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## This apple is too ugly for me! Consumer preferences for suboptimal food products in the supermarket and at home



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### ABSTRACT

Food waste has received increasing scientific and societal attention during the last decade. One important cause of food waste is thought to be the un-willingness of supply chains and consumers to sell, purchase, and consume suboptimal or imperfect foods. Yet, empirical research on this issue is scarce and contradictory. The current research investigates under which conditions consumers purchase or consume foods that deviate from regular products in terms of appearance standards, date labelling, or damaged packaging, without deviation on the intrinsic quality or safety. An online choice experiment among 4214 consumers from five Northern European countries reveals that consumer preferences for suboptimal products differ depending on whether the consumer is in a supermarket or at home, and depending on the type of sub-optimality. Moreover, consumer choices, discount preferences, and waste behaviors of suboptimal products are influenced by demographics (nationality, age), by personality characteristics (value orientation, commitment to environmental sustainability, and perceived consumer effectiveness in saving the environment), and by individual-waste aspects (perceived food waste of the household, perceived importance of food waste, engaging in shopping/cooking). These findings provide important insights into consumer preferences for suboptimal products, and useful suggestions for supply-chain regulations on suboptimal products.

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### 1. Introduction

The last couple of years, more and more attention has been given to the issue of food waste. Numerous articles have provided numbers on the amount of food that is being wasted along the food supply chain and in consumer households (Brautigam, Jorissen, & Priefer, 2014; Buzby & Hyman, 2012; Quested, Parry, Easteal, & Swannell, 2011), indicating that about one third to one half of all produced food is wasted (Parfitt, Marthel, & MacNaughton, 2010). As the production of food is assessed to cause approximately a third of all greenhouse gas emissions (Garnett, 2011), and requires extensive use of water, energy, land, and other natural

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resources (FAO, 2013; Godfray et al., 2010), it is inefficient to waste foods. Unfortunately, there are even some indications that household food waste is increasing over time (Kretschmer et al., 2013). Policy makers, supply chain actors, and consumers have set up non-governmental organizations, developed campaigns, and changed laws trying to reduce the amount of food waste (Aschemann-Witzel, De Hooge, & Normann, 2016a; Fuchs & Glaab, 2011; FUSIONS, 2013; Halloran, Clement, Kornum, Bucatariu, & Magid, 2014; Quested, Marsh, Stunell, & Parry, 2013; Sieber & Dominguez, 2011). In addition, scholars from different disciplines have tried to unravel which factors cause supply chain actors and especially consumers to waste food (Aschemann-Witzel, De Hooge, Amani, Bech-Larsen, & Oostindjer, 2015; Evans, 2012; FUSIONS, 2013; Quested et al., 2013).

One significant source of food waste at retailers and in households seems to be the un-willingness to sell, purchase, or consume

suboptimal or imperfect foods (Aschemann-Witzel et al., 2015; Buzby & Hyman, 2012; Buzby, Hyman, Stewart, & Wells, 2011). There are multiple indications that consumers waste foods at home because the food has passed the best-before date (Newsome et al., 2014; WRAP, 2014a, 2014b). Also, international trade regulations and retailers have developed product specifications (i.e., rules concerning the appearance, weight, shape, and size of products) (Gobel, Langen, Blumenthal, Teitscheid, & Ritter, 2015; Halloran et al., 2014), on the basis of which supply chains waste foods that do not fulfil these product specifications, because it is assumed that consumers do not wish to buy and consume such suboptimal products (Buzby et al., 2011; Gobel et al., 2015; Gustavsson & Stage, 2011; Lebersorger & Schneider, 2014; Loebnitz, Schuitema, & Grunert, 2014).

Yet, it is currently unclear which factors explain consumers' (non-)preference for suboptimal products. The current research addresses this question by studying consumer preferences for different types of suboptimal food products in the supermarket and at home. With an online choice experiment among 4214 consumers from five Northern European countries, we reveal consumer choices for suboptimal food products in terms of appearance, best-before date, and packaging damage in supermarkets and at homes. Moreover, we study consumers' demand for discounts to buy suboptimal food products at supermarkets, and consumers' likelihood of wasting suboptimal food products at home. Finally, we demonstrate the importance of demographics (e.g., nationality, age, gender, household composition, education, income), of personality characteristics (value orientation, commitment to environmental sustainability, and perceived consumer effectiveness in saving the environment), and of individual-waste aspects (food-waste awareness, perceived household food waste, perceived food waste importance) in consumer preferences for suboptimal food products. Collectively, these findings provide some new and essential insights into consumer preferences for the purchase and consumption of suboptimal products, and can aid supply chains and policy makers to reduce waste of suboptimal foods, therewith reducing inefficient use of resources.

### 1.1. Suboptimal products at supermarkets and in homes

Suboptimal or imperfect foods are products that deviate from normal or optimal products 1) on the basis of appearance standards (in terms of e.g. weight, shape, or size) (Bunn, Feenstra, Lynch, & Sommer, 1990), 2) on the basis of their date labelling (e.g., close to or beyond the best-before date), or 3) on the basis of their packaging (e.g., a torn wrapper, a dented can) (White, Lin, Dahl, & Ritchie, 2016), without deviation on the intrinsic quality or safety (Aschemann-Witzel et al., 2015; Gobel et al., 2015; Halloran et al., 2014). Empirical research on consumer preferences for suboptimal products is scarce, and only a handful of existing studies provide some insights into whether consumers are willing to purchase suboptimal products in supermarkets, and whether they are willing to consume suboptimal products at home.

Concerning the purchase of suboptimal products in supermarkets, three studies found that consumers were only willing to purchase fruits that were suboptimal in terms of appearance when the optimal fruits were sprayed with pesticides (Bunn et al., 1990), or when the deviation from the product specifications was only moderate (compared to extreme) (Loebnitz & Grunert, 2015; Loebnitz et al., 2014). Research on damaged packaging extends this work by demonstrating that consumers under high cognitive load (i.e., consumers who were mentally preoccupied with other tasks) perceived superficial packaging damages (e.g., a torn wrapper, a dented can) as a source of potential contamination and of health and safety risks (White et al., 2016). Consequently, consumers under high cognitive load showed a less positive attitude towards

and a lower intention to purchase foods with superficial packaging damage. Also, in one study, the majority of consumers (62%) indicated to buy foods with the longest remaining shelf lives (Newsome et al., 2014), suggesting that consumers avoid the purchase of foods that are suboptimal in terms of being close to the best-before date. Further indirect support for the idea that consumers are less positive about foods with superficial packaging damage or foods close to the best-before date, comes from food loss research at supermarkets. Non-perishable food products such as pasta, canned vegetables, or cereals, have been found to mostly get discarded because of "crushed, dented, or otherwise damaged packaging, and expired shelf dates" (Kantor, Lipton, Manchester, & Oliveira, 1997, p. 5). There are some suggestions that consumers would need price discounts before they would be willing to buy such suboptimal products (Vergheze, Lewis, Lockrey, & Williams, 2013), where willingness-to-pay decreases with the extent of the remaining shelf-life (Tsiros & Heilman, 2005). Literature also suggests that there can be an interaction between price discounts and perception of quality of the product (Theotokis, Pramataris, & Tsiros, 2012). Together, these findings seem to suggest that consumers will not be motivated to buy suboptimal foods (in terms of appearance, date labelling, or damaged packaging) in supermarkets.

Yet, there are also some indirect suggestions that consumers would be willing to purchase suboptimal foods in supermarkets. Marketing campaigns of supermarkets that provided a limited supply (in terms of days of the campaign, supply, or ways to buy) of suboptimal fruits and vegetables (e.g., the "Inglorious fruits and vegetables" from the French retailer Intermarché, the "Buitenbeentjes" from the Dutch retailer Albert Heijn) appeared to be successful (Aschemann-Witzel, De Hooge, Almlí & Oostindjer, 2016b). Similarly, multiple European retailers offer products that are close to the best-before date at a lower price, and such actions attract consumers (Aschemann-Witzel et al., 2015). Consumers might thus be more motivated to purchase suboptimal products than existing research suggests. We propose that this discrepancy may depend on the type of product sub-optimality. That is, consumers may have different preferences for products that are suboptimal on the basis of appearance (e.g. a bent cucumber, an apple with a spot), date labelling (e.g. dairy close to the best-before date), or on the basis of packaging damage (e.g., a dented carton).

Concerning the consumption of suboptimal foods at home, consumers have been shown to dislike not using products up to their full utility, and therefore are motivated to avoid wasting products that they possess (Bolton & Alba, 2012). This implies that, once consumers own a suboptimal product, they would prefer consuming the product (independent of the type of sub-optimality) to wasting it. On the contrary, the research on superficial damaged packaging in supermarkets demonstrates that damaged packaging can function as a source of perceived potential contamination and of perceived health and safety risks (White et al., 2016). As such perceptions would also play a role in the consumption of foods at home, this research would suggest that consumers are less likely to consume foods with suboptimal packaging at home.

In sum, there are few, and contradictory, empirical findings on the question whether consumers are motivated to buy and consume suboptimal products. It seems likely that consumers will act differently towards suboptimal products when they need to make a purchase decision in a supermarket compared to when they need to make a consumption decision at home (also suggested in previous focus group interviews, see Almlí et al., 2016). Indeed, there are multiple differences in consumer decisions concerning suboptimal foods in supermarkets compared to at homes: in supermarkets, consumers still can select the products, whereas at home the food is already bought. Moreover, consumers might experience different degrees of personal responsibility for the sub-optimality

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