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# The role of ethical orientation in animal welfare choice behaviour: A segmentation study

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ABSTRACT

Consumers are becoming more and more conscious about their consumption choices, demanding more sustainable, healthy and fair options. Meat consumption especially is under scrutiny for environmental as well as ethical reasons. We develop a set of items to measure ethical orientation and apply it to consumers' choices of meat products with 3000 consumers across six European countries (Denmark, Germany, Spain, Poland, Netherlands, Italy). We find consumer preferences to be similar across countries, with two thirds of consumers showing a preference for animal welfare attributes, especially outdoor access. Consumer segments can be differentiated based on their degree of ethical orientation, environmental concern, level of trust in the food system and price sensitivity. Ethical orientation differentiates between consumers' self-reported welfare meat purchases. Our results contribute to the literature on consumer behavior regarding farm animal welfare across different meat product and countries.

## 1. Introduction

Consumers are becoming more and more conscious of their consumption choices. They are looking for healthy, sustainable and fair offerings. With higher demands to meat production systems in terms of farm animal welfare and sustainability, the meat industry's social license to operate (SLO) is scrutinized (Birkle et al., 2022; Hötzel & Vandresen, 2022). Rooted in the mining industry, but since transferred to animal husbandry (Hampton et al., 2020; Kanis et al., 2003), SLO describes society's permission to perform business activities within acceptable boundaries. With an increasing awareness of animal husbandry practices and a growing demand for sustainable production systems (e.g., Duong et al., 2022; Lin-Schilstra et al., 2022; Weible et al., 2016), practitioners and policy makers have to consider adjusting current standards to reflect consumers' demands for acceptable animal husbandry practices or at least transparent information provision to ensure sustained trust in the food system (Macready et al., 2020). In the same vein, marketers might need new approaches to reach emerging consumer segments. Our study contributes to the literature by 1) shedding light on consumer preferences for farm animal welfare meat attributes through a latent class segmentation approach to describe preference segments of consumers in the meat market, 2) developing a set of items to measure consumers' ethical orientation and 3) applying these to meat choices.

Apart from health and environmental concerns, ethical concerns are often mentioned by consumers, who want to reduce their meat consumption (Estévez-Moreno et al., 2022; Peschel, Kazemi, et al., 2019; Verain et al., 2016). While there exist established scales for health (e.g., Michaelidou & Hassan, 2008) or environmental concerns (e.g., Haws et al., 2014), there is a lack of tools that measure a general ethical orientation in a straight-forward manner, which can be related to purchasing decisions. Ethicality covers different domains, such as empathy, integrity, respect, and reliability, which can provide an indication of an individual's adherence to a certain morally grounded rule they apply when shopping. Given the breadth and complexity of ethics, our research aims to develop a set of items that offers a measure of ethical orientation that can serve as a simple yet still comprehensive measure of ethical concerns. We aim to create an effective tool that can facilitate measurement of consumer ethical orientation in future studies in fields such as meat marketing that reaches consumers with increased ethical concern in their meat consumption choices.

Previous research suggests that the share of consumers, who is willing to pay more for farm animal welfare is rather low, but with a tendency to grow over time (Clark et al., 2017), especially if targeted

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specifically. Previous research also suggests that information provision on farm animal welfare changes consumers' willingness-to-pay (WTP) where different farm animal welfare attributes are valued differently in the decision-making process (Lagerkvist & Hess, 2010).With this study, we provide an updated picture of European consumers' preference and price-sensitivity for farm animal welfare and sustainable meat attributes using latent class choice analysis. The structure of this paper is as follows: We first provide an overview of the literature on consumers' ethical orientation when purchasing meat products as well as their preferences for sensory and production-related pig and broiler meat attributes. We then describe our methodological approach consisting of four steps: in-depth interviews with meat chain professionals, best-worst scaling to reduce the number of relevant attributes, a multi-country discrete choice experiment with the final list of attributes and the development of items to measure ethical orientation. We present our results of the latent class choice analysis and conclude with a discussion and managerial implications of this research.

## 2. Literature review and conceptual development

### 2.1. Ethical orientation and sustainable meat choices

Ethical consumer behavior refers to consumer decision-making that is affected by ethical concerns (e.g., Bray et al., 2011). It is closely linked to sustainability and environmental protection, but also workers' rights, fair trade, animal welfare and others (Carrington et al., 2010). A broad literature exists on consumer ethical decision-making (see Hassan et al., 2022 for a recent review), partly focusing on the formation of intentions to make ethical decisions, partly on the link (or, sometimes, lack of same) between intentions and behavior (e.g., Carrington et al., 2010). Studies on intentions to make ethical choices have often employed a socio-cognitive framework like the Theory of Planned Behavior (TPB) (e.g., Shaw et al., 2000). According to the widely cited theory of marketing ethics by Hunt and Vitell (1986), intentions to make ethical choices are partly affected by an evaluation of the consequences of such choices and by the application of deontological norms. In line with this, the concept of 'ethical obligation' has been suggested as a potential determinant of such intentions (Shaw et al., 2000; Sparks et al., 1995).

Previous studies that dealt with consumers' ethical attitudes in relation to meat consumption offer findings that provide insights into the conundrums and moral underpinnings of meat consumption. For example, Schröder and McEachern (2004) find that consumers experience value conflicts in regard to meat consumption, on one hand supporting the right animals have for a good life, but on the other cognitively distancing themselves from them. Similarly, Rosenfeld et al. (2020), discusses the existence of 'meat-eating cognitive dissonance', the conflict between consumers' eating behavior and their affections toward animals, as well as mechanisms that prevent and reduce this ''moral guilt associated with eating meat'', e.g., meat preferences due to culture, or gender-based meat-eating predispositions (see also Rothgerber (2013). In extension to these 'moral coping' mechanisms, Piazza et al. (2015) also discusses how consumers justify their meat-eating behavior by arguing that meat eating is nice, necessary, normal and natural. Barkan et al. (2015) describe this phenomenon as ethical dissonance, and maintain that people in order to cope, resort to dissonance-reducing mechanisms. This is in line with the work of Szmigin et al. (2009), whose findings indicate that even consumers who consider themselves ethical are quick to rationalize their unethical purchasing behavior. It becomes therefore obvious that meat eating is characterized by a state of inner conflict and dissonance, with a multitude of questions that revolve around its ethical aspect.

To understand ethical consumer behavior towards sustainable meat choices, we propose that measuring consumers' ethical orientation based on the virtues of ethical behavior (Shanahan & Hyman, 2003) provides insight into consumers' moral compass. In the food sector, various types of product claims that aim to encourage sustainable consumer choices have been employed. These claims provide information regarding e.g., animal welfare, and overall living and feeding conditions of the animals, that communicate virtue, goodness and welfare that adds an ethical dimension to consumers' purchase decisions (Spielmann, 2021). In consumer research, the ethical dimension of choice has come into play in relation to the growing focus on sustainability from the companies' side, and the demand for sustainable production systems from the consumers' side. Ethicality comprises a set of principles that encompass a broad spectrum of values and personal predispositions about life that serve as moral compass. The long-standing discourse about what constitutes moral character and how it is being shaped has focused, among others, on whether morality is an integral constituent of peoples' character or dictated by situational factors (Helzer et al., 2014). For example, Doris and Doris (2002) argue that morality is situational, whereas Helzer et al. (2004) argue in favor of moral behavior that is embedded and consistent in humans. In empirical research, the operationalization of ethical orientation has utilized primarily scenario-based scales, that provide the context for participants to relate to (e.g., Vitell & Muncy, 2005), as well as scales that delve into the moral character embedded in a person (Spielmann, 2021). Our study aims to investigate the role of embedded morality in the context of meat choice.

### 2.2. Other psychographic factors related to sustainable meat choices

Animal welfare is a credence attribute (Darby & Karni, 1973) – the average consumer is not able to verify whether any statement on animal welfare is actually correct or not. Credence attributes will only be used in decision-making when consumers have trust in the source of the information. Consumer trust is therefore a major factor in the consideration of ethically relevant information about animal welfare when choosing meat.

Furthermore, consumers' environmental concern is an important antecedent of supporting sustainability initiatives (Poortinga et al., 2004), as well as purchasing of food products that are produced sustainably (Hosta & Zabkar, 2021). Awareness of the environmental, social, and economic impact of food production, is an important contributor of purchase intention of sustainably produced foods (Mainieri et al., 1997).

### 2.3. Consumer preferences for meat quality attributes

Meat purchases may raise ethical concerns for consumers due to issues related to animal welfare and the environmental effects of meat production. These concerns are not so much related to the meat quality itself, but to parameters linked to the way it was produced. A number of studies are available that have addressed the role of different attributes in consumers' choice of pork products. The attributes used in these studies differ widely, including intrinsic attributes like colour and marbling, extrinsic attributes often related to origin and safety, and also attributes relating to animal welfare and environmental impact of pig production. In most cases the attributes are selected because of specific interests in the effect of certain attributes on consumer choice and not so much because of a desire to achieve a complete mapping of attributes that are important to consumers. Some studies do provide a segmentation analysis to take into account heterogeneity in consumer preferences for attributes and their levels (Grunert et al., 2018; Liljenstolpe, 2011; Meuwissen et al., 2007).

In the context of the present study, previous research addressing issues related to animal welfare and sustainability are of special interest. Previous studies generally find positive utility linked to welfare attributes and, in the aggregate, also a positive willingness to pay for them. This goes especially for attributes dealing with extra space given to animals, having animals in stable systems where they can move around at all times, access to outdoor areas, and smaller pen sizes (Denver et al., 2017; Grunert et al., 2018; Liljenstolpe, 2011; Meuwissen et al., 2007;

Mørkbak et al., 2010; Norwood & Lusk, 2011). Results were more mixed for attributes regarding castration (Grunert et al., 2018; Liljenstolpe, 2008; Viske et al., 2006). As for attributes that can be considered relevant for sustainable production but that are not related to animal welfare, positive utilities have been reported for farm-produced feed (Liljenstolpe, 2008), but evidence on the role of more direct indicators relating to environmental impact has been more mixed. For example, in a study on the role of various production parameters conducted in Germany and Poland, $CO_2$ footprint came out as the least important attribute (Grunert et al., 2018).

Also, attributes in the choice of broiler meat have been studied, likewise mostly with discrete choice experiments and sometimes with direct questioning. Also, here most studies are guided by the desire to investigate the importance of specific attributes and not so much by a desire to cover the most important attributes of importance for consumer choice. Intrinsic attributes have been investigated in a few studies (Brisk et al., 2015; Naspetti et al., 2015), but most studies concentrate on extrinsic attributes.

The most frequent attributes investigated with regard to animal welfare and consumer response have been stocking density, outdoor access and breed. While animal welfare attributes are generally positively valued, the effect sizes vary. Outdoor access is generally positively valued (Carlsson et al., 2007; de Jonge & van Trijp, 2013; Mulder & Zomer, 2017). Slow-growth breeds, dual purpose breeds and 'breeding of the brother' are likewise associated with positive utility (Brisk et al., 2015; Lusk, 2018), but utilities are sometimes low and the relative importance of these attributes is small (Escobedo del Bosque et al., 2021; Mulder & Zomer, 2017). Price is generally an important attribute; in a segmentation study carried by Escobedo del Bosque et al. (2021), two out of three segments, accounting together 43 % of the sample, had price as the dominant attribute in choice.

## 2.4. Material and methods

The objective of the main study of this paper was to analyze consumer preferences for farm animal welfare meat attributes through a latent class segmentation approach, and to describe preference segments of consumers in the meat market, accounting for ethical orientation. Both the development of the design of the discrete choice experiment as well as the development of the items intended to measure ethical orientation followed a step-wise approach including several pre-studies, which are described below in detail to ensure transparency in our approach. In the following, we first present the sample of the main study briefly. We then report on the development of the measures used in the main study. Afterwards, we report on the development of the experimental design for the discrete choice experiment. Finally, we provide an account of our method of analysis of the main study.

### 2.4.1. Sample and procedure for the main study

Ethical approval was obtained by the university's Research Ethics Committee with the approval number BSS-2022–046. The market research agency Norstat (https://norstat.dk/) collected data from 500 respondents representative of each country's gender, age, education and regional distribution in Denmark, the Netherlands, Poland, Italy, Spain and Germany. The sample characteristics can be found in Table 1.

## 2.5. Measures

### 2.5.1. Ethical orientation

Human ethical orientation is a set of principles that serve as moral compass in social interactions. They encompass a broad spectrum of values and personal predispositions about life that become manifest across professional and personal contexts. Our aim in this study was to identify those moral predispositions that apply in a typical everyday activity, and thus enable us to assess beliefs about the virtuous qualities of individuals (Shanahan and Hyman, 2003). We drew on the conceptual work on ethics by Shanahan and Hyman (2003), and initially selected five domains that describe virtues of ethical behavior that are inherently relevant for non-business contexts, such as consumers' choice behavior. The selected domains cover: 1) Empathy; 2) Respect; 3) Incorruptibility; 4) Piety; and 5) Reliability. Shanahan and Hyman (2003) delineate several virtues that exist within each of these five ethics domains.

An initial pool of items was developed, with the aim to operationalize the ethical domains and the virtues associated with them. We formulated the individual virtue statements in a way that descriptively encompasses their core meaning. For example, within the domain of

**Table 1**
Sample demographics of the main sample.

| Countries | *Gender* | *Age group* | *Education* | N |
|---|---|---|---|---|
| **Denmark** | Female: 256 (8.5)Male: 249 (8.2) | 18–39: 180 (5.9)<br>40–59: 166 (5.5)60+: 159 (5.3) | Level 0–2: 23 (0.8)<br>Level 3–4: 244 (8.1)<br>Level 5–8: 238 (7.9)<br>Other: | 505 (16.8) |
| **Germany** | Female: 254 (8.4)Male: 251 (8.3) | 18–39:169 (5.6)<br>40–59:179 (5.9)60+: 157 (5.2) | Level 0–2: 125 (4.1)<br>Level 3–4: 132 (4.4)<br>Level 5–8: 234 (7.7)<br>Other: 14 (0.5) | 505 (16.8) |
| **Italy** | Female: 254 (8.4)Male: 249 (8.2) | 18–39: 143 (4.7)<br>40–59: 184 (6.1)60+: 176 (5.8) | Level 0–2: 2 (0.1)<br>Level 3–4: 359 (11.9)<br>Level 5–8: 142 (4.7)<br>Other: | 503 (16.7) |
| **Poland** | Female: 266 (8.8)Male: 245 (8.1) | 18–39: 186 (6.1)<br>40–59: 167 (5.5)60+: 158 (5.2) | Level 0–2: 86 (2.8)<br>Level 3–4: 229 (7.6)<br>Level 5–8: 196 (6.5)<br>Other: | 511 (17) |
| **Spain** | Female: 248 (8.2)Male: 254 (8.4) | 18–39: 158 (5.2)<br>40–59: 193 (6.4)60+: 151 (5.0) | Level 0–2: 5 (0.2)<br>Level 3–4: 213 (7.0)<br>Level 5–8: 284 (9.4)<br>Other: | 502 (16.7) |
| **The Netherlands** | Female: 250 (8.3)Male: 252 (8.3) | 18–39: 168 (5.5)<br>40–59: 176 (5.8)60+: 158 (5.2) | Level 0–2: 72 (2.4)<br>Level 3–4: 189 (6.2)<br>Level 5–8: 241 (8.0)<br>Other: | 502 (16.7) |
| **Total** | 3028 (100) | | | |

Note: Shown as Count (% of total). Education level 0–2: Less than primary, primary and lower secondary education; Education level 3–4: Upper secondary and postsecondary non-tertiary education; Education level 5–8: Tertiary education, Other education

Empathy, the virtue of *compassion* was operationalized with the following statement: '*I exhibit empathy towards others, I can easily attune to other peoples' emotional states*'. Within the domain of Respect, the virtue of *cool headedness* was operationalized with the following statement: '*I always strive to feel calm and in control of myself when I interact with others*'. Within the domain of Incorruptibility, the virtue of *honor* was operationalized with the statement: '*As an individual, I have the quality to act in a morally correct manner*'. Within the domain of Piety, the virtue of *saintliness* was operationalized with the statement: '*I often exhibit selfless behavior; I am concerned more with the needs and wishes of others than with my own*'. Within the domain of Reliability, the virtue of *responsibility* was operationalized with the statement: '*I feel I have a duty to be liable and exhibit accountability for my behavior to others*'.

The initial pool of items developed after this phase contained a total of 24 items (Appendix Table 12). The items were translated by professional translators to German for the purpose of pretesting.

*2.5.1.1. Pre-test measuring ethical orientation.* An online survey was administered in August 2022 to a sample of 200 German consumers. An exploratory factor analysis (EFA) with a Varimax orthogonal rotation, was run on the 24-items that measured ethical orientation. The results indicated an initial factorial structure of five factors. The data indicated cross-loadings, as well as misplaced items. After an iterative process of removing items that cross-loaded, a solution of 11 items was chosen to be further tested in our main study. Following this procedure, the selected items were translated by professional translators to German, Dutch, Spanish, Italian, Polish, and Danish.

*2.5.1.2. Ethical orientation in the main study.* An exploratory factor analysis (EFA) with a Varimax orthogonal rotation, was run on the 11-item questionnaire that measured ethical orientation on 3027 European consumers in our main study. After removal of one item due to cross-loading, the results indicated a one-factor solution across the participating countries based on the Kaiser criterion of eigenvalue $\geq 1$ as well as a scree-plot inspection. The first three eigenvalues for each country are shown in Table 2.

The single factor explained 54 % of the variance in The Netherlands, 50 % in Germany, 55.5 % in Spain, 38 % in Denmark, 53 % in Italy, and 53 % in Poland, which is comparable to previous literature (Peterson, 2000). Cronbach's alpha values were satisfactory across all countries, i.e., above the cut-off threshold of 0.7 (Cortina, 1993). The final set of items is reported in the appendix (Table 12).

Confirmatory Factor Analyses (CFA) were conducted per country to ascertain the fit of the data to a one-dimensional measure of ethical orientation for each of the six samples. The results indicated that the model fit the data in a satisfactory manner (see Table 3).

It is further necessary to determine whether the same measures evoke the same cognitive frame of reference across the six countries in order for cross-country comparisons to be substantive (Vandenberg & Lance, 2000). We therefore tested for measurement invariance by implementing a series of increasingly constrained structural equation models. Constraints were applied on factor loadings (metric invariance), intercepts (scalar invariance) and residual variances (measurement error invariance), with each additional model being nested within the previous one. Measurement invariance is established by testing whether differences between these increasingly restrictive models are significant (Milfont & Fischer, 2010). Measurement invariance was assessed with the use of the fit indices CFI, and RMSEA, by comparing the decrement in model fit with every addition of constraints in the model (Rutkowski & Svetina, 2014). The results of the measurement invariance test indicated that there is metric invariance, which allows for meaningful comparisons of the measures across countries (Table 4).

**Table 2**
Eigenvalues per country.

| Eigenvalues | DE | NL | ES | IT | PL | DK |
|---|---|---|---|---|---|---|
| 1st | 5.476 | 5.804 | 6 | 5.803 | 5.734 | 4.394 |
| 2nd | 0.745 | 0.687 | 0.576 | 0.715 | 0.994 | 0.963 |
| 3rd | 0.606 | 0.65 | 0.536 | 0.593 | 0.749 | 0.750 |

**Table 3**
Fit of CFA per country.

| | DE | NL | ES | IT | PL | DK |
|---|---|---|---|---|---|---|
| $Chi^2$(df) | 87.25 (35) | 101.67 (35) | 78.30 (35) | 92.55 (35) | 145.82 (32) | 124.22 (35) |
| Pcmin/df | 2.49 | 2.91 | 2.24 | 2.64 | 4.56 | 3.55 |
| CFI | 0.98 | 0.98 | 0.99 | 0.98 | 0.96 | 0.94 |
| TLI | 0.97 | 0.97 | 0.98 | 0.97 | 0.95 | 0.92 |
| RMSEA | 0.05 | 0.06 | 0.05 | 0.06 | 0.08 | 0.07 |
| SRMR | 0.03 | 0.03 | 0.02 | 0.03 | 0.04 | 0.04 |

*2.5.2. Other psychographic factors*

We measured trust in the food system by asking participants the following question: '*How would you range your overall trust in the following actors?*'. Participants were asked to rate 4 actors (Farmers, Food manufacturers, Retailers, Authorities) based on the TrustTracker model by Macready et al, (2020). An example of the actors participants were asked to rate on a 7-point scale (1 = very little trust, 7 = very high level of trust), is the following: '*Farmers (producing plants and animals for human consumption)*' (Cronbach's alpha = 0.78).

To measure environmental concern, we asked participants to state their level of agreement on a 7-point scale (1 = strongly disagree, 7 = strongly agree), on 4 items by Haws et al. (2014). One example of these items is: '*It is important to me that the products I use do not harm the environment.*' (Cronbach's alpha = 0.90).

## 2.6. Developing the experimental design for the discrete choice experiment

The main study of this paper relies on a discrete choice experiment to analyze consumers' choice behavior towards sustainable meat products (Lizin et al., 2022). An important step in developing a discrete choice experiment is to select an appropriate set of attributes and attibute levels that reflect the true motivation in a given real choice situation (Kløjgaard et al., 2012). To ensure that we encountered the necessary and most important levels of attributes for consumers, we first conducted an analysis of the available literature on consumer perceptions of pork and broiler meat, where we identified the most relevant meat attributes as described above. The resulting list of attributes and their levels was subsequently validated by expert interviews. Based on these, a pilot study using best-worst scaling was conducted to reduce the number of attributes to a feasible amount to design the choice experiment. We report the pre-studies in more detail below.

*2.6.1. Qualitative interviews with meat experts to confirm list of attributes from professional point of view*

The overall aim of the qualitative interviews was to validate the meat quality attributes identified in the literature in terms of their impact on meat quality and secondarily in terms of consumer preferences for the various attributes. The interviews were carried out with 3–5 meat chain professionals per country, who had specific knowledge in one or more attributes (intrinsic attributes, breed, feed, space amount and space quality). This involved 25 one-hour interviews, with 13 pork chain professionals (ES-3, DK-2, PL-2, IT-3, NL-1, D-2) and 12 broiler meat chain professionals (ES-2, DK-3, PL-1, IT-1, NL-3, D-2). Meat chain professionals were recruited either through stakeholders involved in the EU funded project [excluded for review] or through referrals.

The interviews resulted in a list of 52 attributes and attribute levels for pork and 34 for broiler meat. The attributes were divided into five categories: sensory properties, feed, breed, space allocation and space quality. The full list can be found in the appendix. After careful selection

**Table 4**
Measurement invariance of the CFA model.

| Level of invariance | χ2 | p | df | CFI | RMSEA | ΔCFI | ΔRMSEA |
|---|---|---|---|---|---|---|---|
| Configural invariance | 1114.5 | 0<.01 | 210 | | | 0.94 | 0.04 |
| Metric invariance | 1224.61 | 0<.01 | 255 | 110.12 | 45 | 0.94 | 0.04 |
| Scalar invariance | 1774.90 | 0<.01 | 305 | 550.29 | 50 | 0.90 | 0.04 |

of the various attributes and attribute levels by professionals we developed a best-worst scaling approach to obtain consumer perceptions for the revised list of attributes for both pork and broiler meat.

#### 2.6.2. Best-worst scaling to identify the most relevant attributes from the consumer point of view

To reduce the list of 86 attributes for pork and broiler meat to a manageable amount for a choice experiment, we used best-worst scaling. Best-worst scaling is related to random utility theory, which is associated with discrete-choice experiments. The advantage of best-worst scaling is that it not only provides information about the most preferred, but also the least preferred alternative or attribute (Louviere et al., 2013). This allows us to compute best-worst scores, which provide more information about consumer preferences compared to only identifying the preferred choice.

We conducted a best-worst scaling study with 200 German consumers to review and select which attributes from the attribute list were most important for the consumers and to further reduce the attributes and attribute levels. Germany was chosen as the largest market out of the six countries selected for the main study. In this process, consumers rated which attributes within each of the five categories for both pork and broiler meat were of most (best) and least (worst) importance. The attributes with the highest best-worst rating in each dimension were included in the choice experiment as can be seen in Table 5. Detailed results are available in the appendix (table 9 and 10).

#### 2.6.3. Discrete choice experiment

A discrete choice experiment for pork and broiler meat constitutes the core of the main study. Choice modelling has a long tradition in (food) consumer research as it allows for the elicitation of preferences following random utility theory (McFadden, 1974; Train, 2009). The method assumes that consumers trade-off the different attributes displayed on the choice alternatives in a given choice set to choose that alternative, which provides the highest utility to them. Random utility theory posits that choices depend on an observable and a random, unobservable utility component. The observable component can be described by the attributes presented, while the random utility component remains in the error term:

$$U_{nit} = V_{nit} + \varepsilon_{nit}$$

The utility ($U$) of an individual ($n$) choosing alternative ($i$) from a given choice set ($t$) is given by the utility of the observable component $V_{nit} = \beta X_{nit}$ and the random component $\varepsilon_{\mathrm{nit}}$. Here, $\mathrm{X_{nit}}$ represents a vector of the attributes of the $i_{th}$ product alternative and $\beta$ represents preference parameters for the explanatory variables.

In this study, participants chose repeatedly between two pork chops or chicken breast alternatives (3 pieces, 600 g) and the none-of-these alternative. These products were chosen because they are very common pork and broiler meat products in all included countries. Consumers were instructed to imagine choosing their preferred pork chops/chicken breast alternative in their usual supermarket. Each subject made 9 choices per meat category in randomized order. Those subjects consuming either only pork or only broiler meat, answered only the choices regarding the respective meat product. The choice sets were designed based on a D-optimal random parameter panel design generated using Ngene software (Choice Metrics, 2021). The overall design comprised 36 choice sets[1] in four blocks with a D-error of 0.26. The pork chops and chicken breast were characterized by different combinations of the attributes shown in Table 5. The prices were computed based on self-reported reference prices to reduce hypothetical bias (Hensher, 2010; Rose et al., 2008). Further, a cheap talk script based on Tonsor and Shupp (2011) was employed to increase task compliance, which is especially important when studying farm animal welfare as these attributes are prone to evoking social desirability bias (Lai et al., 2022). Fig. 1 displays an example of a choice set.

### 2.7. Latent class choice analysis

Latent class choice analysis was performed to elicit differences in preference for pork and broiler meat across European consumers. The model assumes that there exists a finite number of unobserved classes in a population, such that preferences are homogenous within, but heterogeneous between classes (e.g.,Wedel & Kamakura, 2000). Class-specific sets of identifiable parameters can be determined based on the choices that consumers make. Accordingly, the utility an individual derives from a certain attribute in a choice set depends on the unobservable class membership to one of $q = 1,2\ldots Q$ latent classes. It is assumed that this utility is not individual-specific. The probability of belonging to a certain class $q$ is dependent on individual $i$ choosing alternative $j$, which consists of a specific set of observable attributes $x$' (Greene & Hensher, 2003):

$$Prob_{jit|q} = \frac{\exp(x'_{it,j}\beta_q)}{\sum_{j=1}^{Ji}\exp(x'_{it,j}\beta_q)}$$

Based on the assumption that a total of $Q$ latent preference classes exists in the population, the overall log-likelihood is given by:

$$lnL = \sum_{i=1}^{N} ln\left[\sum_{q=1}^{Q} C_{iq}\left(\prod_{t}^{T_i} Prob_{jit|q}\right)\right]$$

where $C_{iq}$ is the probability that individual $i$ belongs to class $q$.

The classes were subsequently profiled by psychographic (ethical orientation, environmental concern and trust) and demographic variables (gender, age and consumption frequency) by adding them as covariates to the model. This is an established method in the field of consumer preference elicitation (Grunert et al., 2015; Lizin et al., 2022; Mueller Loose et al., 2013; Peschel, Grebitus, et al., 2019; Peschel et al., 2016). Effects coding was used for all variables except price, age and the psychographic factors, which entered the model as continuous variables. The modeling procedure set out with a multilevel approach, allowing segment ratios to vary across countries, but that variation was minimal. Therefore, the data was modeled at the aggregate country level. All models were estimated using Latent Gold Choice 6.0 software (Vermunt & Magidson, 2005, 2021).

[1] Due to a mistake by the research agency when setting up the survey only 35 different choice sets were used for chicken.

**Table 5**
Attributes and attribute levels used in the choice experiment.

| Overview of attributes and levels | | | |
|---|---|---|---|
| **Sensory properties** | Superior taste | Superior Tenderness | none |
| **Feed origin** | On-farm production | Purchased on international market | Mix of on-farm production and purchased feed on international market |
| **Breed** | Traditional, local breed | Mainstream, coventional breed | |
| **Space allocation** | Current legislation | 30 % more than current legislation | 100 % more than current legistlation |
| **Space quality** | Outdoor access | No outdoor access | |
| **Price** | 25 % more than usual price | 50 % more than usual price | 75 % more than usual price |

| | **Alternative A** | **Alternative B** | **Alternative C** |
|---|---|---|---|
| |  |  | |
| **Sensory properties** | _ | Superior taste | **I choose to buy none of these products** |
| **Feed origin** | Purchased feed on international market | On-Farm production | |
| **Breed** | Local, traditional breed | Mainstream, conventional breed | |
| **Space allocation** | 30% more space | 100% more space | |
| **Space quality** | Outdoor access | No outdoor access | |
| **Price** | X +25% | X +75% | |
| **I would choose:** | **A___** | **B___** | **C___** |

| | **Alternative A** | **Alternative B** | **Alternative C** |
|---|---|---|---|
| |  |  | |
| **Sensory properties** | _ | Superior taste | **I choose to buy none of these products** |
| **Feed origin** | Purchased feed on international market | On-Farm production | |
| **Breed** | Local, traditional breed | Local, traditional breed | |
| **Space allocation** | 100% more space | 30% more space | |
| **Space quality** | No outdoor access | No outdoor access | |
| **Price** | X +75% | X +25% | |
| **I would choose:** | **A___** | **B___** | **C___** |

**Fig. 1.** Examples of choice set alternatives for chicken breast and pork chops. Note. Choice questions: Imagine you are in a store and you would like to purchase the pork chops/chicken breast that you usually buy. Do you choose Alternative A, Alternative B or Alternative C?

**Table 6**
Descriptive statistics of psychographic measures and consumption frequency.

| Country (N) | Pork | | Broiler meat | | Ethical orientation | Trust | Environmental concern |
|---|---|---|---|---|---|---|---|
| | Frequency | Usual price | Frequency | Usual price | | | |
| **NL** (502) | 5.13 (1.78) | 4.63€ (1.70) | 5.72 (1.29) | 6.63€ (1.81) | 5.19 (1.03) | 4.37 (0.97) | 4.51 (1.18) |
| **DE** (505) | 5.03 (1.61) | 6.75€ (3.13) | 5.19 (1.20) | 6.68€ (3.11) | 5.17 (1.06) | 4.15 (1.09) | 5.05 (1.31) |
| **ES** (502) | 5.65 (1.45) | 4.45€ (2.78) | 6.17 (1.21) | 5.33€ (2.84) | 5.46 (0.96) | 4.95 (0.98) | 5.23 (1.23) |
| **DK** (505) | 5.41 (1.56) | 38.38dkk (12.07) | 5.60 (1.22) | 49.45dkk (15.32) | 5.21 (0.81) | 4.50 (0.98) | 4.59 (1.26) |
| **IT** (503) | 5.23 (1.42) | 4.92€ (1.91) | 5.80 (1.15) | 6.32€ (2.62) | 5.09 (1.12) | 4.53 (1.04) | 5.14 (1.17) |
| **PL** (511) | 5.28 (1.47) | 19.07zł (10.81) | 5.51 (1.28) | 20.36zł (9.47) | 5.00 (1.19) | 4.14 (1.13) | 5.10 (1.37) |

Note: Values displayed as Mean (Standard Deviation). Assessed on 7-point scales. Price was per 3 pieces (ca. 600 g). 1€ = 7.46 dkk. 1€ = 4.26 zł.

## 3. Results

### 3.1. Descriptive statistics of psychographic measures and consumption frequency

We observe some variation across countries regarding consumption frequency and psychographic measures as can be seen in Table 6. Broiler meat is overall consumed more often than pork. Prices usually paid for chicken are higher than for pork, which is in line with market conditions. Perceived ethical orientation is generally high with mean value between 5.00 (SD 1.19) and 5.46 (SD 0.96). Mean values for trust range between 4.14 (SD 1.13) and 4.95 (SD 0.98). Environmental concern differs between 4.51 (SD 1.18) and 5.23 (SD 1.23).

### 3.2. Role of ethical orientation and other psychographic constructs in welfare meat choice

To arrive at a better overview of the data, we first show pairwise correlation of the included consumption and psychographic factors and ethical orientation. Ethical orientation is not correlated with pork ($r = -0.03$, $p > 0.1$) or broiler meat consumption frequency ($r = 0.02$, $p > 0.1$). Ethical orientation is weakly correlated with environmental concern ($r = 0.28$, $p < 0.001$) and trust ($r = 0.18$, $p < 0.001$). These correlations indicate that while there is some relationship between these, they do not measure the same construct.

We further run individual ANOVAs to test for a difference between consumption patterns and the psychographic factors. There is a significant difference in ethical orientation between those respondents who claim to purchase organic or free-range chicken ($M_{farm\ animal\ welfare\_chicken} = 5.18$ (1.01)) compare to those who buy conventional on a regular basis ($M_{conventional\_chicken} = 5$ (1.06), $F_{(1)} = 13.24$, $p < 0.001$)). The same holds for pork purchases ($M_{farm\ animal\ welfare\_pork} = 5.20$ (1.01) vs $M_{conventional\_pork} = 5.05$ (1.03), $F_{(1)} = 15.68$, $p < 0.001$), but not for those who purchase plant-based meat substitutes ($M_{plant} = 5.11$ (1.07) vs $M_{no\ plant} = 5.16$ (1.01), $F_{(1)} = 1.05$, $p > 0.1$). These findings suggest that there is some aspect of perceived ethicality involved when purchasing higher farm animal welfare meat, which is not the case for meat substitutes.

It is important to note that the observed pattern is different for environmental concern. Here, we see a significant difference for all three categories. There is a significant difference in environmental concern between those respondents who claim to purchase organic or free-range chicken $M_{farm\ animal\ welfare\_chicken} = 5.04$ (1.24) compare to those purchasing conventional on a regular basis ($M_{conventional\_chicken} = 4.47$ (1.38), $F_{(1)} = 88.83$, $p < 0.001$). The same pattern is observed for pork purchases ($M_{farm\ animal\ welfare\_pork} = 5.09$ (1.23) vs $M_{conventional\_pork} = 4.67$ (1.33), $F_{(1)} = 78.25$, $p < 0.001$), as well as those who purchase plant-based meat substitutes compared to those who do not ($M_{plant} = 5.25$ (1.17) vs $M_{no\ plant} = 4.83$ (1.3), $F_{(1)} = 62.71$, $p < 0.001$). This shows that even though ethical orientation and environmental concern go hand-in-hand for some consumer choices, they are inherently different concepts. Ethical orientation is focused on the well-being of animals involved in food production, whereas environmental concern has a broader scope, influencing choices across all food categories, including plant-based meat substitutes.

### 3.3. Latent class choice model

To ensure proper classification of respondents, we decided to exclude those from the choice analysis that opt out of all choices (6.6 % for pork/6.7 % for broiler meat). We also excluded respondents, who entered a typical price value, which deviated more than three standard deviations from the sample mean (1.7 % for pork/2.3 % for broiler meat). We ran models with up to 6 classes. The model fit characteristics are shown in Table 7. We could not choose the best model based on the Bayesian Information Criterion (BIC) as this was continuously decreasing. This continuous decrease in the information criteria is often seen in large data sets (Pass et al. 2014). Considering the BIC, classification error, R-square and class size a 3-class model was evaluated as the best solution for both meat types.

**Table 7**
Model fit value 1–6 classes per meat category.

| Pork | | | | | | |
|---|---|---|---|---|---|---|
| | LL | BIC(LL) | AIC(LL) | Npar | Class.Err. | $R^2$ |
| 1-Class | −22104.91 | 44288.40 | 44229.82 | 10 | 0 | 0.15 |
| 2-Class | −20282.64 | 40785.32 | 40621.29 | 28 | 0.05 | 0.25 |
| 3-Class | **−19572.67** | **39506.82** | **39237.34** | **46** | **0.11** | **0.33** |
| 4-Class | −19120.09 | 38743.10 | 38368.18 | 64 | 0.13 | 0.37 |
| 5-Class | −1878.09 | 38214.56 | 37734.18 | 82 | 0.15 | 0.41 |
| 6-Class | −18603.77 | 37993.36 | 37407.53 | 100 | 0.17 | 0.43 |
| **Broiler meat** | | | | | | |
| | LL | BIC(LL) | AIC(LL) | Npar | Class.Err. | $R^2$ |
| 1-Class | −22660.56 | 45400.17 | 45341.13 | 10 | 0 | 0.14 |
| 2-Class | −20355.97 | 40933.28 | 40767.95 | 28 | 0.04 | 0.27 |
| 3-Class | **−19474.62** | **39312.85** | **39041.24** | **46** | **0.08** | **0.35** |
| 4-Class | −18939.72 | 38385.33 | 38007.43 | 64 | 0.11 | 0.40 |
| 5-Class | −18607.03 | 37862.25 | 37378.06 | 82 | 0.12 | 0.43 |
| 6-Class | −18437.35 | 37665.18 | 37074.71 | 100 | 0.16 | 0.45 |

The parameter estimates for the latent class choice model are displayed in Table 8 and the respective WTP values in Table 9. When viewing the results from both tables, it becomes apparent that the pattern of results is similar for both meat products. Classes 1 and 2, comprising about two-thirds of the sample are willing to pay a premium for farm animal welfare attributes as can be seen from Table 6. Outdoor access stands out in terms of utility and WTP estimates for both classes. On-farm produced feed (Pork: $\beta$=.30, Chicken: $\beta$=.26) and 100 % more space (Pork: $\beta$=.32, Chicken: $\beta$=.32) are of higher utility for class1 as can be seen in Table 5. Local, traditional breed (Pork: $\beta$=.20, Chicken: $\beta$=.34) and outdoor access (Pork: $\beta$=.63, Chicken: $\beta$=.57) provide higher utility for class2 compared to Class 1. Class 2 is, however, also the class characterized by less than average meat consumption for pork (Pork: $\beta = -0.17$), suggesting that this group of consumers is very selective in purchasing meat products. Class 2 also stands out by reporting significantly less trust compared to the sample average (Pork: $\beta = -0.23$, Chicken: $\beta = -0.15$) and for the pork model also less ethical orientation ($\beta = -0.09$). Respondents in Class1 are more likely than the sample average to purchase farm animal welfare meat on a regular basis (Pork: $\beta$=.19, Chicken: $\beta$=.15). Both class 1 and 2 are characterized by a higher environmental concern compared to the sample average. We consider Class 1 to be "Ethically oriented", while class 2 can be considered "Low in trust". Class 3 is mainly characterized by being price sensitive (Pork: $\beta$ = -1.52, Chicken: $\beta$ = -3.06), having a higher than average meat consumption frequency for pork ($\beta$=.14) and a lower than average environmental concern (Pork: $\beta = -0.34$, Chicken: $\beta = -0.30$).When taking a closer look at the mean values for ethical orientation, environmental concern and trust, this image becomes clearer as can be seen in Fig. 2. The respective standard deviations can be found in an overview in the appendix for transparency.

Running separate ANOVAs for each construct per product category with multiple comparisons across classes using Tukey contrasts revealed significant ($p < 0.05$) differences for all means, except for ethical orientation between Classes 2 and 3 for both products, trust Classes 1 and 3 for both products and environmental concern between Classes 1 and 2 for pork. For chicken, environmental concern differed between all class combinations. This inspection shows that ethical orientation differentiates between the two classes that are willing to pay more for farm animal welfare attributes (Classes 1 and 2). Environmental concern only differentiates between these two classes for chicken, but not for pork. Ethical orientation therefore helps in explaining class membership for consumers, who are willing to pay more for farm animal welfare. The

**Table 8**
Utility and covariate estimates for meat choices across classes.

| | Pork chops | | | Chicken breast | | |
|---|---|---|---|---|---|---|
| | Class1 | Class2 | Class3 | Class1 | Class2 | Class3 |
| Relative Size | 50 % | 27 % | 23 % | 46 % | 35 % | 19 % |
| | $\beta$ | $\beta$ | $\beta$ | $\beta$ | $\beta$ | $\beta$ |
| **Attributes** | | | | | | |
| Sensory | | | | | | |
| Superior taste | 0.25*** | 0.19*** | 0.26*** | 0.16*** | 0.17*** | 0.70*** |
| Superior tenderness | 0.12*** | 0.11** | −0.06 | 0.11*** | −0.08** | 0.07 |
| No claim | −0.38*** | −0.29*** | −0.20*** | −0.28*** | −0.10*** | −0.78*** |
| Feed | | | | | | |
| On-farm production | 0.30*** | 0.18*** | −0.22*** | 0.26*** | 0.14*** | 0.66*** |
| Purchased on international market | −0.24*** | −0.17*** | −0.06 | −0.27*** | −0.07* | −0.42*** |
| Mix of both | −0.06* | −0.01 | 0.27*** | −0.01 | −0.07* | −0.24* |
| Breed | | | | | | |
| Local, traditional | 0.13*** | 0.20*** | 0.25*** | 0.12*** | 0.34*** | 0.25*** |
| Conventional, mainstream | −0.13*** | −0.20*** | −0.25*** | −0.12*** | −0.34*** | −0.25*** |
| Space | | | | | | |
| 100 % more | 0.32*** | 0.30*** | −0.25*** | 0.32*** | 0.15*** | 0.49*** |
| 30 % more | −0.06** | −0.02 | 0.05 | −0.02 | 0.04 | 0.30*** |
| Current legislation | −0.26*** | −0.28*** | 0.20*** | −0.30*** | −0.19*** | −0.79*** |
| Outdoor access | | | | | | |
| Yes | 0.43*** | 0.63*** | 0.17*** | 0.43*** | 0.57*** | 0.76*** |
| No | −0.43*** | −0.63*** | −0.17*** | −0.43*** | −0.57*** | −0.76*** |
| No Choice | −1.95*** | 0.02 | −6.10*** | −1.82*** | −0.61*** | −32.92*** |
| Price | −0.16*** | −0.07*** | −1.52*** | −0.15*** | −0.22*** | −3.06*** |
| **Covariate estimates** | $\beta$ | $\beta$ | $\beta$ | $\beta$ | $\beta$ | $\beta$ |
| Intercept | −1.09*** | 1.41*** | −0.33 | −0.71** | 0.83** | −0.12 |
| Age | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Gender | | | | | | |
| Female | −0.07* | 0.11** | −0.04 | −0.01 | 0.07* | −0.06 |
| Male | 0.07* | −0.11** | 0.04 | 0.01 | −0.07* | 0.06 |
| Consumption frequency | 0.04 | −0.17*** | 0.14*** | 0.00 | −0.03 | 0.03 |
| Trust | 0.03 | −0.23*** | 0.21*** | 0.01 | −0.15*** | 0.14*** |
| Environmental concern | 0.14*** | 0.20*** | −0.34*** | 0.19*** | 0.11*** | −0.30*** |
| Ethical orientation | 0.09** | −0.09* | 0.00 | 0.01 | −0.04 | 0.03 |
| Regular farm animal welfare meat purchase | | | | | | |
| yes | 0.19*** | 0.02 | −0.21*** | 0.15*** | −0.10* | −0.05 |
| no | −0.19*** | −0.02 | 0.21*** | −0.15*** | 0.10 | 0.05 |
| | LL = -19572.67, BIC(LL) = 39506.82, pseudo-$R^2$ = 0.33 | | | LL = -19474.62, BIC(LL) = 39312.85, pseudo-$R^2$ = 0.35 | | |

Note: ***p < 0.001, **p < 0.01, *p < 0.05. Price converted in € for all countries.

class with the highest willingness-to-pay for farm animal welfare attributes (Class 2) is also the class with the lowest trust.

## 4. Discussion

Our study contributes to understanding the role of ethical orientation in consumers' meat choices. We have a particular focus on meat products, an industry which is under scrutiny for responsible practice (Birkle et al., 2022; Weible et al., 2016). We carefully designed a discrete choice experiment that provided consumers with the most relevant farm animal welfare attributes to guide their decision process. We identified those attributes based on previous literature, expert interviews and a pre-study using best-worst scaling. We developed a set of items to measure consumers' ethical orientation and applied it in a segmentation approach to consumers' meat choices. Similarly to previous research, we find that expert opinions on the relevance of different farm animal welfare and sustainability attributes for meat quality do not exactly match consumers' preferences (Coleman et al., 2022; Hötzel & Vandresen, 2022). While experts deemed all attributes, feed, breed, space allocation and outdoor access to be important for meat quality, consumers in our study show a clear preference for outdoor access. Overall, we find that the majority of consumers in our sample value farm animal welfare attributes and are willing to pay a premium for these. This is contrary to previous research, where the share of these consumers was still low (Clark et al., 2017). Except for price-sensitivity, we find that consumers differ in terms of their ethical orientation, environmental concern and trust. The degree of environmental concern is similar across the two classes that are willing to pay premiums, but they differ on the other two parameters. The largest segment with the highest ethical orientation prefers local food production and more space for the animals. Those consumers, who are more critical, characterized by low trust, prefer local, traditional breeds and outdoor access. Those consumers with a higher ethical orientation are also more likely to report that they purchase farm animal welfare meat. This suggests that consumers' ethical orientation relates to their choices and can therefore be a fruitful avenue both in terms of understanding ethical consumer

**Table 9**
Willingness-to-pay estimates for meat attributes across classes.

| | Pork chops | | | Chicken breast | | |
|---|---|---|---|---|---|---|
| Relative Size | 50 % | 27 % | 23 % | 46 % | 35 % | 19 % |
| **Attributes** | | | | | | |
| Sensory | | | | | | |
| Superior taste | 1.61 | 2.63 | 0.17 | 1.09 | 0.80 | 0.23 |
| Superior tenderness | 0.80 | 1.46 | −0.04 | 0.74 | −0.35 | 0.02 |
| No claim | −2.42 | −4.09 | −0.13 | −1.84 | −0.44 | −0.25 |
| Feed | | | | | | |
| On-farm production | 1.90 | 2.47 | −0.14 | 1.74 | 0.63 | 0.22 |
| Purchased on international market | −1.54 | −2.35 | −0.04 | −1.81 | −0.30 | −0.14 |
| Mix of both | −0.36 | −0.12 | 0.18 | 0.07 | −0.33 | −0.08 |
| Breed | | | | | | |
| Local, traditional | 0.85 | 2.76 | 0.17 | 0.83 | 1.55 | 0.08 |
| Conventional, mainstream | −0.85 | −2.76 | −0.17 | −0.83 | −1.55 | −0.08 |
| Space | | | | | | |
| 100 % more | 2.07 | 4.10 | −0.16 | 2.11 | 0.68 | 0.16 |
| 30 % more | −0.41 | −0.24 | 0.04 | −0.13 | 0.20 | 0.10 |
| Current legislation | −1.66 | −3.86 | 0.13 | −1.98 | −0.88 | −0.26 |
| Outdoor access | | | | | | |
| Yes | 2.80 | 8.78 | 0.11 | 2.86 | 2.58 | 0.25 |
| No | −2.80 | −8.78 | −0.11 | −2.86 | −2.58 | −0.25 |

Note: WTP $= -(\beta_x/\beta_{price})$ in €.

behavior, but also from a marketing point of view. Developing the concept of consumers' ethical orientation further, will contribute to the literature on ethical consumer behavior as a link between intention and behavior, which has so far been difficult to describe (Carrington et al., 2010; Hassan et al., 2022). From a marketing point of view, we contribute by showing that appeals to consumers' ethical orientation may lead to more ethical meat choices.

While the overall structure of segmentation classes is similar to previous research (e.g., Escobedo del Bosque et al., 2021; Grunert et al., 2018; Liljenstolpe, 2011) in that we find a share of consumers willing to pay a premium for farm animal welfare attributes as well as a price-sensitive share of consumers, our results provide new insight due to 1) the range of different farm animal welfare dimensions considered as well as 2) by showing that the majority of consumers is willing to pay a premium. It is important to emphasize that, to enhance the realism of the experiment, the prices in the choice experiment were set at a minimum of 25 % higher than the usual prices consumers reported being willing to pay (Hensher, 2010; Rose et al., 2008). It should also be noted that we did not find differences in the preference patterns across the six included European countries. This is different to previous research by e.g., Díaz-Caro et al. (2019), which indicated that Spanish consumers had different predispositions to pay for different levels of attributes and were willing to pay the highest premium price to buy acorn-feed Iberian ham.

### 4.1. Limitations and future research

Our study focused on two different meat products as this category is under scrutiny by consumers both due to environmental concern, but also due to ethical considerations. The main goal was to explore the role of ethical orientation and consumers' choices for farm animal welfare attributes, where we show that ethical orientation can explain consumers' meat choices for pork chops and chicken breast. Future research should investigate whether these results also hold for other meat products, such as imported meat or processed meat products, where farm animal welfare competes with more aspects of production (working conditions, food safety, healthiness etc.). We welcome further application of measuring ethical orientation as we see alternate ways to address consumers based on this characteristic.

### 4.2. Managerial implications

Heightened consumer attention to farm animal welfare resulted in increased focus from producers and public policies towards improving the meat sector, and also retailer initiatives to improve their image in terms of farm animal welfare. For example, German discounters Aldi and Lidl announced in 2021 that until 2030, they will only offer meat produced according to levels 3 and 4 on a 4-level animal welfare standard (Handelblatt, 2021; Lebensmittelzeitung, 2022). This animal welfare standard is a voluntary industry standard, supported by all major retailers in Germany (Initiative Tierwohl, 2023). Contrary, Denmark implemented a voluntary industry standard for animal welfare (Fødevarestyrelsen, 2023). Both of these labelling schemes are multi-tier labels, where the lowest tier corresponds to the current legislation for conventional meat production and the highest tier is comparable to organic meat production. Interestingly outdoor access, the most relevant farm animal welfare attribute in our study is only part of the highest tier of these animal welfare labels. Based on our results, there are different consumer segments in the market, which prefer different aspects of farm animal welfare and also in their degree of ethical orientation and trust in the food system. For practitioners, these provide flexibility in

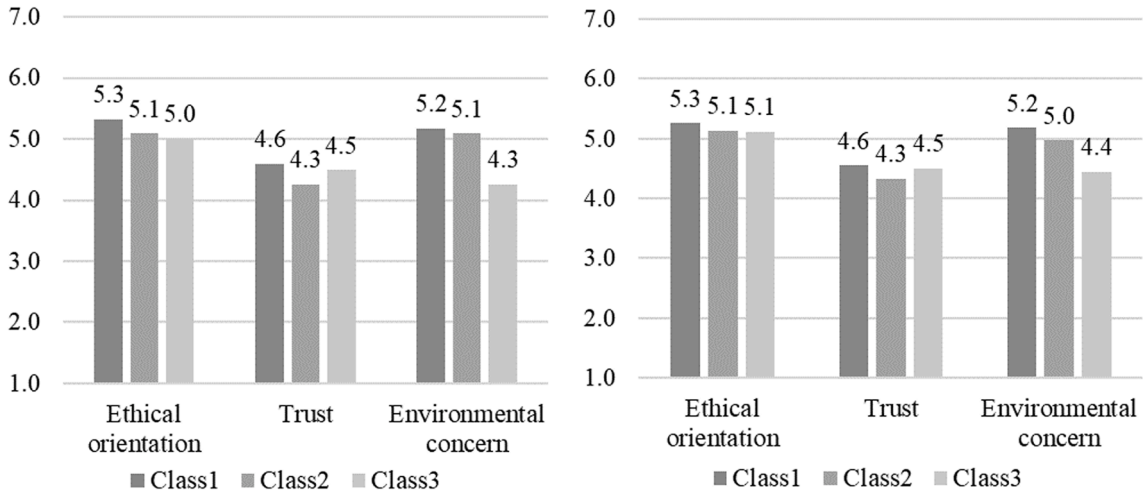


**Fig. 2.** Average Ethical orientation, Trust and Environmental concern across classes. Note: Mean values for pork displayed in the left panel and broiler meat in the right panel.

communicating different aspects of animal welfare and targeting different groups of consumers. Generally, environmentally concerned consumers, will respond to farm animal welfare initiatives. More specifically, specific feed and space improvements could be accompanied by claims about the ethicality of these aspects to reach the segment, which is more ethically oriented. To reach the more critical, smaller segment, local breeds and outdoor access will be more relevant to mention, as well as initiatives that increase trust in the food supply chain. Gradient labels, as those already implemented in the market, should be so transparent that different aspects of animal welfare become more visible to consumers to allow for a choice that reflects their personal preferences. The insight we provide on ethical orientation can improve the communication of relevant attributes to the target consumer segment.

## Compliance with ethical standards

### *Disclosure of potential conflicts of interest*

The authors have no relevant financial or non-financial interests to disclose.

### *Research involving human participants and/or animals*

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Aarhus University (BSS-2022-046).

### *Informed consent*

Informed consent was obtained from all individual participants included in the study.

## Ethical statement

1. Ethical approval for the involvement of human subjects in this study was granted by Aarhus University Research Ethics Committee, Reference number BSS-2022-046.
2. Participants gave informed consent where an affirmative reply was required to enter the survey. They were able to withdraw from the survey at any time without giving a reason.
3. The study was explained to consumers in the online questionnaire. They were informed that all data will be de-identified and only reported in the aggregate. All participants acknowledged an informed consent statement in order to participate in the study. They were financially compensated for their participation according to local panel standards.

## CRediT authorship contribution statement

**Anne O. Peschel:** . **Kristina Thomsen:** Writing – review & editing, Formal analysis, Data curation. **George Tsalis:** Writing – review & editing, Methodology, Formal analysis. **Klaus G. Grunert:** Writing – review & editing, Supervision, Methodology, Funding acquisition.

## 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.

## Data availability

Data will be made available on request.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.foodqual.2024.105334.

## References

Barkan, R., Ayal, S., & Ariely, D. (2015). Ethical dissonance, justifications, and moral behavior. *Current Opinion in Psychology, 6*(Dec), 157–161.

Birkle, I., Klink-Lehmann, J., & Hartmann, M. (2022). Different and alike: Level and determinants of public acceptance of fattening pig, beef cattle and broiler farming in Germany. *Meat Science, 193*, Article 108946.

Bray, J., Johns, N., & Kilburn, D. (2011). An exploratory study into the factors impeding ethical consumption. *Journal of Business Ethics, 98*(4), 597–608.

Brisk, H., Kristensen, H., Dandanell, C., Karlsson, A., Perez-Cueto, F., & Bredie, W. (2015). Promoting Animal Welfare From The Retailers Fridge: Cue Attributes Linked To Purchase Of Fresh Chicken Meat. 61st International Congress of Meat Science and Technology, Clermont-Ferrand.

Carlsson, F., Frykblom, P., & Lagerkvist, C. J. (2007). Consumer willingness to pay for farm animal welfare: Mobile abattoirs versus transportation to slaughter. *European Review of Agricultural Economics, 34*(3), 321–344.

Carrington, M. J., Neville, B. A., & Whitwell, G. J. (2010). Why ethical consumers don’t walk their talk: Towards a framework for understanding the gap between the ethical purchase intentions and actual buying behaviour of ethically minded consumers. *Journal of Business Ethics, 97*, 139–158.

Choice Metrics. (2021). *Ngene 1.3 User manual and reference guide*.

Clark, B., Stewart, G. B., Panzone, L. A., Kyriazakis, I., & Frewer, L. J. (2017). Citizens, consumers and farm animal welfare: A meta-analysis of willingness-to-pay studies. *Food Policy, 68*, 112–127.

Coleman, G. J., Hemsworth, P. H., Hemsworth, L. M., Munoz, C. A., & Rice, M. (2022). Differences in public and producer attitudes toward animal welfare in the red meat industries. *Frontiers in Psychology, 13*.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology, 78*(1), 98.

Darby, M. R., & Karni, E. (1973). Free Competition and the Optimal Amount of Fraud. *Journal of Law and Economics, 16*(1), 67–88. https://doi.org/10.2307/724826

de Jonge, J., & van Trijp, H. C. (2013). The impact of broiler production system practices on consumer perceptions of animal welfare. *Poultry science, 92*(12), 3080–3095.

Denver, S., Sandøe, P., & Christensen, T. (2017). Consumer preferences for pig welfare–Can the market accommodate more than one level of welfare pork? *Meat Science, 129*, 140–146.

Díaz-Caro, C., García-Torres, S., Elghannam, A., Tejerina, D., Mesias, F., & Ortiz, A. (2019). Is production system a relevant attribute in consumers’ food preferences? The case of Iberian dry-cured ham in Spain. *Meat Science, 158*, Article 107908.

Doris, J. M., & Doris, J. M. (2002). *Lack of character: Personality and moral behavior*. Cambridge University Press.

Duong, C., Sung, B., Lee, S., & Easton, J. (2022). Assessing Australian consumer preferences for fresh pork meat attributes: A best-worst approach on 46 attributes. *Meat Science, 193*, Article 108954. https://doi.org/10.1016/j.meatsci.2022.108954

Escobedo del Bosque, C. I., Spiller, A., & Risius, A. (2021). Who wants chicken? Uncovering consumer preferences for produce of alternative chicken product methods. *Sustainability, 13*(5), 2440.

Estévez-Moreno, L. X., Miranda-de la Lama, G. C., & Miguel-Pacheco, G. G. (2022). Consumer attitudes towards farm animal welfare in Argentina, Chile, Colombia, Ecuador, Peru and Bolivia: A segmentation-based study. *Meat Science, 187*, Article 108747. https://doi.org/10.1016/j.meatsci.2022.108747

Fødevarestyrelsen. (2023). *The Governmental animal welfare label*. Retrieved January from https://bedre-dyrevelfaerd.dk/index.php?id=16649&no_cache=1.

Greene, W. H., & Hensher, D. A. (2003). A latent class model for discrete choice analysis: Contrasts with mixed logit. *Transportation Research Part B: Methodological, 37*(8), 681–698. https://doi.org/10.1016/S0191-2615(02)00046-2

Grunert, K. G., Loose, S. M., Zhou, Y., & Tinggaard, S. (2015). Extrinsic and intrinsic quality cues in Chinese consumers’ purchase of pork ribs. *Food Quality and Preference, 42*, 37–47. https://doi.org/10.1016/j.foodqual.2015.01.001

Grunert, K. G., Sonntag, W., Glanz-Chanos, V., & Forum, S. (2018). Consumer interest in environmental impact, safety, health and animal welfare aspects of modern pig production: Results of a cross-national choice experiment. *Meat Science, 137*, 123–129.

Hampton, J. O., Jones, B., & McGreevy, P. D. (2020). Social License and Animal Welfare: Developments from the Past Decade in Australia. *Animals, 10*(12), 2237. https://www.mdpi.com/2076-2615/10/12/2237.

Handelblatt. (2021). *Aldi setzt mit Tierwohl-Ankündigung Bauern, Schlachter und Politik unter Druck*. Retrieved December from https://www.handelsblatt.com/unternehmen/handel-konsumgueter/billigfleisch-aldi-setzt-mit-tierwohl-ankuendigung-bauern-schlachter-und-politik-unter-druck/27363622.html.

Hassan, S. M., Rahman, Z., & Paul, J. (2022). Consumer ethics: A review and research agenda. *Psychology & Marketing, 39*(1), 111–130.
Haws, K. L., Winterich, K. P., & Naylor, R. W. (2014). Seeing the world through GREEN-tinted glasses: Green consumption values and responses to environmentally friendly products. *Journal of Consumer Psychology, 24*(3), 336–354.
Helzer, E. G., Furr, R. M., Hawkins, A., Barranti, M., Blackie, L. E., & Fleeson, W. (2014). Agreement on the perception of moral character. *Personality and Social Psychology Bulletin, 40*(12), 1698–1710.
Hensher, D. A. (2010). Hypothetical bias, choice experiments and willingness to pay. *Transportation Research Part B: Methodological, 44*(6), 735–752.
Hosta, M., & Zabkar, V. (2021). Antecedents of environmentally and socially responsible sustainable consumer behavior. *Journal of Business Ethics, 171*(2), 273–293.
Hunt, S. D., & Vitell, S. (1986). A general theory of marketing ethics. *Journal of Macromarketing, 6*(1), 5–16.
Hötzel, M. J., & Vandresen, B. (2022). Brazilians' attitudes to meat consumption and production: Present and future challenges to the sustainability of the meat industry. *Meat Science, 192*, Article 108893.
Initiative Tierwohl. (2023). *Die Initiative*. Retrieved January from https://initiative-tierwohl.de/initiative/ueber-uns/.
Kanis, E., Groen, A. F., & De Greef, K. H. (2003). Societal Concerns about Pork and Pork Production and Their Relationships to the Production System. *Journal of Agricultural and Environmental Ethics, 16*(2), 137–162. https://doi.org/10.1023/A:1022985913847
Kløjgaard, M. E., Bech, M., & Søgaard, R. (2012). Designing a stated choice experiment: The value of a qualitative process. *Journal of Choice Modelling, 5*(2), 1–18.
Lagerkvist, C. J., & Hess, S. (2010). A meta-analysis of consumer willingness to pay for farm animal welfare. *European Review of Agricultural Economics, 38*(1), 55–78. https://doi.org/10.1093/erae/jbq043
Lai, Y., Boaitey, A., & Minegishi, K. (2022). Behind the veil: Social desirability bias and animal welfare ballot initiatives. *Food Policy, 106*, Article 102184.
Lebensmittelzeitung. (2022). *Lidl kommt bei Umstellung im Fleischsortiment voran*. Retrieved December from https://www.lebensmittelzeitung.net/handel/nachrichten/tierwohl-lidl-kommt-bei-umstellung-im-fleischsortiment-voran-167305?crefresh=1.
Liljenstolpe, C. (2008). Evaluating animal welfare with choice experiments: An application to Swedish pig production. *Agribusiness: An International Journal, 24*(1), 67–84.
Liljenstolpe, C. (2011). Demand for value-added pork in Sweden: A latent class model approach. *Agribusiness, 27*(2), 129–146.
Lin-Schilstra, L., Backus, G., Snoek, H., & Mörlein, D. (2022). Consumers' view on pork: Consumption motives and production preferences in ten European Union and four non-European Union countries. *Meat Science, 187*, Article 108736. https://doi.org/10.1016/j.meatsci.2022.108736
Lizin, S., Rousseau, S., Kessels, R., Meulders, M., Pepermans, G., Speelman, S., & Verbeke, W. (2022). The State of the Art of Discrete Choice Experiments in Food Research. *Food Quality and Preference, 104678*.
Louviere, J., Lings, I., Islam, T., Gudergan, S., & Flynn, T. (2013). An introduction to the application of (case 1) best–worst scaling in marketing research. *International Journal of Research in Marketing, 30*(3), 292–303.
Lusk, J. L. (2018). Consumer preferences for and beliefs about slow growth chicken. *Poultry science, 97*(12), 4159–4166.
Macready, A. L., Hieke, S., Klimczuk-Kochańska, M., Szumiał, S., Vranken, L., & Grunert, K. G. (2020). Consumer trust in the food value chain and its impact on consumer confidence: A model for assessing consumer trust and evidence from a 5-country study in Europe. *Food Policy, 92*, Article 101880.
Mainieri, T., Barnett, E. G., Valdero, T. R., Unipan, J. B., & Oskamp, S. (1997). Green buying: The influence of environmental concern on consumer behavior. *The Journal of social psychology, 137*(2), 189–204.
McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in econometrics* (pp. 105–142). Academic Press.
Meuwissen, M. P., Van Der Lans, I. A., & Huirne, R. B. (2007). Consumer preferences for pork supply chain attributes. *NJAS-Wageningen Journal of Life Sciences, 54*(3), 293–312.
Michaelidou, N., & Hassan, L. M. (2008). The role of health consciousness, food safety concern and ethical identity on attitudes and intentions towards organic food. *International Journal of Consumer Studies, 32*(2), 163–170.
Milfont, T. L., & Fischer, R. (2010). Testing measurement invariance across groups: Applications in cross-cultural research. *International Journal of psychological research, 3*(1), 111–130.
Mueller Loose, S., Peschel, A., & Grebitus, C. (2013). Quantifying effects of convenience and product packaging on consumer preferences and market share of seafood products: The case of oysters. *Food Quality and Preference, 28*(2), 492–504. https://doi.org/10.1016/j.foodqual.2012.11.004
Mulder, M., & Zomer, S. (2017). Dutch consumers' willingness to pay for broiler welfare. *Journal of Applied Animal Welfare Science, 20*(2), 137–154.
Mørkbak, M. R., Christensen, T., & Gyrd-Hansen, D. (2010). Choke price bias in choice experiments. *Environmental and resource economics, 45*(4), 537–551.
Naspetti, S., Alberti, F., & Solfanelli, F. (2015). Quality function deployment in the organic animal food sector: Application to poultry meat. *Italian Journal of Animal Science, 14*(3), 4050.
Norwood, F. B., & Lusk, J. L. (2011). A calibrated auction-conjoint valuation method: Valuing pork and eggs produced under differing animal welfare conditions. *Journal of Environmental Economics and Management, 62*(1), 80–94.
Peschel, A. O., Grebitus, C., Alemu, M. H., & Hughner, R. S. (2019). Personality traits and preferences for production method labeling – A latent class approach. *Food Quality and Preference, 74*, 163–171. https://doi.org/10.1016/j.foodqual.2019.01.014
Peschel, A. O., Grebitus, C., Steiner, B., & Veeman, M. (2016). How does consumer knowledge affect environmentally sustainable choices? Evidence from a cross-country latent class analysis of food labels. *Appetite, 106*, 78–91.
Peschel, A. O., Kazemi, S., Liebichová, M., Sarraf, S. C. M., & Aschemann-Witzel, J. (2019). Consumers' associative networks of plant-based food product communications. *Food Quality and Preference, 75*, 145–156. https://doi.org/10.1016/j.foodqual.2019.02.015
Peterson, R. A. (2000). A meta-analysis of variance accounted for and factor loadings in exploratory factor analysis. *Marketing Letters, 11*, 261–275.
Piazza, J., Ruby, M. B., Loughnan, S., Luong, M., Kulik, J., Watkins, H. M., & Seigerman, M. (2015). Rationalizing meat consumption. The 4Ns. *Appetite, 91*, 114–128.
Poortinga, W., Steg, L., & Vlek, C. (2004). Values, environmental concern, and environmental behavior: A study into household energy use. *Environment and behavior, 36*(1), 70–93.
Rose, J. M., Bliemer, M. C., Hensher, D. A., & Collins, A. T. (2008). Designing efficient stated choice experiments in the presence of reference alternatives. *Transportation Research Part B: Methodological, 42*(4), 395–406.
Rosenfeld, D. L., Rothgerber, H., & Janet Tomiyama, A. (2020). From mostly vegetarian to fully vegetarian: Meat avoidance and the expression of social identity. *Food Quality and Preference, 85*, Article 103963. https://doi.org/10.1016/j.foodqual.2020.103963
Rothgerber, H. (2013). Real men don't eat (vegetable) quiche: Masculinity and the justification of meat consumption. *Psychology of Men & Masculinity, 14*(4), 363.
Rutkowski, L., & Svetina, D. (2014). Assessing the hypothesis of measurement invariance in the context of large-scale international surveys. *Educational and psychological measurement, 74*(1), 31–57.
Schröder, M. J., & McEachern, M. G. (2004). Consumer value conflicts surrounding ethical food purchase decisions: A focus on animal welfare. *International Journal of Consumer Studies, 28*(2), 168–177.
Shanahan, K. J., & Hyman, M. R. (2003). The development of a virtue ethics scale. *Journal of Business Ethics, 42*(2), 197–208.
Shaw, D., Shiu, E., & Clarke, I. (2000). The contribution of ethical obligation and self-identity to the theory of planned behaviour: An exploration of ethical consumers. *Journal of Marketing Management, 16*(8), 879–894.
Sparks, P., Shepherd, R., & Frewer, L. J. (1995). Assessing and structuring attitudes toward the use of gene technology in food production: The role of perceived ethical obligation. *Basic and applied social Psychology, 16*(3), 267–285.
Spielmann, N. (2021). Green is the new white: How virtue motivates green product purchase. *Journal of Business Ethics, 173*(4), 759–776.
Szmigin, I., Carrigan, M., & McEachern, M. G. (2009). The conscious consumer: Taking a flexible approach to ethical behaviour. *International Journal of Consumer Studies, 33*(2), 224–231.
Tonsor, G. T., & Shupp, R. S. (2011). Cheap talk scripts and online choice experiments: Looking beyond the mean. *American Journal of Agricultural Economics, 94*(3), 1015–1031.
Train, K. E. (2009). *Discrete Choice Methods with Simulation*. Cambridge University Press. http://books.google.de/books?id=hGw-PgAACAAJ.
Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods, 3*(1), 4–70.
Verain, M. C. D., Sijtsema, S. J., & Antonides, G. (2016). Consumer segmentation based on food-category attribute importance: The relation with healthiness and sustainability perceptions. *Food Quality and Preference, 48*, 99–106. https://doi.org/10.1016/j.foodqual.2015.08.012
Vermunt, J. K., & Magidson, J. (2005). *Technical Guide for Latent GOLD Choice 4.0: Basic and Advanced*. Statistical Innovations Inc.
Vermunt, J. K., & Magidson, J. (2021). *Upgrade manual for latent gold basic, advanced/syntax, and choice version 6.0*. Statistical Innovations Inc.
Viske, D., Lagerkvist, C. J., & Carlsson, F. (2006). Swedish consumer preferences for animal welfare and biotech: A choice experiment.
Vitell, S. J., & Muncy, J. (2005). The Muncy-Vitell consumer ethics scale: A modification and application. *Journal of Business Ethics, 62*(3), 267–275.
Wedel, M., & Kamakura, W. A. (2000). *Market Segmentation: Conceptual and Methodological Foundations* (2nd ed.). Kluwer Academic.
Weible, D., Christoph-Schulz, I., Salamon, P., & Zander, K. (2016). Citizens' perception of modern pig production in Germany: A mixed-method research approach. *British Food Journal*.