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Research article

Building sustainability into food products: How information about sustainable production affects acceptance of new food

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Abstract

Consumers are interested in more sustainably produced food products, but sustainability can be incorporated into and communicated in several ways. It is therefore imperative to understand how information about aspects of sustainable production affects consumer acceptance of potential new products before making major investments in revised production systems. Concept tests serve as an early warning indicator in the process of developing new products. To investigate ways in which sustainability elements can be built into food product concepts that will appeal to consumers, we employ an approach to concept testing that builds on research on consumer quality perception. This provides a way of testing expected acceptance of new products and provides evidence on how elements of the concept affect the perception of expected quality and, in turn, overall liking and purchase intention. We apply the methodology to test new pork and chicken product concepts that include sustainability-related messaging. The results indicate that some sustainability elements favour product acceptance, partially mediated by perceived quality and perceived sustainability, but acceptance is equally related to packaging and more traditional aspects of food quality.

Keywords: Meat, New product development, Sustainability, Consumer acceptance, Partial least squares.

JEL codes: M3, Q13.

Highlights

- Sustainability aspects can affect consumer acceptance of meat products.
- Perceived sustainability and perceived quality are related.
- The effects depend on degree of processing.

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1. Introduction

Consumer demands for food products have become increasingly multidimensional over the past decades (Grunert, 2005, 2006). The way in which consumers perceive food quality has evolved from a focus mainly on sensory properties to encompass descriptions of convenience, health and, most recently, sustainability. Food producers therefore face the challenge of having to develop food products that consider these multidimensional consumer demands (Grunert *et al.*, 2010). The more dimensions that become relevant regarding consumer preferences and intention to buy, the more possibilities for new product development and product differentiation. However, there is also a greater risk of developing and launching products that are not well aligned with consumer preferences. More sustainable products often require costly changes in the setup of primary production, so the development of new products based on an understanding of both consumer preferences and production possibilities in a cross-functional product development process becomes even more important.

Developing new products with credence characteristics such as sustainability provides an additional challenge, as the benefits provided cannot be experienced directly by consumers, but rely solely on credible communication from the seller (Fernqvist, Ekelund, 2014). Just claiming that a product is produced in a sustainable way will not usually convince consumers that are already suspicious of greenwashing (Montero-Navarro *et al.*, 2021). Therefore, positioning new products based on sustainability requires a credible narrative, where the sustainability claim is linked to specific characteristics of the production process.

It is well known that, in order to reduce the risk of failure when launching new products, it is necessary to seek feedback from the market throughout the new product development process (Grunert *et al.*, 2011). Concept testing is a widely used tool because it allows quantitative feedback from the market indicating product effectiveness at an early stage in the product development process, before actual prototypes are available for testing (Ozer, 1999). For product concepts involving credence characteristics such as sustainability, a concept test can provide an initial assessment of whether the narrative supporting the sustainability claim is viewed as compelling and convincing by consumers.

A wide array of concept testing tools is available both commercially and in scientific publications (Ozer, 1999). Concept tests can have both predictive and diagnostic functions. They are expected to provide an initial approximation of expected sales after the product is launched, and they can also be used to analyse the effect of particular product attributes on consumer preferences and intention to buy. Concept testing methods that focus on the diagnostic function mostly work by presenting respondents with systematically derived variations of a basic concept, which then allows an estimation of the impact of these variations. On the other hand, monadic concept tests usually focus on the predictive function and do not provide diagnostic information that could help improve the concept. Most concept testing methods lack strong theoretical anchoring and are not linked to theory on consumer quality perception.

In the present paper, we address two research questions:

- How do elements of sustainability in a new product concept affect product acceptance?
- How is the relationship between sustainability elements and product acceptance mediated by perceived quality and perceived sustainability?

To this end, we use a concept testing methodology that has both predictive and diagnostic functions; that can be used to compare concepts that do not share a common underlying attribute structure as in conjoint analysis; and that is developed based on insights into consumer quality perception and how it relates to intention to buy. The examples we use in this paper are product concepts developed for pork and poultry products that are positioned in terms of additional sustainability of the production process.

2. Conceptual development

2.1. Perception of food quality

Subjective food quality – the quality that is perceived by the consumer – is commonly defined as the get component of perceived customer value (Grunert, 2005). Subjective food quality is therefore closely linked to the benefits that a consumer wants to get out of buying and consuming a food product. The four major dimensions of benefits commonly distinguished in food quality are sensory pleasure derived from the product, especially in terms of a good taste; convenience in the preparation of a meal and or in consumption; the healthiness of the product; and benefits related to the way in which the food has been produced – for example, in terms of environmental impact and animal welfare (Brunsø *et al.*, 2002).

Before a product is purchased, all four quality dimensions are unknown to the consumer. Sensory pleasure and convenience are experience qualities that are amenable to assessment after the product has been purchased, whereas health and production characteristics are credence characteristics that remain unknown to the consumer also after the purchase (Fernqvist, Ekelund, 2014). If a consumer cannot draw on previous experiences with the same product, then they can only form expectations about the product based on quality cues, which are imperfect indicators of the expected quality. These cues include labelling schemes that provide information on healthiness or sustainability characteristics (Dahlhausen *et al.*, 2018; Meijer *et al.*, 2021). The relationship between cues and quality has been investigated in cue utilisation theory (Fernqvist, Ekelund, 2014; Jacoby *et al.*, 1971). Before the first purchase of a new product, consumer quality expectations are exclusively based on quality cues, including the appearance of the product, the packaging, the labelling, the store in which it is sold and the price (Bredahl, 2004). The most important set of quality cues, however, are derived from the communication about the new product (Poulsen *et al.*, 1996). Therefore, a concept test can use insights on how consumers use communicative cues as indicators of expected quality. This requires distinguishing quality cues from expected quality dimensions, which in turn can be related to overall product liking and intention to purchase.

2.2. Sustainability

There is considerable interest in sustainable living today and, related to this, an interest in buying products that are produced in a more sustainable way (EIT Food, 2025). Research has shown that sustainability claims can have a positive effect on consumer preferences and willingness to pay, but that it depends on a host of factors (Li, Kallas, 2021). Sustainability is a complex, multidimensional concept; people's understanding of sustainability is often limited, especially regarding food (Grunert *et al.*, 2014).

Previous research on consumer interest in sustainability-related production characteristics in meat production suggests that consumers are most interested in aspects of sustainability that relate to tangible benefits, as opposed to a general positive impact on the state of the planet. For example, consumers are positive about claims relating to animal welfare as well as claims about limited use of antibiotics in animal production, which have sustainability and potential health implications for the individual consumer. They are less interested in claims regarding the carbon dioxide (CO₂) footprint, which is a general environmental impact measure (Grunert *et al.*, 2018).

If a product is perceived as more sustainable than competing products, then this can have an effect on the perception of quality, even the sensory aspects of quality. These types of inferences can go both ways: the perception of sustainability can lead to a 'warm glow' effect, a positive feeling of doing the right thing when buying the product, which can transfer to the perception of sensory characteristics (Bratanova *et al.*, 2015; Grunert *et al.*, 2024). However, negative inferences are also possible when consumer believe that the additional sustainability must come at the expense of other quality aspects (Chernev, Blair, 2021).

2.3. Concept testing

In the process of developing a new product, a concept is usually defined as a description of a potential new product with such level of detail that a potential buyer can relate to it and form a reliable estimate of the likelihood of buying the product once it comes on the market (Ozer, 1999). Thus, a

concept is more than a new product idea; it needs descriptions of all marketing parameters, including packaging, communication and pricing.

A concept test is a way of getting a first reaction from potential buyers of the envisioned new product (García-Milon *et al.*, 2019). Apart from qualitative methods (focus groups and expert opinions), concept testing methods can be sorted into two basic categories (Ozer, 1999; Peng *et al.*, 2024). Monadic concept tests measure potential buyers' intention to buy the product, using proximal measures close to purchase, like attitude, liking and overall preference (Peng, Finn, 2008). Comparative concept tests show respondents a range of concepts that are derived from a common factorial design defined by key attributes of the product in question. Conjoint analysis and discrete choice experiments are the most common tools used for comparative concept tests (Hauser, Rao, 2004). Both methods can be used to arrive at initial coarse estimates of predicted sales or market share and, in the case of comparative concept tests, the impact of different products attributes on consumer purchase can be estimated (Kato *et al.*, 2025). Therefore, comparative concept tests are advantageous because they have predictive and diagnostic functions. They require that a fixed attribute structure for the new product has already been established, and that variations of the product can be defined within the realms of this attribute universe. Monadic product tests measuring purchase intention allow for more flexibility in the description of product concepts, but they do not normally provide diagnostic information on how different elements of the concept have contributed to the purchase intention.

2.4. Concept testing based on consumer quality perception theory

We propose a model for concept testing that is based on extant theory about food quality perception¹. The different elements in a concept description are viewed as cues that consumers can use to form their expectations about relevant quality dimensions, which in turn impact concept acceptance. We operationalise concept acceptance in terms of overall liking and purchase intention, thus concentrating on the common core of the attitudinal and behavioural aspects of acceptance. In addition, concept elements can affect acceptance directly, not mediated by quality expectations, to the extent that these elements elicit positive affect that influences purchase intention without cognitive mediation. Our conceptual model is shown in Figure 1. We add perceived sustainability as a separate construct, also inferred from the elements in the concept description, because the way in which sustainability-related elements affect acceptance is of great interest in the examples we use in this paper, and because it also allows us to look at potential trade-offs or synergies between sustainability and other quality dimensions. Perceived sustainability, in turn, can affect the overall perceived quality (where the direction can go both ways, i.e., a higher degree of sustainability could be believed to be related both to more or less taste and healthiness), and it can affect acceptance directly. Our methodology entails an analysis of liking of concept elements and their impact on product acceptance while also investigating the cognitive mediation accounting for part of the effect, which positions it as a hybrid between monadic and multi-attribute concept tests (e.g. conjoint analysis).

¹ A previous version of this model was used in the EU-funded project QPorkChains (see Chrysoschoidis *et al.*, 2009).

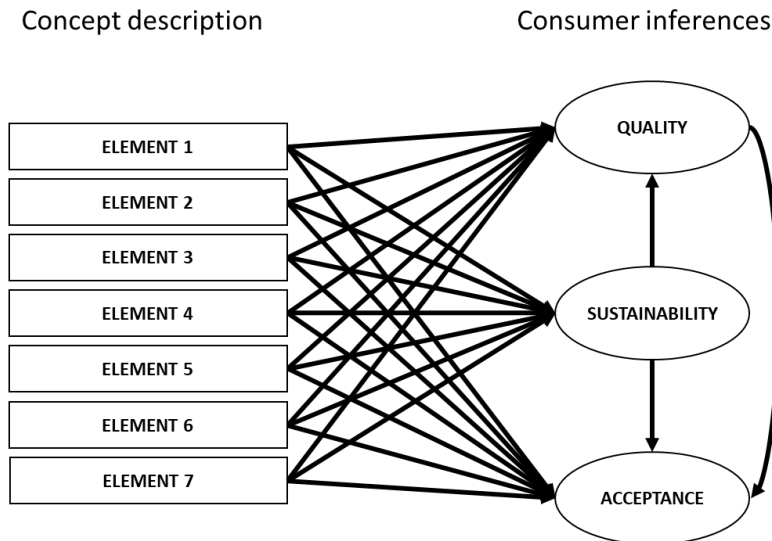


Figure 1. Conceptual model.

3. Methodology

The core of our study is a test of six product concepts, three pork-based products and three chicken-based products, implemented as part of a consumer survey in six European countries. Based on the data, determinants of product acceptance are estimated by partial least squares (PLS) structural equation modelling, using the model presented in Figure 1. The product concepts to be tested were developed in consumer focus groups carried out in two countries.

3.1. Concept development

The concepts were developed as part of a project on sustainable meat production. Two consumer focus groups were carried out, one in Germany (Munich) and one in Spain (Seville), with consumers of pork and chicken. After discussing general practices with regard to buying, preparing and eating pork and chicken, participants in the focus groups were informed about some of the sustainability initiatives that were being tested as part of the project. Based on this, focus group participants developed, in groups, product concepts that involve some of these initiatives. This resulted in the development of six new product concepts, three for pork and three for chicken. The concept descriptions are shown in Figure 2. For both pork and chicken, one of the concepts related to fresh meat, one related to processed meat, and one related to processed meat directed specifically at children as the target group. All three pork concepts mentioned that part of the feed given to the pigs was replaced by locally sourced feed, and that the feed was based on byproducts from the production of fruits and vegetables, which is good for sustainability. In addition, the concepts mentioned that the pigs have access to toys such as ropes, paper bags, balls and chewing toys, which is good for animal welfare. All three chicken concepts mentioned that the meat is from a slower-growing chicken breed and that they are reared with 50% more space compared to normal procedure. In addition, the space in which they live has been enriched with straw bales, which again is good for animal welfare.

Pork concept 1

Pork tenderloins are packaged in cardboard with a transparent top. The tenderloins are from pigs where part of their feed is local byproducts from farming (e.g. apples, berries, buckwheat, oranges and carob) instead of imported standard feed. In the stable the pigs have access to toys such as ropes, paper bags, balls and chewing toys, which is good for animal welfare.

This product is for anybody who is interested in tasty meat that is produced with due concern for sustainability and animal welfare.

The product is priced at 20% above the normal price.

Pork concept 2

A pack of minced pork meat with a bacon flavour is packaged in a transparent recyclable bag. It is produced using meat from pigs where part of their feed is local byproducts from farming (e.g. apples, berries, buckwheat, oranges and carob) instead of imported standard feed. In the stable the pigs have access to toys such as ropes, paper bags, balls and chewing toys, which is good for animal welfare.

This product is for anybody who likes meat with a bacon flavour – for example, in Bolognese sauce. It makes food preparation easier as it is no longer necessary to add bacon. Moreover, this product is for anybody who is looking for more convenient options in the kitchen but at the same time is concerned about sustainability and animal welfare.

This product is priced at 20% above the normal price of minced meat.

Pork concept 3

This pack of pork nuggets is packaged in brightly coloured cardboard. The nuggets are made from 100% pork meat, breaded with non-refined flour and fried in organic sunflower oil. It is produced using meat from pigs where part of their feed is local byproducts from farming (e.g. apples, berries, buckwheat, oranges and carob) instead of imported standard feed. In the stable the pigs have access to toys such as ropes, paper bags, balls and chewing toys, which is good for animal welfare.

This product is attractive especially for kids who like eating nuggets. Parents can buy this product for their kids and at the same time have due concern for sustainability and animal welfare.

This product is priced at 25% above the normal price for nuggets.

Chicken concept 1

A pack of chicken breasts is packaged in biodegradable plastic. The meat is from a slower-growing chicken breed reared with 50% more space compared with the normal procedure. The space in which they live is enriched with straw bales, which is good for animal welfare.

This is a product for anybody who likes to eat chicken and is interested in that the meat is produced with due concern for sustainability and animal welfare.

This product is priced 30% above the normal price of chicken breasts.

Chicken concept 2

A pack of sliced cooked chicken meat is sold in colourful new packaging. The meat is from a slower-growing chicken breed reared with 50% more space compared with the normal procedure. The space in which they live is enriched with straw bales, which is good for animal welfare. This product is for people who want a cold cut with less fat and fewer calories produced in a way with due concern for sustainability and welfare.

This product is priced at the same level as cold cuts based on pork or beef.

Chicken concept 3

Breaded and fried golf-ball-size chicken balls are packed in a cardboard box with a picture of a chicken with a bubble maker. The meat is from a slower-growing chicken breed reared with 50% more space compared with the normal procedure. The space in which they live is enriched with straw bales which is good for animal welfare.

This product is attractive for children and their parents who are concerned about buying a meat product produced with due concern for sustainability and animal welfare. The product is priced 20% above normal chicken nuggets.

Figure 2. Product concepts.

3.2. Questionnaire

The concepts developed in the focus groups were tested in an online consumer survey study carried out in six European countries.

The core of the questionnaire was the evaluation of the product concepts. The six concepts developed in the focus groups were presented to respondents in the survey one by one. After each presentation of a concept, respondents were asked to evaluate the different elements of the concept description with regard to their liking, using a 7-point scale from 1 (not at all) to 7 (very much). Then, respondents were asked to evaluate the tastiness, healthiness, sustainability and the value for money of the described product on a 7-point scale from 1 (not at all) to 7 (very much). Finally, respondents were asked how much they like the product and the likelihood of buying the product when it becomes available in the marketplace, thus covering both the attitudinal and behavioural aspects of acceptance. They were also asked whether they thought eating this product will make them feel as contributing to a good cause. These questions were answered on a 7-point scale from 1 (not at all) to 7 (very much).

Before the concept test, respondents were asked to provide demographic characteristics information about the frequency of consuming pork and chicken and their agreement with the statement *my shopping habits are affected by environmental concerns* (rated on a 7-point scale from 1 [not at all] to 7 [very much]). After the concept test, a number of background variables were measured. *Food-related lifestyle* was measured based on three dimensions – *food involvement*, *food innovativeness* and *food responsibility* – using the instrument developed by Brunsø *et al.* (2021). Trust in food chain actors was measured by four items from Macready *et al.* (2020). *Meat attachment* was measured using the 16-item Meat Attachment Scale developed by Graça *et al.* (2015). Finally, *health interest* was measured using eight items from Roininen, Tuorila (1999).

3.3. Data collection

Data were collected via online questionnaire in Denmark, Germany, Italy, the Netherlands, Spain and Poland. Respondents were recruited from national consumer panels by a professional market research company (Norstat). The sample size was set to at least 300 respondents per country. The screening criteria for participation were age ≥ 18 years, at least partly responsible for shopping in the household, eat both pork and chicken and a score at least 4 on the item measuring environmental concern (see above). The latter criterion was adopted to make sure that people who are basically uninterested in the sustainability of food are not part of the study, because these are assumed not to be interested in products positioned in terms of sustainability. Based on previous research (Peschel *et al.*, 2025), it is estimated that this excluded 15%-30% of the population in the six countries. Quotas were established for gender and age. After excluding respondents who did not complete the concept test, the final sample size was 1965. Table 1 presents the demographic characteristics of the sample.

Table 1. Sample characteristics.

Demographic characteristic	Denmark	Spain	Italy	The Netherlands	Germany	Poland
Gender %						
Male	52.3	54.9	51.9	53.9	49.5	54.9
Female	47.7	45.1	48.1	46.1	50.5	45.1
Age (years) %						
18-34	29.9	17.4	29.2	27.8	31.8	22.7
35-49	25.5	30.9	26.3	27.2	23.9	28.9
50-64	24.0	30.5	25.7	23.2	24.2	27.1
65+	20.6	21.1	18.9	21.7	20.1	21.2
Education level %						
Middle	29.3	12.4	6.5	20.3	36.2	9.4
High school	9.3	19.5	5.0	24.3	21.1	33.0
Bachelor's degree	38.6	48.0	53.7	35.4	40.6	17.7
Master's degree	22.7	20.1	34.8	20.0	2.2	39.8
n	321	299	341	346	318	340

3.4. Analysis

For each of the six product concepts, a model corresponding to the one in Figure 1 was estimated using PLS structural equation modelling (SmartPLS software) (Memon *et al.*, 2021; Ramayah *et al.*, 2018). *Perceived tastiness*, *healthiness* and *value for money* were used as reflective indicators for *perceived quality*. *Perceived sustainability* and *contributing to a good cause* were used as reflective indicators for *sustainability*. *Overall liking* and *intention to buy* were used as indicators for *acceptance* in order to concentrate on the common core in these two indicators.

Respondents with a score of 7 on both product liking and purchase intention were categorised as *convinced*, and respondents with a score of 6 in one and 7 in the other of these two variables were categorised as *almost convinced*. All the remaining respondents were categorised as not convinced. This is in line with the recommendation to adopt a conservative approach in the interpretation of purchase intention results in concepts (Ozer, 2011).

The reliability of the measures of background variables was checked based on Cronbach's alpha. The three dimensions of food-related lifestyle have Cronbach's alphas of 0.89, 0.91 and 0.90. Cronbach's alpha of the four items measuring trust in food chain actors was 0.82. An exploratory factor analysis of the Meat Attachment Scale indicated two factors with an eigenvalue > 1, grouping the positive and the negative items (see Table A.2). Only the positive items were used in the analysis, with Cronbach's alpha of 0.93. Likewise, an exploratory factor analysis of the health consciousness items indicated two factors with an eigenvalue > 1, grouping the positive and the negative items (see Table A.3). Only the positive items were used in the analysis, with Cronbach's alpha of 0.86.

The background and demographic variables were then used as predictors in an ordinal regression with respondents' status as convinced, almost convinced or not convinced as the dependent variable.

4. Results

Table 2 shows the shares of respondents categorised as *convinced* or *almost convinced*. The share of respondents categorised as convinced ranges from 6.0% to 12.3% across the six concepts.

For the PLS analysis, we inspected the variance inflation factor (VIF) values for the outer and inner models for potential collinearity problems. Because our analysis links liking of concept elements to overall product evaluation, obtained in the same questionnaire, collinearity of measures could be a problem. All VIF values are < 5 , indicating that no serious collinearity problems are present (Kim, 2019). Table 3 presents the path coefficients of the structural model for each concept. R^2 values for perceived quality, perceived sustainability and acceptance all range from 0.6 to 0.8. The measurement model for perceived quality, sustainability and acceptance are shown in Table A.1. For the three pork concepts, liking the core concept – for example, *new product with tenderloin* – has a major effect on concept acceptance. This effect is both direct and mediated by perceived quality and perceived sustainability, with both mediators showing roughly equal importance. The packaging elements also have a positive impact on acceptance, fully mediated by perceived quality and perceived sustainability, although more so by the sustainability construct. Likewise, liking the price has an effect on acceptance, but also on perceived quality and sustainability, indicating that a higher price is used as an indicator of quality. With regard to the sustainability aspects (in addition to the packaging), the concept element *local feed* has a positive impact on acceptance, partly mediated by perceived sustainability for the concepts *product with tenderloin* and *minced meat with bacon flavour*, but not *pork nuggets*. The general element *concern for sustainability* has an overall positive effect on acceptance, mostly mediated by *perceived sustainability* and partly serially mediated by perceived quality. The remaining elements – fed with byproducts, access to toys, concern for animal welfare – have no significant effect on acceptance. The pattern of effects is similar across the three product concepts and thus does not depend on the degree of processing.

Table 2. Share of respondents convinced, almost convinced, not convinced.

	Pork tenderloin	Minced pork with bacon taste	Pork nuggets	Chicken breasts	Chicken cold cuts	Chicken balls
Convinced %	8.4	6.9	6.1	8.4	12.3	6.4
Almost convinced %	5.5	2.8	3.5	4.9	5.6	3.6
Not convinced %	86.1	90.2	90.4	86.7	82.0	90.0

The pattern of the results is similar for the three poultry concepts. Liking the core concept, the packaging and the price level have an impact on concept acceptance, partly mediated by perceived quality and perceived sustainability, with both mediators having roughly similar importance. With regard to the sustainability-related aspects, in addition to the effect of packaging in biodegradable plastic, the use of a *slower growing breed* has a positive effect on acceptance for the chicken breast product, but not for the two processed products. *Concern for sustainability* has a positive effect on acceptance only for the chicken breast product. For the processed products, *concern for sustainability*

has an effect on perceived sustainability, but this does not carry through to acceptance. *Enrichment with straw bales* has no effect and *concern for animal welfare* has a positive effect on perceived sustainability, but again this does not carry through to product acceptance. Despite the limited effect of the sustainability-related elements in the concept description, perceived sustainability has a significant overall impact on product acceptance.

Table 3. Coefficients for the partial least squares regression analysis.

Path coefficient from - to	Perceived quality	Perceived sustainability	Acceptance (direct effect)	Acceptance (total effect)
<i>Concept 1: pork tenderloin</i>				
Concept elements				
Access to toys	-0.05**	-0.07**	NS	NS
Cardboard packaging	0.05*	.14**	NS	0.11**
Concern for animal welfare	NS	0.09*	-0.07**	NS
Concern for sustainability		0.28**	-0.06*	0.07*
Fed with by-products	NS	NS	NS	NS
Local feed	NS	0.11**	0.06*	0.12**
New product with tenderloin	0.26**	0.26**	0.25**	0.44**
Priced 20% above market average	0.13**	0.13**	0.14**	0.23**
Cognitive mediators				
Perceived quality			0.28**	0.28**
Perceived sustainability	0.51**		0.34**	
R ²	0.74	0.61	0.73	
<i>Concept 2: minced meat with bacon flavour</i>				
Concept elements				
Access to toys	-0.05**	-0.07**	NS	NS
Cardboard packaging	0.05*	0.33**	NS	0.11**
Concern for animal welfare	NS	0.09*	-0.08*	NS
Concern for sustainability	NS	0.28**	-0.06*	0.06*
Fed with by-products	NS	NS	NS	NS
Local feed	NS	0.11**	0.06*	0.12**
New minced meat product	0.26**	0.26**	0.24**	0.44**
Priced 20% above market average	0.26**	0.26**	0.25**	0.23**

Cognitive mediators				
Perceived quality			0.28**	0.28**
Perceived sustainability	0.51**		0.34**	0.48**
R ²	0.72	0.60	0.74	
<i>Concept 3: pork nuggets</i>				
Concept elements				
Access to toys	-0.08**	NS	NS	-0.05*
Cardboard packaging	0.06**	0.20**	NS	0.14**
Concern for animal welfare	NS	0.20**	-0.05*	NS
Concern for sustainability	NS	0.23**	NS	0.07*
Fed with by-products	NS	NS	-0.06*	NS
Local feed	NS	NS	NS	NS
New product pork nuggets	0.25**	0.26**	0.37**	0.61**
Priced 25% above market average	0.14**	0.11**	0.09**	0.18
Cognitive mediators				
Perceived quality			0.30**	0.30**
Perceived sustainability	0.55**		0.30**	0.47**
R ²	0.74	0.62	0.77	
<i>Concept 4: chicken breast</i>				
Concept elements				
50% more space	NS	NS	NS	NS
Biodegradable plastic packaging	NS	0.13**	NS	0.09**
Slower growing breed	0.10**	NS	NS	0.07**
Concern for animal welfare	NS	0.15**	NS	NS
Concern for sustainability	NS	0.23**	-0.09**	NS
Enriched with straw bales	NS	NS	NS	NS
New chicken breast product	0.22**	0.29**	0.25**	0.42**
Priced 30% above market average	0.14**	0.13**	0.20**	0.29**

Cognitive mediators				
Perceived quality			0.26**	0.26**
Perceived sustainability	0.52**		0.29**	0.42**
R ²	0.74	0.62	0.73	
<i>Concept 5: chicken cold cuts</i>				
Concept elements				
50% more space	NS	NS	NS	NS
Colourful new packaging	0.04**	0.12**	0.03*	0.12**
Slower growing bread	NS	0.08**	NS	NS
Concern for animal welfare	NS	0.10**	NS	NS
Concern for sustainability	NS	0.22**	-0.07**	NS
Enriched with straw bales	NS	NS	NS	NS
New chicken cold cut product	0.22**	0.26**	0.33*	0.53**
Priced the same as other cuts	0.18**	0.18**	0.08**	0.23**
Cognitive mediators				
Perceived quality			0.36**	0.36**
Perceived sustainability		0.55**	0.27**	0.47**
R ²	0.77	0.65	0.77	
<i>Concept 6: chicken balls</i>				
Concept elements				
50% more space	NS	0.06*	NS	
Cardboard packaging	0.04*	0.09**	0.04*	0.08**
Slower growing bread	.05*	NS	NS	NS
Concern for animal welfare	NS	0.12**	NS	NS
Concern for sustainability	NS	0.11**	NS	NS
Enriched with straw bales	NS	NS	NS	NS
Readymade new product	0.21*	0.22**	0.15**	0.27**
Ball-shaped minced meat	0.14**	NS	0.18**	0.23**

Breaded and fried	0.19**	0.14**	0.19**	0.28**
Priced 20% above chicken nuggets	-0.03*	0.20**	0.07**	0.12**
Cognitive mediators				
Perceived quality			.24**	.24**
Perceived sustainability	0.40**		0.21**	0.31**
R ²	0.70	0.61	0.72	

Note: NS = not significant ($p > 0.05$), * $p < 0.05$, ** $p < 0.01$.

Table 4. Coefficients for the ordinal regression analysis.

Predictor	Pork tenderloin	Minced pork with bacon taste	Pork nuggets	Chicken breast	Chicken cold cuts	Chicken balls
Food involvement	0.90**	0.75**	0.86**	0.66**	0.77**	0.88**
Food innovativeness	0.07	0.07	0.23*	0.11	-0.05	0.29**
Food responsibility	0.95**	0.97**	0.91**	1.02**	0.78**	0.67**
Trust in food chain actors	0.35**	0.42**	0.36**	0.28**	0.32**	0.67**
Meat attachment	0.27**	0.31**	0.29**	0.24**	0.24**	0.20**
Health consciousness	-0.10	-0.11	-0.02	-0.07	-0.05	-0.11
Age	-0.00	-0.01	-0.01	0.00	-0.01*	-0.02**
Gender						
Male	-0.05	0.01	-0.54	-0.16	-0.49**	0.06
Female (base)	0	0	0	0	0	0
Country						
Denmark	0.80**	-1.06**	-1.36**	-0.12	0.13	-0.65*
Spain	-0.82**	-0.73*	-0.85**	-0.30	-0.78**	-0.55
Italy	-0.88**	-0.71*	-0.77**	-0.80**	-0.68**	-0.77**
Netherlands	-1.35**58	-1.22**	-1.10**	-0.50	-0.31	-0.58
Germany	-0.36	-1.00**	-0.48	-0.01	0.05	-0.55
Poland (base)	0	0	0	0	0	0
Education						
Middle	-0.22	0.11	-0.55	0.26	0.16	0.18
High school	-0.03	0.22	-0.02	0.21	0.23	0.34
Bachelor	-0.05	0.44	-0.14	0.37	0.22	0.13
Master (base)	0	0	0	0	0	0
Nagelkerke pseudo R ²	0.40	0.39	0.41	0.35	0.33	0.40

Note: * $p < 0.05$, ** $p < 0.01$.

Table 4 presents the coefficients from the ordinal regression relating background variables and demographic characteristics to the categorisation of respondents as *convinced*, *almost convinced* or

not convinced. Across all six product concepts, respondents are more likely to be convinced if they have higher food involvement, higher food responsibility, more trust in food chain actors, and more positive meat attachment. In addition, for the pork nuggets and the chicken balls, respondents are more likely to be convinced if they are more innovative with regard to food. Younger people and females are more likely to accept the chicken cold cuts. Some country differences can be found as well: in general, Italian respondents have lower acceptance for all six products, and Danish, Spanish and Dutch respondents have lower acceptance for the pork products.

5. Discussion and conclusion

We have tested six product concepts, all of which contain elements of more sustainable meat production. The results showed that aspects of sustainability in the concept description can have a positive impact on product acceptance. However, these effects can differ by the type of meat and degree of processing, and not all sustainability-related aspects in the concept have this effect. Sustainability of the packaging material, when mentioned in the concept, has an effect on overall acceptance. The information about local feed has a positive effect for two of the three pork concepts. The information about a slower-growing chicken breed has an effect on acceptance only for the minimally processed chicken product, in line with research on organic food indicating that in the perception of processed food consumer perceptions are more complex (Sinesio *et al.*, 2023). It is also interesting to note which elements do not have an effect. Information about enrichment of the environment in which the pigs and chicken are held does not have any effect on acceptance, even though the concept description explicitly links it to animal welfare. A possible explanation for this is that this change to the environment is regarded as so minor that it does not lead to a perceived extent of improved animal welfare that has an effect on acceptance of the concept. Likewise, the additional space per chicken in the three chicken concepts does not have an effect, which is in line with previous research indicating that additional space allowances need to be substantial in order to affect consumer preference (Peschel *et al.*, 2025). Information about the use of byproducts for the feed has no effect, which may be related to findings showing consumer reluctance with regard to products that have been derived from food material that otherwise would have been classified as waste (Peng *et al.*, 2024). We also noted that, for the chicken concepts, the role of sustainability attributes seems to depend on the degree of processing, whereas there is no such effect for the pork products. Liking the price is positively related to perception of quality and sustainability, indicating that price is used as an indicator of quality, but also directly to product acceptance, showing the importance of willingness to pay.

The study has also shed light on the ways in which information in a concept description affects acceptance of that concept. Elements in the concept description are used as cues to infer expectations about product quality and product sustainability but can also have a direct effect on concept acceptance, not cognitively mediated, suggesting that some of these elements elicit a positive effect that immediately transfers to liking and purchase intention (Saeed, Grunert, 2014). In this way, concepts can be tested in a way that is compatible with a dual processing approach to processing product information (Brocas, Carillo, 2014; Samson, Voyer, 2012), considering that processing information about new products does not always happen in a context that encourages cognitive deliberation.

This study used a hybrid concept testing method, situated between monadic concept and multi-attribute concept tests (e.g. conjoint analysis). While not based on an underlying factorial design, the analysis of how different elements of the concept description individually contribute to acceptance, as well as the analysis of how this relationship is mediated by perceived quality and perceived sustainability, allows one to gain insights into expected sales and market shares as well as insights that can be used for improving the concept. In this respect, it is especially interesting to look at how liking the concept elements differs between convinced and almost convinced respondents. This analysis helps identify elements where changes could move some consumers from the almost convinced to the convinced category. We opted for a conservative approach in defining thresholds for convinced and not convinced, in line with industry practice suggesting that only high ratings actually translate into market transactions later (Dahan, Srinivasan, 2000). The possibility of predicting how changes in concept elements will affect the share of convinced and almost convinced potential buyers is of managerial relevance.

The major limitation of our approach is that it is not experimental; it is based on the pattern of correlations between the various measures. Therefore, caution must be taken when making causal interpretations. Developing the method into an experimental approach is a promising avenue for future research. Different groups of consumers can be exposed to variations of the same concept description to analyse how adjustments of specific concept elements affect the pattern of effects on product acceptance.

One should also keep in mind that our results are based on a sample that was screened using a minimum level of interest in sustainability and thus can be generalised only to the segment of consumers who have a minimum of environmental concern. Finally, all concept tests are by definition hypothetical, asking respondents to predict their own future behaviour in a hypothetical situation. The fact that liking of concept elements, cognitive inferences and acceptance indicators were measured in the same questionnaire also involves the risk of common method bias.

The substantive conclusion from our study is that elements of sustainability can positively affect the acceptance of pork and chicken products, but it is necessary to investigate which elements have this effect and the underlying mechanism. The role of the two mediators –perception of quality and sustainability – is an area that merits further research. While sustainability in itself is usually positively valued, there is evidence of both negative and positive inferences from sustainability to quality and vice versa, and the conditions under which one or the other takes place are currently not well understood (Grunert *et al.*, 2024).

Our paper also makes a methodological contribution. Specifically, our concept testing methodology allows an analysis of how sets of concept elements lead to the formation of quality expectations and to product acceptance, thus yielding both predictive and diagnostic information and a concept test.

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Author Contributions

- K.G.G.: Conceptualization, methodology, investigation, writing-original draft, writing-review and editing, funding acquisition, supervision
- E.D.L.: Methodology, investigation, data curation, writing-review and editing

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Appendix

Table A.1. Loadings of the latent constructs.

Latent construct	Indicator	Pork tenderloin	Minced pork with bacon taste	Pork nuggets	Chicken breast	Chicken cold cuts	Chicken balls
Perceived quality	Do you expect the product to be tasty?	0.88	0.89	0.91	0.089	0.92	.093
	Do you expect the product to be healthy?	0.89	0.89	0.89	0.89	.91	.93
	Do you expect the product to be value for money?	0.82	0.82	0.87	0.82	0.87	0.87
Perceived sustainability	Do you expect the product to be sustainable?	0.92	0.92	0.91	0.92	0.92	0.89
	When you eat this product, will you feel as though you are contributing to a good cause?	0.92	0.92	0.92	0.92	0.92	0.88
Product acceptance	Do you like this product?	0.95	0.95	0.96	0.95	0.96	0.96
	Do you intend to buy the product when it becomes available in the marketplace?	0.94	0.94	0.95	0.94	0.96	0.96

Note: All coefficients are significant ($p < 0.001$).

Table A.2. Exploratory factor analysis of the Meat Attachment Scale (Graça *et al.*, 2015).

Item	Loading factor 1	Loading factor 2
To eat meat is one of the good pleasures in life.	0.815	-0.056
I love meals with meat.	0.794	-0.116
I'm a big fan of meat.	0.808	-0.097
A good steak is without comparison.	0.699	-0.046
By eating meat I'm reminded of the death and suffering of animals.	0.025	0.816
To eat meat is disrespectful towards life and the environment.	-0.081	0.867
I feel bad when I think of eating meat.	0.012	0.904
Meat reminds me of diseases.	0.110	0.864
To eat meat is an unquestionable right of every person.	0.722	0.024
According to our position in the food chain, we have the right to eat meat.	0.746	0.031
Eating meat is a natural and undisputable practice.	0.795	-0.089
I don't picture myself without eating meat regularly.	0.804	-0.088
If I couldn't eat meat I would feel weak.	0.788	0.113
I would be fine with a meat free diet	-0.336	0.557
If I was forced to stop eating meat I would feel sad.	0.753	-0.050
Meat is irreplaceable in my diet.	0.842	-0.013
% variance explained	43.0	23.6

Note: Principal component analysis with varimax rotation was performed. Items in bold were combined into a mean score for ordinal regression.

Table A.3. Exploratory factor analysis of the Health Interest Scale (Roininen, Tuorila, 1999)

Item	Loading factor 1	Loading factor 2
I am very particular about the healthiness of food.	0.903	0.013
I always follow a healthy and balanced diet	0.858	0.031
It's important to me that my diet is low in fat.	0.749	0.034
It's important to me that my daily diet contains a lot of vitamins and minerals.	0.862	0.016
I eat what I like and I do not worry about healthiness of food.	0.003	0.870
I do not avoid any foods, even if they may raise my cholesterol.	0.107	0.764
The healthiness of food has little impact on my food choices.	0.015	0.837
The healthiness of snacks makes no difference to me.	-0.033	0.849
% variance explained	<i>37.1</i>	<i>33.3</i>

Note: Principal component analysis with varimax rotation was performed. Items in bold were combined into a mean score for the ordinal regression