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Consumer attitudes towards enhanced flavonoid content in fruit

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ABSTRACT

Flavonoids from fruit and vegetables are currently widely studied as components that have the potential to provide multiple health benefits. In this study consumer perceptions of flavonoids were examined. The data ($N = 130$) were collected in focus group discussions in Finland, The Netherlands and France. In general, the term 'flavonoid' was unfamiliar. After receiving information about the possible health benefits, positive attitudes towards flavonoids were expressed. Relevant issues for the acceptance of flavonoids were the natural occurrence and the health benefits associated with common diseases. However, the need to enhance flavonoid content was questioned since fruit and vegetables were perceived to be already healthy with the natural flavonoid content; additionally, consumers had perceptions of risk and uncertainty associated with breeding and processing methods. Familiar processing methods were said to be most acceptable for enhancing flavonoid content. Consumer knowledge on the health effects of flavonoids is limited, and thus there is a need to inform consumers about them. The challenge in informing consumers about the benefits of flavonoids is to maintain the natural image of fruit-based products.

1. Introduction

The health benefits associated with the consumption of fruit and vegetables have been partly attributed to their flavonoid content. Epidemiological and clinical studies have provided evidence of a potential role for flavonoids in the lowering the risks of cardiovascular disease, coronary heart disease, neurodegenerative diseases, osteoporosis and lung cancer (for reviews, see Arts & Hollman, 2005; Scalbert, Manach, Morand, Rémésy, & Jiménez, 2005). One possible explanation for these beneficial effects of flavonoids is their antioxidative activity.

Although often spoken of as a single term, flavonoids are a group of polyphenolic compounds naturally present in plants. They constitute most of the yellow, red and blue colors in fruit (Lewis, 2002). The more than 5000 flavonoid compounds currently characterized can be classified into several subgroups according to their chemical structure. Flavonoids are present in most edible fruit and vegetables, but different types of flavonoids are obtained from different dietary sources (Erlund, 2004). The role of these different flavonoid compounds in promoting health is under research (for reviews, see Arts & Hollman, 2005; Scalbert et al., 2005). The central question is whether increasing the amount of flavonoids in fruit and vegetable products would provide additional health benefits if compared with an increased use of fruit and vegetables as such. With enhanced flavonoid content the health benefits could be reached with a lower fruit and vegetable intake, and thus be easily attained without a need for any major changes in eating habits.

To enhance the flavonoid content in fruit, different methods can be used. The flavonoid content of fruit can be optimized by breeding and growing plants that contain more flavonoids than other currently used varieties. Alternatively, the loss of flavonoids during processing can be reduced using different processing and storage methods that favor flavonoids in the end product. In addition to the aforementioned methods, flavonoids from external sources can be added to products.

In the EU, products that provide health-related benefits beyond basic nutrition are allowed to make specific health claims that need to be accepted beforehand (Regulation (EC) No. 1924/2006). The scientific evidence behind these claims is assessed by European Food Safety Authority (EFSA). Whether products are allowed to carry health claims based on flavonoid content still remains open, but enhanced flavonoid content may be expressed as a nutrient claim (Regulation (EC) No. 1924/2006). Consumer response to these possible claims depends on several factors. Both claim and product characteristics, like the benefit and familiarity of the functional ingredient and healthiness of the carrier product (van Kleef, van Trijp, & Luning, 2005; van Trijp & van der Lans, 2007), as well as the consumers' individual characteristics, like attitudes, motivation and health status (Urala & Lähteenmäki, 2007; van Kleef et al., 2005), are important.

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Flavonoids are relatively new concepts in food and therefore likely to be unfamiliar to consumers (Bech-Larsen, Grunert, & Poulsen, 2001). Furthermore, enhancing flavonoid content may require novel processing or production methods. Novelty in food is perceived as a potential risk by consumers, partly because we do not know what new products taste like (Pliner & Hobden, 1992) or we are suspicious about their origin (Cox, Koster, & Russell, 2004; Frewer et al., 2004). One challenge for the acceptability of products with enhanced flavonoid content is to make the concept familiar to consumers. In order to achieve this, we need to know what possible suspicions and worries consumers have related to improving the healthiness of fruit and vegetables that already are perceived as healthy foods, the use of which is promoted in a number of public health campaigns across the developed world (Ammerman, Lindquist, Lohr, & Hersey, 2002; Knai, Pomerleau, Lock, & McKee, 2006).

Even though we know little about how consumers perceive flavonoids in foods, consumer responses to health claims, or so-called functional foods that promise specific health effects, have been studied in other contexts. Reasons for choosing products with health claims depend on the product category and other attributes that are relevant within that product category (De Jong, Ocké, Branderhorst, & Friele, 2003; Urala & Lähteenmäki, 2003; Verbeke, 2005). Personal relevance of the promised benefit is a significant promoter of the intention to purchase (de Jong et al., 2003; Verbeke, 2005). In Finland the rewarding feeling of taking care of one's own health was important for the willingness to use functional foods (Urala & Lähteenmäki, 2004, 2007). There appear to be wide cultural differences in the perception of products with health claims (e.g. Bech-Larsen & Grunert, 2003; van Trijp & van der Lans, 2007), although in some studies only minor discrepancies have been found (Lyly, Roininen, Honkapää, Poutanen, & Lähteenmäki, 2007).

The new legislation will allow health claims in all EU countries (Regulation (EC) No. 1924/2006), but in some countries products with health claims are more familiar because they have been in the market for a while. The consumer study was carried out in three countries that vary in market maturity in their experiences on functional food products. Among these countries the markets are the most mature in Finland and the least mature in France. For example, functional probiotic lactic acid bacteria containing dairy products, which typically are among the first functional foods to appear in market, were launched in 1990 in Finland, in 1994 in The Netherlands and in 2000 in France (Heasman & Mellentin, 2001; Yakult Europe, 2008). Conducting the same study in these countries gives a perspective on the cultural similarity or diversity of consumer thinking.

The objective was to study how consumers perceive flavonoids as specific naturally occurring health promoting compounds in fruit and vegetables and the acceptability of enhancing the flavonoid content by different methods. Since flavonoids are likely to be relatively unfamiliar to consumers, the information required and the most appropriate products to enhance flavonoid content were discussed as more specific topics. Apples, strawberries and grapes were selected as concrete examples for the focus groups as these fruits are known to contain ample amounts of flavonoids (see for example, Häkkinen & Törrönen, 2000; MacLean, Murr, Dell, & Horvath, 2006; Masa, Vilanova, & Pomar, 2007).

2. Materials and methods

2.1. Participants

Eighteen focus group discussions were conducted in Finland, The Netherlands and France. According to former research, general health orientation varies systematically as a function of age and gender (Oakes, 2003; Roininen et al., 2001; Verbeke, 2005). Middle-aged and elderly women tend to be more health oriented than men and younger consumers. To elicit the perspectives of different types of consumers, participants ($N = 130$) were divided into groups according to gender, age and a perceived risk of CVD, as shown in Table 1. The type of focus groups as described in Table 1, for example "younger", is used as identification in the citations. Health and nutrition professionals, as well as people suffering from serious food allergies, were excluded from the study.

2.2. Focus groups

Since consumers are rarely aware of flavonoids in fruit and vegetables or new processing and production methods, focus group discussions were chosen as the method to study consumer perceptions. This method allows consumers to express issues they do not understand or which raise questions (Krueger & Casey, 2000; Morgan, 1998). Focus group discussions can efficiently raise possible suspicions and queries people have related to new issues, and are therefore suitable for finding the possible barriers in the acceptance of new functional ingredients and technologies.

Table 1
Focus group participants (FIN = Finland, NL = The Netherlands, FR = France, W = women, M = men, CVD = cardiovascular disease)

	Country	Type of focus group	Gender	*N*	Mean age, years (range)	Mean of perceived risk of CVD (range)
1	FIN	Younger	W	6	32 (27–36)	3.0 (1–4)
2	FIN	Younger	M	5	34 (27–39)	2.8 (1–4)
3	FIN	Older, low-risk	W	6	48 (40–57)	3.8 (3–4)
4	FIN	Older, low-risk	M	7	48 (40–63)	3.7 (3–4)
5	FIN	Older, high-risk	W	6	58 (50–65)	6.3 (6–7)
6	FIN	Older, high-risk	M	6	51 (41–56)	6.3 (5–7)[a]
1	NL	Younger	W	8	32 (24–37)	3.1 (2–5)
2	NL	Younger	M	8	30 (22–39)	3.3 (2–4)
3	NL	Older, low-risk	W	8	51 (41–60)	3.5 (1–4)
4	NL	Older, low-risk	M	8	51 (43–59)	2.4 (1–4)
5	NL	Older, high-risk	W	8	48 (40–58)	5.0 (5)
6	NL	Older, high-risk	M	8	51 (43–60)	5.4 (5–6)
1	FR	Younger	W	8	33 (19–40)	2.6 (2–4)
2	FR	Younger	M	9	33 (19–39)	2.6 (1–4)
3	FR	Older, low-risk	W	7	56 (48–39)	3.3 (2–4)
4	FR	Older, low-risk	M	8	63 (50–74)	2.9 (2–4)
5	FR	Older, high-risk	W	7	51 (42–64)	5.6 (5–7)
6	FR	Older, high-risk	M	7	61 (55–71)	5.6 (5–7)

[a] One of the participants was diagnosed with CVD.