Should we stop meating like this? Reducing meat consumption through substitution

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ABSTRACT

High levels of meat consumption are increasingly being criticised for ethical, environmental, and social reasons. Plant-based meat substitutes have been identified as healthy sources of protein that, in comparison to meat, offer a number of social, environmental and health benefits and may play a role in reducing meat consumption. However, there has been a lack of research on the role they can play in the policy agenda and how specific meat substitute attributes can influence consumers to replace partially replace meat in their diets. In this paper, we examine consumers' preferences for attributes of meat and meat substitute products and develop consumer segments based on these preferences. The results of a choice experiment with 247 UK consumers, using food labels and mince (ground meat), illustrate that the type of mince, fat content, country of origin and price are major factors that influence choice. Carbon footprint, method of production and brand play a secondary role in determining consumers' choices of meat/meat substitutes. Latent class analysis is used to identify six consumer segments: *price conscious*, *healthy eaters*, *taste driven*, *green*, *organic* and *vegetarian* consumers which have different socio-demographic characteristics and meat consumption patterns. Future interventions and policies aimed at reducing meat consumption including labelling, provision of more information, financial incentives, educational campaigns and new product development will be more effective if they are holistic and target specific consumer segments, instead of focus on the average consumer.

1. Introduction

The growth of the world's population and rising disposable incomes has led to an increase in global meat consumption (de Boer et al., 2014; Hallström et al., 2014; Edjabou and Smed, 2013). However, the perceived health, social and environmental concerns associated with high levels of meat consumption have stimulated calls to reduce the quantity of meat we eat and created an on-going global debate among policy makers, practitioners and academics (Yadavalli and Jones, 2014; Hallström et al., 2014). In the UK the three part long *"Should I eat meat: the health dilemma?"* program aired at prime time on the BBC 2 national television station in 2014 and other recent news headlines including *"Can eating less meat help reduce climate change?"* (BBC, 2015) and *"Red meat linked to breast cancer"* (BBC, 2014) have increased consumer awareness on the issues related to high meat consumption. More recently the International Agency for Research on Cancer, the cancer agency of WHO, has classified the consumption of red meat

(particularly processed meat) as carcinogenic to humans (IARC, 2015). Furthermore, Food and Agricultural Organisation (FAO) reports have been critical of the ecological impact of high levels of meat consumption (Tubiello et al., 2014) and government white papers (e.g. Defra, 2013a; Foresight, 2011) have highlighted the need for a reduction in meat (particularly red meat) consumption. Dietary changes however, may be required to reduce the consumption of meat products (Bajželj et al., 2014; Tukker et al., 2008). Meat substitutes are plant-based meat alternative products that look and taste like meat and could potentially play a role in stimulating dietary change (Hoek et al., 2011; de Bakker and Dagevos, 2012). However, there is a lack of research that examines the factors that encourage consumers to partially replace meat with meat substitutes (Schösler et al., 2012).

In the academic literature, it has been reported that many consumers consider meat products to be an important source of nutrients and a traditional component of their diet (Verbeke et al., 2010). However, high levels of meat consumption have been associated with health conditions including cardio vascular diseases, type 2 diabetes and some forms of cancer (Troy and Kerry, 2010; Olmedilla-Alonso et al., 2013), as well as the global obesity epidemic (Vergnaud et al., 2010), which affects a fifth of the world's

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adult population (Sofi et al., 2010). In addition to health related concerns, increasing meat production and consumption have also been identified as one of the main drivers of environmental and social pressures (Westhoek et al., 2014; Krystallis et al., 2012), as meat products have been associated with an inefficient conversion rate of feed to meat protein, high greenhouse gas emissions, deforestation, biodiversity loss and several cases of food safety risks (Hallström et al., 2014; Nijdam et al., 2012; Defra, 2013a). As a result, increasing attention is being placed on understanding the benefits associated with diets based less on meat and more on plant protein to allow the development of effective meat-reduction or meat-substitution policies and strategies (Hallström et al., 2014; de Boer et al., 2014).

To develop effective interventions and policies however, there is a need for researchers to better understand the factors that encourage consumers to eat less meat and investigate the role that meat substitute products can play in reducing meat consumption. As specific consumer groups may have different preferences regarding meat and meat substitute products (Hoek et al., 2011; Nocella et al., 2012; de Jonge and van Trijp, 2014), identifying segments of consumers with preferences for different meat or meat substitute attributes will also contribute to existing knowledge. Therefore, in order to address gaps in existing literature and answer calls for further research in this area (e.g. Schösler et al., 2012; Vanhonacker et al., 2013) an objective of this paper is to identify the attributes of meat and meat substitutes that influence consumer choices. In addition, we aim to elicit consumer preferences for these attributes and identify segments of consumers based on these preferences in the interest of establishing ways to reduce meat consumption through substitution. Drawing on McFadden's (1973) Random Utility Theory, we use labels to communicate information on specific attributes of meat and meat substitutes and develop a choice experiment to measure consumer preferences and segment consumers. Our results will provide valuable insights for policymakers, businesses and practitioners seeking to more accurately understand the factors that may hinder or encourage a dietary transition and therefore enable the development of more effective policies and strategies for reducing high levels of meat consumption (Tucker, 2014; Schösler et al., 2012). Ground meat, which in the UK is called mince, is the focus of this study as it is one of the most frequently consumed meat products due to its relatively low price and because it comes in a variety of different types, including meat free mince substitutes (de Boer et al., 2014; Mintel, 2013a). According to EBLEX (2013), the main organisation for the English beef and sheep industry, mince is the most commonly purchased type of beef accounting for 37% of the retail expenditure for beef (over £750 million). Additionally, Keynote (2013) reports that turkey mince was one of the drivers of the increase of turkey consumption, while meat free mince is one of the most successful products in the meat substitute market (Mintel, 2013a).

Our paper is structured as follows. In the next section we review the recent literature around meat consumption, the concept of meat substitution and the significance of food policy to encourage more sustainable meat consumption patterns. Next, we describe the choice experiment setting in detail including the attribute selection, choice design and the modelling approach followed in the analysis. In the next section we present the results of the analysis before discussing our findings and their policy implications. Finally, in our concluding section we describe this study's limitations and identify areas for further research.

2. Literature review

Western diets are characterised by a high intake of animal products that is above dietary recommendations (Westhoek et al., 2014). Several countries, including Germany (German Council for Sustainable Development, 2013), Netherlands (Health Council of the Netherlands, 2011) and the USA (U.S. Department of Agriculture, 2015), have reported high levels of meat consumption and the need for moderating meat in consumer diets to substantially reduce the global pressure on public health, the environment and society. In the UK, the Department of Health (2011) reports that meat consumption will need to drop by approximately 70% from an average 226 g/day for men and 163 g/day for women today, to about 70 g per person/day to reach healthy levels (Westland and Crawley, 2012).

Reducing the quantity of meat consumed in the average Western diet however, may require a profound societal transition because meat holds a special status in many societies (deFrance, 2009), is one of the most popular food products in many countries (Vanhonacker et al., 2013) and is generally perceived as healthy food (Verbeke et al., 2010). Therefore, wholesale changes in consumer diets may not be easily achieved in the short term due to tradition, cultural values and hedonistic lifestyles (de Bakker and Dagevos, 2012). Many consumers remain unwilling to reduce their meat consumption, although they are aware of several meat related concerns (Tucker, 2014; Schösler et al., 2014). Asking consumers to eat less meat may also result in a resistance to change and cause confusion regarding the products they could substitute meat with (de Boer et al., 2014). In addition, meat producers, processers and other stakeholders are likely to develop counter-strategies to resist changes that favour meat consumption reduction (Foresight, 2011).

In the extant literature, suggested meat reducing interventions include the promotion of one or more meatless days, encouraging consumers to reduce the portions of meat in meals, supporting and furthering replacement of meat with meat free (or partly meat free/hybrid) substitutes and encouraging cultural and lifestyle changes to influence consumption practices (de Boer et al., 2014; Laestadius et al., 2014; Sutton and Dibb, 2013; de Bakker and Dagevos, 2012). From a policy perspective, although there are different regulatory options to promote these changes and encourage sustainable meat consumption, according to Spiller and Nitzko (2015), measures to influence consumer decisions can be divided into three general categories: *consumer education, financial incentives and regulatory mechanisms*. Studies suggest that exploring different strategies to encourage sustainable food consumption and building alliances with modern consumers that take into consideration social diversity can be a useful step forward for the sustainability agenda (Spiller and Nitzko, 2015; Dagevos and Voordouw, 2013).

Food labelling is one of the recommended approaches to encourage consumers to move to more sustainable meat consumption patterns (Spiller and Nitzko, 2015). The UK is considered a European front-runner for promoting nutrition labelling on food and especially front-of-pack signposting (Draper et al., 2013; Grunert et al., 2010). The understanding and use of labels such as Guideline Daily Amounts (GDA), traffic light labels and other nutrition related logos is higher for UK consumers, than residents of other European countries such as Sweden, Germany or France (Van Kleef and Dagevos, 2015; Grunert et al., 2010). In their recent review of literature on nutritional labelling however, Van Kleef and Dagevos (2015) report that to date, researchers have focused mainly on the issue of understanding food labels and less on if these labels will actually lead to changes in food consumption. In addition to nutrition labels, other food labels have been recommended as effective ways to communicate the production related characteristics of meat and meat substitutes, including production method, environmental impact, origin and type of product (de Jonge et al., 2015; Van Loo et al., 2014; Koistinen et al., 2013; Hoek et al., 2011).