination in 10%. Hence, the small numbers of participants in both regions who reported meat reduction but no climate action (no-yes) weakly mirrored those in the yes-yes category but did not form a predictable category. The main difference between the regions is that the combination of climate action and meat reduction was predicted more accurately in the NW countries (66% versus 10%),

whereas climate action without meat reduction was predicted more accurately in the S&E countries (68% versus 51%).

The variable social class self-placement was excluded from the model, as it had a nonlinear relationship with the dependent variable. This relationship is displayed in Fig. 1, focusing on meat reduction. In both regions, reported meat reduction was the lowest among the working class, it increased among the middle classes, but slightly decreased among the higher class (ANOVA test of deviation from linearity yielded $F(3, 10064) = 3.34$, $p =.018$ in NW countries and $F(3, 16269) = 3.38$, $p =.017$ in S&E countries). However, it should be noted that the higher class was represented by small numbers of participants, which explains the large confidence intervals.

5. Discussion

This study was guided by the hypothesis that meat reduction is gradually being adopted as a climate action by many EU consumers, and that this development is somewhat faster and more easily identifiable in
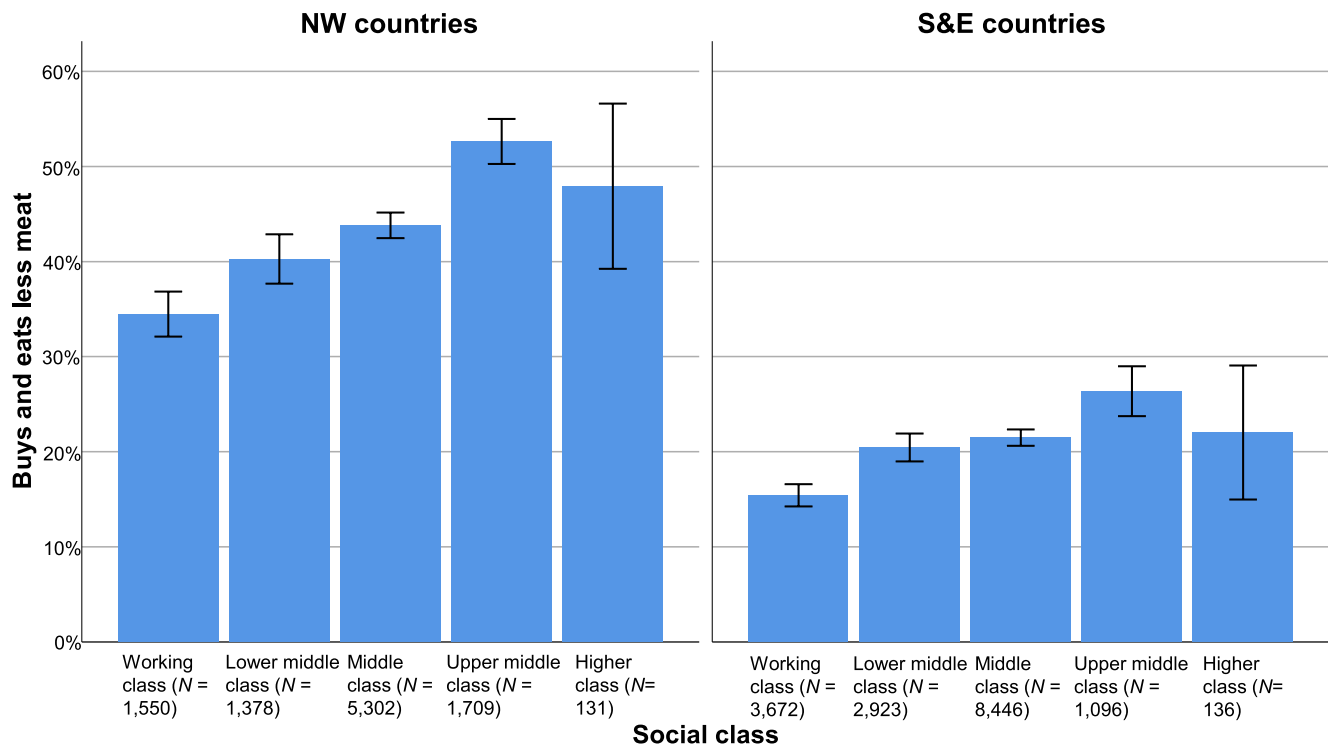
Fig. 1. Relationship between social class self-placement and reported meat reduction per region: Bar charts with 95% confidence intervals.

the NW countries than in the S&E countries. The results agree with this hypothesis. In answering research question 1, it was found, as hypothesized, that meat reduction was related to the other two food items, that these items were also related to some continuous energy-related items, but that meat reduction was far from the mainstream pro-environmental actions of recycling and waste reduction. The special position of meat reduction was further examined by analyzing how consumers who took climate actions and included meat reduction differed from those who also took climate actions but left out meat reduction, both in comparison with those who did neither (research question 2). As hypothesized, it was found that the likelihood of combining climate action and meat reduction was associated with value concerns and specific cultural identities. The likelihood was positively affected by both climate-specific concerns and broader issues of concern about nature deterioration, public health, as well as poverty and hunger, as opposed to concerns about the economy and international terrorism. The significant covariates were also indicative of broader welfare concerns, such as being female, being higher educated, having an urban (vs. rural) background, having political interest, and placing oneself as belonging to the middle class (but less so if it was the higher class). Those who did not incorporate meat reduction had lower levels of these concerns and might have been hampered by incongruences between the cultural meaning of meat reduction and their cultural identities in terms of right-wing positions (in NW countries), masculinity or social class. In the S&E countries, meat reduction was mentioned less often and also showed weaker relations to the other variables.

These results extend those reported in previous Eurobarometer research, which analyzed the position of meat reduction in what EU consumers think "eating a healthy and sustainable diet" involves (de Boer & Aiking, 2022). In 2020 a majority of consumers in the NW countries saw a role for themselves in making the food system more sustainable and a large minority saw meat reduction as part of a healthy and sustainable diet. Both topics were much less common in the S&E countries. The present data do not allow for a direct comparison with earlier research, but the new results indicate that meat reduction is now becoming more acceptable in some NW populations, which agrees with

some recent changes mentioned in the literature (Brunin et al., 2021; Stewart et al., 2021; Verain et al., 2022). In hindsight, these tendencies can be symbolically linked to various health and environmental events, such as the publication of the report on colon cancer and meat consumption by the International Agency for Research on Cancer (IARC) (Bouvard et al., 2015) and the adoption of the 2015 Paris agreement, which highlighted the key role of the global food system in achieving the agreed upon emission reductions (Ritchie, Reay, & Higgins, 2018). Also relevant is that from around 2015, global attention from both consumers and businesses to meat alternatives has increased, leading to rising sales and investments (Rödl, 2021), although the financial impacts on the meat sector are still very limited (Geijer & Gammoudy, 2020).

The results suggest that prior "green" actions might have helped the adoption of meat reduction, but it should be emphasized that there were, even in the NW countries, many consumers who mainly reported recycling and waste reduction, but did not mention meat reduction. These consumers seemed to lack the motivation to additionally reduce their meat consumption and they may also have had the opinion that they were doing enough. The exceptional position of recycling, which was originally not explicitly linked to climate change, demonstrates the enduring role of material factors and personal experiences. It may also demonstrate that many organizational initiatives are required to create a behavior context that is supportive of effective environmental actions. According to a broad review (Thomas & Sharp, 2013), recycling has been supported by changing attitudes, provision of facilities, information and communication campaigns and the influence of others' behavior. This differs in many ways from the context of meat reduction. For instance, recent experiments show that consumers are to some degree responsive to persuasive information about meat and tend to adapt their meal choices accordingly (Lacroix & Gifford, 2020; Morren, Mol, Blasch, & Malek, 2021), in one study in the context of a university canteen for up to twenty weeks after a lecture (Jalil, Tasoff, & Busta-mante, 2020). However, these interventions, which had been organized by the researchers, show by their very nature that the participants would not have taken these actions spontaneously.

The results underline that there is a broad set of value-based

concerns that can motivate consumers to reduce meat consumption. However, they may not have very clear ideas about the relationships between, for instance, meat reduction, food system changes and the prevalence of poverty, hunger and lack of drinking water in the world. This also means that many consumers may not be sufficiently aware of the differences between more important and less important sustainability aspects (see also Whitmarsh et al., 2011; Wynes et al., 2020). A key point is that practical knowledge about proper and improper behavior (Reckwitz, 2002) is related to—but not equivalent to—technical knowledge about, for instance, differences in carbon emissions. As a result, consumers may not see the priority to be given to meat reduction, in comparison with other shifts in food choices. The popularity and the component loading of the meat reduction item were about of the same size as those of the organic food item. This is noteworthy, given the outstanding position of meat reduction in fighting climate change (Ivanova et al., 2020) and biodiversity loss (Machovina et al., 2015). A diet change involving a reduction in the amount of animal products consumed has a much larger potential in decreasing the amount of greenhouse gas emissions than a shift from conventional to organic food, due to lower crop and livestock yields of organic agriculture (Ivanova et al., 2020). Hence, these technical matters can seriously complicate the communication with consumers about their behavior.

This study demonstrates that, in addition to the typical "green" concerns and the broader welfare concerns (or their opposites), some cultural factors need attention. It has been noted that the marketing of meat alternatives and substitutes is in several ways a "middle of the road" phenomenon (Sadler, 2004; Armstrong Soule & Sekhon, 2019). To address cultural incongruences, the cultural meaning of meat alternatives may require a makeover, for instance, to bring them more in line with masculine or other than middle class ways of eating. The current plant-based meat alternatives may provide too little "value for money" in the eyes of consumers of the working class who often wish to obtain maximum effect at minimum cost (Bourdieu, 1984, p. 379). Moreover, the alternatives may fall short of providing the food pleasure that consumers of the higher classes expect (Johnston & Baumann, 2007; Schösler & de Boer, 2018). Studies on sustainable hospitality overall, and in particular in luxury restaurants, show that, for instance, paying more for vegetables may not be considered a luxury for a high-end restaurant if it offers creative meals that are meat-free and provide a new taste or texture experience (Batat, 2020). Interestingly, new varieties of meat alternatives are now being introduced to the market, which also contain more authentic and domestic ingredients, such as oats (Lonkila & Kaljonen, 2022).

Comparisons with Eurobarometer 91.3 from 2019 did not reveal many changes over the past years, except for the increasing choice of spread of infectious diseases as a serious world problem and the decreasing choice of world peace issues. Whether concern about the spread of infectious diseases might have an effect on meat consumption is an issue that has generated various speculations (Attwood & Hajat, 2020). The present analyses did not found a correlation between concern about the spread of infectious diseases and reported meat reduction, but the participants might have been unaware of the potential role of intensive animal farming in this context (Espinosa, Tago, & Treich, 2020). To investigate experimentally the relationship between messages about the COVID-19 pandemic and consumers' intentions to reduce meat consumption, a recent online survey among American consumers exposed the participants to one out of five messages, designed to mimic the way NGOs tend to promote meat reduction among the public (Niemiec, Jones, Mertens, & Dillard, 2021). Two of the messages used the saliency of the COVID-19 pandemic to highlight either 1) the risk of disease transmission from factory farms and the threat of antibiotic resistance or 2) the threat to worker's health created by factory farms, also referring to outbreaks in meatpacking plants. Three more traditional messages highlighted the climate-related, personal health or animal welfare implications of factory farmed meat consumption. Although all messages differentially influenced beliefs about the various negative consequences of meat consumption, these altered beliefs did not differentially motivate changes in respondents' intentions to reduce meat consumption and choose plant-based alternatives (Niemiec et al., 2021). This illustrates that the reception of information might just be a beginning and that more attention should be given to the question how and under what circumstances beliefs and attitudes can be transformed into desirable, attainable and effective consumer goals (Kruglanski et al., 2015) for making sustainable food choices in daily life.

5.1. Limitations

An important limitation is that the study is based on a secondary analysis, which means that the work is limited to the questions asked by the original investigators, guided by EU policy development. On the one hand, this is a strength, because it might be assumed that the questions are policy relevant. On the other hand, it is a weakness in that the set of variables cannot shed more light on other cultural identities that may affect the position of meat reduction, such as ethnic food traditions, religious factors or the fact of living in a particular food environment. An additional strength is that the analyses were carried out separately in large, but economically and culturally different, groups of EU countries, whose historically grown differences have to be taken into account.

6. Conclusions

This study has shown that meat reduction is gradually being adopted as a climate action by many EU consumers, and that this development is somewhat faster and more easily identifiable in the Northwestern countries than in the Southern and Eastern countries. The adoption of meat reduction has become related to the adoption of other climate actions, but it is not yet on par with mainstream pro-environmental actions. Those participants who incorporated meat reduction in their actions to fight climate change were more than others motivated by broad environmental, social and public health concerns, including concerns about the traditional sustainability issues of poverty and hunger in the world. Those who did not incorporate meat reduction, but took some other climate action, had lower levels of these concerns and might have been hampered by incongruences between the cultural meaning of meat reduction and salient aspects of their cultural identities, related to right-wing positions, masculinity or social class. Hence, although reducing meat consumption is still a potentially controversial issue in the process of making food systems sustainable, it seems well on its way to become part of the climate actions that EU consumers are taking.

CRediT authorship contribution statement

Joop de Boer: Conceptualization, Formal analysis, Writing – original draft. **Harry Aiking:** Conceptualization, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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