



# Consumer interest in environmental impact, safety, health and animal welfare aspects of modern pig production: Results of a cross-national choice experiment



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## ABSTRACT

Are consumers interested in aspects of pig production and do they take these into account in their buying decisions when such information is available? Samples of consumers in Germany and Poland selected the two – for them – most important out of a list of ten production characteristics, relating to animal welfare, health and safety, and environmental issues. In a subsequent choice experiment, the relative weight these characteristics had in consumers' choices was estimated. Relative importance of production characteristics varied between consumer segments, with the *production interested* segment being bigger in Germany than in Poland. With the exception of one animal welfare related criterion in Germany, those production characteristics that consumers perceive as most important relate to health and safety aspects rather than to animal welfare and environmental impact.

## 1. Introduction

In many countries, an increasing public interest in sustainable, high quality and safe food can be observed. With respect to farm animal production, many consumers expect food production processes taking into account aspects like animal welfare and other social and ethical attributes (Boogaard, Oosting, & Bock, 2006; Tonsor, Olynk, & Wolf, 2009; Van Loo, Caputo, Nayga, & Verbeke, 2014). Furthermore, concern about health and environmental risks caused by meat production is growing due to food scandals and crises in the last decades (Krystallis, De Barcellos, Kügler, Verbeke, & Grunert, 2009). This has led to an increasing interest in the role that credence attributes (i.e., attributes that cannot be assessed by consumers, not before and not after the purchase, but need to be communicated, see Fernqvist & Ekelund, 2014) play in consumer choice, in addition to the classical search and experience attributes like appearance and taste. One should expect that such concerns would lead consumers to take aspects of the pig production process into account when choosing pork products, and to be willing to pay higher prices for pork that has been produced with concern for ethical attributes such as animal welfare, health-related attributes or attributes related to environmentally friendly production systems (Liljenstolpe, 2008). Therefore, stakeholders across the supply chain are interested in how production parameters can be used to

position their products. At the moment, production parameters are mainly used to distinguish conventional from organic products, thus creating a main market for standard production and a niche market for production that bundles production parameters in a specific way. However, based on better insight into consumer preferences for production attributes, it may be possible to attain a place in the market somewhere between conventional and organic production, for example by focusing on production parameters specifically related to animal welfare, or health and safety properties. In this way, farmers obtain the possibility to differentiate their production systems to increase competitiveness (Napolitano, Girolami, & Braghieri, 2010).

Previous studies have shown that the highly industrialized and efficient pork production systems have been viewed critically by some consumer segments (Font-i-Furnols & Guerrero, 2014; Liljenstolpe, 2008). Stocking density (Vanhonacker, Verbeke, Van Poucke, Buijs, & Tuytens, 2009), permanent fixation (Ryan, Fraser, & Weary, 2015), use of antibiotics (Lusk, Norwood, & Pruitt, 2006; Tonsor et al., 2009), the absence of straw (Benard & de Cock Buning, 2013; Boogaard, Boekhorst, Oosting, & Sørensen, 2011), use of GMO-feeds (Ngapo et al., 2004), and piglet castration (Frederiksen, Johnsen, & Skuterud, 2010) are the most criticized issues in modern pig production systems. Still, it has been shown that animal welfare is often not the most important meat choice attribute (Nocella, Hubbard, & Scarpa, 2010), as compared

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to traditional pork attributes such as fat content (Mørkbak, Christensen, & Gyrd-Hansen, 2010) and country of origin (Pouta, Heikkilä, Forsman-Hugg, Isoniemi, & Mäkelä, 2010). With this proliferation of product and process attributes that can be used in the marketing of pork, consumers are increasingly confronted with multiple attributes based on which they can make choices based on their personal preferences. In making such choices, consumers can rely on those attributes that are most important to them or make trade-offs between a range of attributes (Bettman, Luce, & Payne, 1998), and also need to make trade-offs between both positive benefits such as animal welfare and (additional) price (Lagerkvist & Hess, 2011; Verbeke, 2009). However, up to now there are only few studies about the question how consumers deal with trade-offs between different production related attributes, for example between production attributes related to the environment (e.g., low carbon footprint) and animal welfare aspects.

Consumer attitude towards animal welfare differs between different parts of the world and even across the EU (Nocella et al., 2010). In general, for the majority of EU citizens it is important to protect the welfare of farmed animals (European Commission, 2016). However, especially consumers in northern EU member countries seem to be more concerned with animal welfare problems than southern citizens or those of new member states (Nocella et al., 2010). German citizens for example rate animal welfare aspects very high; 61% of citizens suggested that it is important to protect farm animals' welfare. In contrast, only 34% of Polish citizens agree with this statement (European Commission, 2016). With a higher-than-average per capita pork consumption in the EU, Germany (51.81 kg/capita/year in 2013 and 52.4 in 2015) and Poland (46.19 kg/capita/year in 2013 and 52.3 in 2015) are both "heavy users" (FAOSTATS, 2017; Danish Agriculture and Food Council, 2016), but the countries differ in their perception and evaluation of animal welfare (European Commission, 2016).

Studies such as the Eurobarometer of the European Commission measure attitudes and opinions and have therefore limited significance concerning real buying behavior (Napolitano, Girolami, et al., 2010; Verbeke, 2009). Furthermore, such studies often draw conclusions based on averages of a sample without taking into account different consumer segments. Thus, these results have to be interpreted carefully (Vanhonacker & Verbeke, 2014). Furthermore, the price premium that consumers are willing to pay is often over-estimated due to hypothetical bias and social desirability effects in answering (Dransfield et al., 2005; Napolitano, Braghieri, et al., 2010). In contrast to the large number of studies regarding WTP for animal welfare or WTP for sustainability attributes (Verain et al., 2012), only few studies have been conducted segmenting consumers based on their preferences for a broader range of production-related attributes (animal welfare, environmental impact, health and safety) and for the more traditional product characteristics (e.g. color, fat content, country of origin, price) (for examples, see Bernués, Olaizola, & Corcoran, 2003; Vanhonacker, Verbeke, Van Poucke, & Tuytens, 2007).

Trade-offs between different favored attributes can be analyzed using choice experiments (Tonsor et al., 2009). Choice experiments are still hypothetical due to the fact that respondents do not have to exchange real money (Lusk, Roosen, & Fox, 2003). However, they simulate real-life purchasing situations by forcing consumers to make trade-offs between different attributes and therefore allow an analysis of how consumers prioritize their requirements (Tonsor et al., 2009). Against this background, the research objective of this study is first to analyze which production attributes related to environment, health and animal welfare are ranked highest by consumers when making choices about purchases of pork in Germany and Poland. Second, it is investigated how those production attributes that are regarded as important by consumers are traded off against conventional product attributes (fat content, color, origin) and price in a choice experiment. The results are helpful to all stakeholders in the supply chain in designing production processes that give a competitive advantage, in developing marketing strategies based on such production attributes, and in developing

**Table 1**  
Socio-demographic characteristics of both samples.

	Germany (n = 1007)	Poland (n = 998)
<b>Gender (%)</b>		
Male	52	52
Female	48	48
<b>Age (mean)</b>	51.8	48.9
<b>Age groups (%)</b>		
25–35	14.7	22.7
36–45	17.9	20.4
46–55	21.8	17.9
56–65	33.1	27.2
66 +	12.5	11.7
<b>Education (%)</b>		
ISCDE 1–3	62.8	45.5
ISCDE 4–5	37.2	54.5
<b># of persons in household (%)</b>		
One	26.9	10.4
Two	44.7	34.3
Three or more	28.4	55.4

appropriate market communication tools.

## 2. Material and methods

### 2.1. Data collection and sample characteristics

A cross-national web-based survey was conducted in Germany and Poland in 2015. The population was people eating pork and who have main or shared responsibility for shopping in their household. Respondents were members of online panels of a major market research agency. Sampling was conducted with due concern for demographic variation.

A sample of 1007 pork eaters in Germany and 988 in Poland was obtained (Table 1). The shares of female and male respondents are similar in both studies. The mean age of German consumers was 52 years and for Polish consumers it was 49 years.

The questionnaire was divided into four parts. First respondents should select those two out of ten production characteristics that are most important for them when buying pork (see Table 2). Based on an extended literature research and in consultation with a major pork producer in Poland, these ten aspects were identified as potentially important for consumers and as achievable in pork production either already now or within a time span of a few years. There were four animal welfare attributes: no fixation of animals, castration with anesthesia, availability of straw, and transportation under 4 h. There were four attributes related to health and safety: GMO-free feed, pigs are free of microbial contaminations, complete traceability, and lower use of antibiotics. Finally, there were two environmental aspects: production with zero carbon footprint, manure used for fertilization.

Second, participants had to answer some filler questions unrelated to the main purpose of the survey to avoid priming effects of asking about production characteristics that could result in a bias in the following choice experiment. Third, a choice experiment was conducted. Respondents had to choose between three neck cutlets, differing in visual fat content (high/low), visual color (dark/light), country of origin (domestic, imported from Poland/Germany, produced in EU), price per kilo (in Germany/Euros: 6.00 €, 6.95 €, 7.90 €; in Poland/Zloty: 16.95 zł, 19.05 zł, 21.15 zł) and the two most important production parameters that the respondent had selected in the first part of the questionnaire (present/not present). Fat content and color were varied in pictures of the product, whereas the other information was presented verbally. The prices used were based on market prices for this type of cut in the two countries plus a premium corresponding to the premium typically achieved for pork products with specific (mostly animal welfare related) production characteristics,

Each participant evaluated twelve choice sets, choosing among the

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