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The impact of fat content, production methods and carbon footprint information on consumer preferences for minced meat

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ABSTRACT

Growing concern over the environmental impacts and other credence characteristics of food has resulted in increasing interest in the quality attributes of meat products in Finland. The aim of this study was to provide information on the relative preferences of consumers for minced meat attributes. Using a choice experiment, we examined whether the meat type, method of production, fat content, price and presence of carbon footprint information have an impact on consumer choice. A low fat content was found to have a particularly positive effect on the choice of a minced meat product. The carbon footprint information had a significant impact on the meat type-specific consumer preferences: the popularity of beef products decreased and of pork products increased when the footprint information was presented to the consumers. Six heterogeneous consumer classes were identified with latent class analysis: price-conscious (23% of the respondents), fat content-conscious (23%), ideological but passive (17%), content with conventional (14%), beef-preferring (12%) and method of production -conscious consumers (11%). Consumers were generally willing to pay more for a low fat content, but the relative willingness to pay estimates were largely dependent on the consumer groups: premiums for organic and animal welfare-oriented production methods also existed. These attributes could thus represent good means for differentiating minced meat products. The impact of carbon footprint information on the willingness to pay estimates was relatively low.

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1. Introduction

Growing concern over the environmental impacts and different credence characteristics of food has increased consumer interest in the production methods and other attributes of food products (Forsman-Hugg et al., 2008). Recently, there has been public debate specifically on animal welfare and healthiness issues, as well as the climate change impact of meat consumption. At the same time, the meat industry in Finland is facing an increasingly international and competitive market, because meat imports have steadily increased in recent years (ETL, 2009), while national competition is also intensive. Meat is an important part of the Finnish diet, and about a half of the meat consumed in Finland is pork, one quarter beef and one quarter poultry (TIKE, 2010). Minced meat accounts for a large proportion of Finnish meat consumption, representing 24% of all meat product purchases (Viinisalo, Nikkilä, & Varjonen, 2008). As meat is often sold as an undifferentiated product (Napolitano, Caporale, Carlucci, & Monteleone, 2007), the addition of supplementary quality cues could enable meat companies to

differentiate their offerings and thus gain a competitive advantage. However, in order to develop a profitable differentiation strategy, processors have to be aware of the varying needs and expectations of heterogeneous consumer segments. Meat companies are thus interested in knowing how different product characteristics influence consumer choices and whether there is a possibility for a price premium if product offerings are differentiated using these attributes.

Several studies have been conducted in order to reveal the preferences of consumers for food and meat attributes, and according to these, food safety, the country of origin, organic production and animal welfare have been particularly requested attributes for meat (Loureiro & Umberger, 2007; Pouta, Heikkilä, Forsman-Hugg, Isoniemi, & Mäkelä, 2010; Schnettler, Vidal, Silva, Vallejos, & Sepulveda, 2009). Many studies have highlighted the heterogeneity of consumer preferences, as subgroups of consumers have been found to differ in their valuations of product characteristics (Chalak, Balcombe, Bailey, & Fraser, 2008; Kornelis, van Herpen, van der Lans, & Aramyan, 2010; Nilsson, Foster, & Lusk, 2006; Pouta et al., 2010). Animal welfare, healthiness and the environmental impacts of meat production and consumption have been increasingly addressed in both public and scientific discussion,

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but to the best of our knowledge there has been no research on the impact of carbon footprint information on the choice of a meat product. The concept of the carbon footprint is rather new, both in research and business, and some food companies have only recently started to make carbon footprint information available to their consumers. For example, in Finland by spring 2012 six companies provided this information on the packages of about 40 food products in total. Many consumers are still unfamiliar with carbon footprint information, making it difficult for them to evaluate and compare different product offerings. Consumer preferences for carbon footprint information have, however, been partially addressed by studying the impact of food miles on food choice (Kemp, Insch, Holdsworth, & Knight, 2010), and in relation to other goods, such as air travel.

Consumer willingness to pay (WTP) plays an important role in product differentiation, as production costs may notably increase due to investments in distinct product attributes. Even providing information on product features is often costly. The modelling of the product life cycle necessary to assess, for example, the carbon footprint information of a product is expensive and resource demanding (e.g. Katajajuuri et al., 2006). Producers must thus have confirmation that consumers are willing to pay a premium for enhanced traceability, as the price charged for the product must ensure the profitability of their business.

The purpose of this study was to assess which product features of minced meat give consumers the greatest added value and to evaluate if providing carbon footprint information to consumers has a significant impact on their choices. The information obtained can help meat producers in adapting and differentiating their production to address the demand in a competitive market.

The research was based on a choice experiment, which allows the relative preferences of consumers for product attributes to be revealed based on their product choices. The minced meat products offered in the choice experiment differed in attributes such as the fat content, meat type (beef, pork, mixed pork and beef), method of production (conventional, safety and health -oriented, animal welfare -oriented and organic production) and price. The impact of carbon footprint information on consumer choice was tested by providing meat type -specific information on the carbon footprint size to a sub-sample of consumers as additional information. A conditional logit model was used to analyse consumers' relative preferences for the product features, and a latent class model was employed to examine consumer heterogeneity. The heterogeneous consumer segments were profiled using logistic regression models. Finally, the relative willingness to pay estimates for particular products of interest were calculated.

2. Previous literature on consumer preferences and heterogeneity

Choice experiment studies assessing consumer preferences for food attributes have become a common line of research in the American and European contexts. Foodstuffs that have been examined are various, including products from bread (Hu, Hunnemeyer, Veeman, Adamowicz, & Srivastava, 2004) to meat (Becker, Benner, & Glitsch, 2000; Cicia & Colantuoni, 2010; Loureiro & Umberger, 2007; Lusk, Roosen, & Fox, 2003; Tonsor, Schroeder, Fox, & Biere, 2005). Traceability attributes have generally appeared to be of growing importance to consumers, and food safety and animal welfare-oriented production methods have been highly valued (Cicia & Colantuoni, 2010).

Animal welfare has been revealed to have a positive impact on the choice of meat products (Cicia & Colantuoni, 2010; Napolitano et al., 2007), although according to some studies, consumers were not actually willing to pay notably more for animal welfare-oriented

products or for having information on this feature, despite their positive preferences (Maria, 2006; Schnettler et al., 2009). Consumers have had conflicting preferences for *organic production* (Pouta et al., 2010; Teratanavat & Hooker, 2006), and their willingness to pay for it has varied.

Health-oriented food attributes have been appreciated in several studies focusing, for example, on the use of growth-promoting hormones (Lusk et al., 2003; Tonsor et al., 2005), weight control-related features, and functional food attributes. Health and safety benefits have been preferred over environmental production practices, for instance in the context of general food choice motives (Kornelis et al., 2010) and organic food choice (Gracia & de Magistris, 2008). In addition, in their study on US consumer preferences for beef attributes, Loureiro and Umberger (2007) found that consumers were willing to pay the highest premium for the food safety attribute of a steak when compared to the country of origin, traceability and tenderness. In the study of Pouta et al. (2010) on broiler products, the WTP for production methods promoting consumer health was the lowest compared to organic and animal welfare -oriented production methods, as well as the country of origin. However, Roininen et al. (2001) discovered that eating healthily was important for Finnish, British and Dutch consumers, but that Finnish respondents, when compared to the two other nationalities, were the most health-oriented and least pleasure-oriented.

In a meta-analysis Cicia and Colantuoni (2010) concluded that food safety, on-farm traceability or the country of origin and animal welfare were especially important meat characteristics. Several WTP studies have been conducted on these individual attributes, for instance regarding safety of the food (Teisl & Roe, 2010; Enneking, 2004; Goldberg & Roosen, 2005; Hammitt & Hanger, 2007), animal welfare (Olesen, Alfnes, Røra, & Kolstad, 2010; Napolitano, Pacelli, Girolami, & Braghieri, 2008; Lagerkvist, Carlsson, & Viske, 2006; Liljenstolpe, 2008; Carlsson, Frykblom, & Lagerkvits, 2007), organic or ecological production (Olesen et al., 2010; Ureña, Bernabéu, & Olmeda, 2008) and healthiness (Thurström & Rausser, 2008).

The impact of *carbon footprint information* on consumer food choice is a research gap in the recent literature. Kemp et al. (2010) conducted a study on the impact of a concept known as "food miles" on purchasing behaviour, the term implying that locally produced food is more environmentally friendly than food imported from a distant location due to the emissions from transport. This "food miles" concept could be seen as a proxy for studying the impact of carbon footprint information. Even though the consumers stated having high valuations for locally produced products, the aversion to food miles was not reflected in their actual purchase decisions. On the other hand, MacKerron, Egerton, Gaskell, Parpia, and Mourato (2009) found evidence in their stated choice experiment study that consumers would be willing to pay for certified carbon offsets in the context of leisure air travel.

Many studies have accounted for heterogeneity in consumer preferences (e.g. Kornelis et al., 2010; Roininen et al., 2001), and the latent class model used in this study has been a common means of analysis (e.g. Chalakov et al., 2008; Hu et al., 2004; Nilsson et al., 2006; Pouta et al., 2010). Among others, rather large price-conscious consumer groups and smaller segments have often been identified having highly positive preferences for quality parameters such as responsible methods of production or a health orientation (Nilsson et al., 2006; Pouta et al., 2010).

The consumer segments have been described with the typical socio-demographic variables but also with attitudes. Consumers' attitudes, evaluative psychological tendencies or predispositions (Fishbein & Ajzen, 1975; Eagly & Chaiken, 1993; Aikman, Crites, & Fabrigar, 2006) about objects guide behaviour towards those objects. Also in the case of food it has been observed that attitudes predict stated behaviour reasonably well (Roininen et al., 2001;

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