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## The effect of fat content on visual attention and choice of red meat and differences across gender



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### ABSTRACT

In this paper we study the effect of fat content on visual attention and choice of red meat, as well as differences across gender. In an eye-tracking study, conducted with 105 Portuguese meat consumers, we find that fat content has an impact on visual attention, choice reaction time and choice of red meat products. Consumers pay more attention and choose more often meat products with lower fat content. This impact is further gender specific, with female consumers paying more attention and requiring less time to choose meat products with lower fat content. In contrast, male consumers pay more attention to red meat products with higher fat content, but spend more time to choose red meat products with lower fat content. We discuss managerial and theoretical implications in relation to marketing of red meat products.

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### 1. Introduction

Previous research on consumer decision-making with regard to red meat has shown that the amount and type of visual fat is a major factor in consumer choice (Banović, Fontes, Barreira, & Grunert, 2012; Banović, Grunert, Barreira, & Fontes, 2009, 2010; Brunso, Bredahl, Grunert, & Scholderer, 2005; Grunert, 1997, 2006; Grunert, Bredahl, & Brunso, 2004). While these studies measure consumer response to fat content of red meat, it is not clear whether the impact of fat content on choice is due to consumers paying more attention to a meat product depending on the level and type of fat. Previous research has also shown that consumer preferences and perceptions toward fat content in red meat products depend on certain factors, such as product familiarity (Banović et al., 2012; Bredahl, 2004), health concerns (Van Wezemael, Verbeke, de Barcellos, Scholderer, & Perez-Cueto, 2010), sensory appeal (Brunso et al., 2005; Grunert, 1997), as well as demographics, such as age (Quagraine, Unterschlutz, & Veeman, 1998; Russell & Cox, 2004) and gender (Kiefer, Rathmann, & Kunze, 2005; Kubberød, Ueland, Rødbotten, Westad, & Risvik, 2002; Ueland, 2007; Wardle et al., 2004). Among these factors gender has been

found to have a significant effect on visual attention and choice (Bayliss, Pellegrino, & Tipper, 2005; Feng, Spence, & Pratt, 2007; Shen & Itti, 2012). It is therefore interesting to see whether male and female consumers differ in their visual attention to fat content, and if this difference explains variation in their choices.

Consumer visual attention and choice is further influenced by top-down processes (Pieters & Warlop, 1999; Wedel & Pieters, 2008) and may vary depending on consumers' goals, such as health or taste (Bialkova & van Trijp, 2010, 2011). Therefore, if during a choice task a goal is not specified, there is a risk of increasing variation in consumers' visual attention patterns and choices, depending on which goal was more salient to them (e.g. health or taste). Previous studies have shown that health is a major drive behind consumer perceptions of fat content in red meat products (Banović et al., 2009; Brunso et al., 2005; Grunert, 1997). In addition, product evaluations strongly depend on the compatibility between product attributes and choice task (Chernev, 2004; Nowlis & Simonson, 1997). Therefore, in order to minimize variation in consumer visual patterns that could occur due to the varying background goals, we have decided to specify the choice task to a health choice task.

In this paper we study the impact of fat content on consumer visual attention and choice of red meat products. We further investigate if this impact differs between male and female consumers.

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Our objective is to identify if male and female consumers differ in their visual attention when exposed to red meat products with varying fat content and how visual attention subsequently influences their choice. Our study has several contributions. First, we provide insight in the role of visual attention on the effect of red meat visual characteristics. Second, we provide support for the relationship between visual attention and choice of red meat products, taking into account gender differences. Third, we give future research directions for studies related to food choice and gender differences, and demonstrate the potential contribution of eye-tracking studies in marketing of red meat products.

## 2. Theoretical background

Visual search and attention play a vital role in perception and product choice (Wedel & Pieters, 2008). In relation to food product choice, only few studies take into account visual search and attention (Bialkova et al., 2014; Bialkova & van Trijp, 2010, 2011; Graham, Orquin, & Visschers, 2012), while hardly any study has been conducted with focus on visual attention and choice of meat in general or red meat in particular. Previous research on meat and red meat products points out that consumer perception is affected by its visual characteristics, such as fat content (Banović et al., 2009, 2010; Grunert, 1997; Grunert et al., 2004). In addition, it has been shown that choice reaction time decreases over repeated representations of stimuli (Banović, Rosa, & Gamito, 2014; Hidalgo-Sotelo, Oliva, & Torralba, 2005), which may be due to increased familiarity (Banović et al., 2012; Bredahl, 2004).

Significant gender differences have been found in visual attention, reaction time and frequency of choice (Bayliss et al., 2005; Coley & Burgess, 2003; Ellis, 2011; Shen & Itti, 2012), where female consumers outperform male consumers in recognizing stimuli faster and making frequent spontaneous purchases. It has also been shown that male and female consumers differ in their perceptions and preferences of red meat products (Kähkönen & Tuorila, 1999; Rozin, Hormes, Faith, & Wansink, 2012). For example, previous studies demonstrate that, compared to female consumers, male consumers prefer red meat with a strong and rich taste, high colour intensity and chewier texture (Kubberød, Ueland, Rødbotten, et al., 2002; Kubberød, Ueland, Tronstad, & Risvik, 2002). An explanation behind these differences is that female consumers have more negative attitudes toward consumption of red meat (Kubberød, Ueland, Tronstad et al., 2002; Rozin, Bauer, & Catanese, 2003), such as being fatty and less healthful (Wardle et al., 2004). Another explanation is that female consumers are more concerned with following a healthy diet, and thus avoid red meat products or prefer white meat products (Kiefer et al., 2005; Kubberød, Ueland, Rødbotten, et al., 2002).

With the present research we seek to gain a better understanding of consumers' visual attention and choice with regard to red meat products. Using a bottom-up approach, we investigate how consumers react to different levels of fat content (measured through fat marbling, fat rim and their combination), in terms of their visual attention (measured by the fixation count) and their product choices (measured by the choice reaction time and product choice), as well as how fat content interacts with visual attention to determine product choice. We finally introduce gender as a moderating variable to account for differences in the above described relationships between male and female consumers. We provide a graphical conceptual representation in Fig. 1.

### 2.1. Research hypotheses

Earlier research shows that consumers spend more time looking at products that are about to be chosen (Pieters & Warlop, 1999;

Wedel & Pieters, 2008), whereas repeated stimulus presentation decreases choice reaction time (Hidalgo-Sotelo et al., 2005). Among the drivers of visual attention and choice are the visual characteristics of the product (Bialkova et al., 2014). Consequently, consumer attention to red meat products depends on its visual characteristics, such as fat content, which consequently may impact their choice. In fact, fat content has been shown to influence consumer perceptions of meat quality and purchase intention (Banović et al., 2009), with consumers preferring red meat products with lower fat content (Grunert, 1997). Familiarity with red meat products and repeated exposure decreases both visual attention and choice reaction time (Banović et al., 2012; Hidalgo-Sotelo et al., 2005). We therefore assume that red meat products that vary in fat content will produce different patterns in visual attention and product choice. Therefore:

- $H_{1a}$ : Consumers pay more attention to red meat products with lower fat content;
- $H_{1b}$ : Consumers choose more often red meat products with lower fat content;
- $H_{1c}$ : Consumers choose red meat products with lower fat content faster.

In a diverse set of experimental paradigms on visual attention, males and females perform differently (Ellis, 2011; Fairweather, 1976; Halpern, 2013). Females perform better in memory tasks involving object recognition (Yonker, Eriksson, Nilsson, & Herlitz, 2003). Females show lower fixation counts, whereas males tend to scan more visual space (Bayliss et al., 2005). Given that gender differences regarding visual search and attention exist, we expect that female consumers will have lower reaction times in making their product choice compared to male consumers (Shen & Itti, 2012).

Given that consumer perceptions of and preferences for red meat products differ across gender (Kähkönen & Tuorila, 1999; Rozin et al., 2012), we hypothesize that female consumers will pay more attention and choose red meat products with lower fat content. Therefore:

- $H_{2a}$ : Female consumers pay more attention to red meat products with lower fat content compared to male consumers;
- $H_{2b}$ : Female consumers choose more often red meat products with lower fat content compared to male consumers;
- $H_{2c}$ : Female consumers choose red meat products with lower fat content faster compared to male consumers.

Visual attention has an impact on consumer choice, with products that are noticed more often having a higher probability to be chosen (Banović et al., 2014; Wedel & Pieters, 2008). Thus, fat content will impact consumer choice of red meat products only when fat content is noticed. Moreover, fat content that drives more consumer visual attention will have a greater impact on consumer choice and this will be more evident among female consumers (Kiefer et al., 2005). Therefore:

- $H_{3a}$ : The impact of fat content of red meat products on frequency of choice is higher (vs. lower), when attention to these products is higher (vs. lower);
- $H_{3b}$ : The impact of fat content of red meat products on choice reaction time is higher (vs. lower), when attention to these products is higher (vs. lower);
- $H_{4a}$ : The impact of fat content of red meat products on frequency of choice is higher (vs. lower) among female consumers (as compared to male consumers), when attention to these products is higher (vs. lower);

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