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The influence of information and beliefs about technology on the acceptance of novel food technologies: A conjoint study of farmed prawn concepts

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Abstract

Consumers appear to be cautious about accepting novel technologies applied to foods because of perceived risks and lack of benefits. Text descriptions of novel technologies were tested at four locations around Australia on 453 prawn consumers. Half of the participants (Information treatment group) received additional information about the technologies. A conjoint study was undertaken with additional responses to questions on perceived risks, benefits, need, unnaturalness and safety of the technologies (beliefs). Recognition of the additional information was tested by an open question at the end of the task.

Information treatment did not influence responses. Participants were segmented by the sum of their beliefs. Those (mostly male), classified with strong positive beliefs (15%), placed on average, less importance upon technology but an equal amount on cost and size of the product concepts. For those (mostly female), classified with strong negative beliefs (17%), technology was of greater average importance, with a greater range of (dis)utilities across the technologies. All participants favoured regular prawns to those treated with novel technologies although one technology (Triploidy) did receive relatively positive utilities possibly related to information that triploidy is sometimes "found in nature" and results in larger prawns. Generally, addressing "information deficit" did not overcome aversion to novel technologies applied to food concepts.

Keywords: Novel; Irradiation; Triploidy; Electron beam; Acceptance; Prawns; Environment; Risk

1. Introduction

A recent review (van Kleef, van Trijp, & Luning, 2005) highlighted the challenges to new product development (NPD) and the increasing recognition for a need to incorporate the "voice of the consumer" prior to expensive development and product launch (daCosta, Deliza, Rosenthal, Hedderley, & Frewer, 2000). New product development is rarely focused on wholly new products (van Kleef et al., 2005). Rather, new product development more commonly focuses on incremental changes to existing products, including the application of novel processing technologies to traditional foods. Whilst it may not be always mandatory to disclose processing technologies, the unprecedented access to information (e.g. the internet, mass media) that consumers and consumer pressure groups currently have suggest that it may be wise to test acceptance of technologies rather than risk a negative backlash when such information is "discovered" (Evans & Cox, 2006).

Whilst technology has emerged in response to problems identified by scientists and consumers alike, it is well documented that consumers are increasingly wary of new technologies because of the perceived risks (Duffy, Fearne, & Healey, 2005; Frewer, Howard, Hedderley, & Shepherd,

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1997; Mucci & Hough, 2003; Slovic, 1987) and a perceived lack of consumer benefits. Furthermore, consumers fear that new technologies applied to food have "unknown consequences" and risks that cannot be estimated without long term testing or experience (Mireaux, Cox, Cotton, & Evans, in press). Recent US research has highlighted the perceived importance and preference for "natural" products (Rozin, 2005; Rozin et al., 2004). Such preferences were found to be primarily related to ideational reasons and to a lesser extent, instrumental reasons and associations. The latter may be related to extensive media reporting of negative incidents including food scares where technology has "gone wrong" (Belton, 2001) and a "natural backlash" would seem to be apparent where consumers reject "interference" (Mireaux et al., in press) or "contagion" (Rozin, 2005). However "interference" is commonly used in many established food processing technologies (for example, pasteurisation) suggesting that there is poor understanding of food technologies. Furthermore, many consumers are suspicious of the motives for the introduction of a novel technology, or, simply fail to recognise that food processing technology provides benefits (for example, pasteurisation provides microbiological safety, shelf life and convenience), preferring an "ideal" or "natural" product. For example, pasteurisation was viewed with suspicion when first introduced (Davis, 1955; Rosenau, 1913). Consumers thought that the technology would allow producers to be unhygienic and that the quality of milk would be diminished. Widespread acceptance of pasteurisation took several decades before it became the established "norm" it is today. Nevertheless there are minorities of consumers that still reject pasteurisation. Certain groups of consumers, for example, consumers of organic foods (Magnusson, Arvola, Koivisto Hursti, Åberg, & Sjödèn, 2003) or unprocessed products translate their beliefs and attitudes into behaviour and choose only "natural" products. However other consumers who hold similar beliefs and attitudes may not in practice make the same behavioural choices, but rather may make their choice based on other factors such as "price" and "convenience" (Steptoe, Pollard, & Wardle, 1995) in contrast to "natural content".

The challenge to product developers becomes even greater when there is little understanding by consumers of agriculture or aquaculture and the gap between cultivation or breeding technologies and the final food products (Duffy et al., 2005).

Furthermore, when benefits of technology are focused upon indirect (e.g. environmental) or future benefits and not the immediate direct consumer benefits, the challenge to communicate the value of the technology becomes even greater. Indeed there is evidence from Europe (Grunert, Bech-Larsen, Lahteenmaki, Ueland, & Astrom, 2004; Scholderer & Frewer, 2003) and one suggestive study from Australia (Wilson, Evans, Leppard, & Syrette, 2004) on attitudes towards genetic modification (GM) that simply addressing the "information deficit" does little to assuage fears and may indeed accentuate existing (negative) attitudes (an attitude activation effect). However, it is not known whether the redundancy of the information deficit model applies to other (generally unknown) novel technologies, such as those investigated in the current study.

2. Hypotheses

Based on the previous findings discussed above, the null hypothesis tested in this study was that there would be no greater acceptance of novel technologies if information was provided describing one of the problems the technology would impact.

It was recognised that individual consumers may have different beliefs (antecedents of attitudes) about the risks and benefits of technologies applied to the proposed products (general attitudes and values, Grunert et al., 2004). Differences in the importance and utility of product attributes would therefore exist, and these differences may relate to the individuals' predisposed beliefs about, and understanding of, different technologies.

Hypothesis 1. This hypothesis purported that provision of information explaining one of the side benefits of the technologies, specifically an environmental benefit (information treatment) would not be associated with *differential importance* attributed to technologies relative to other attributes (averaged importance and utilities).

Hypothesis 2. This hypothesis purported that consumer's beliefs about the technologies will be associated with *differential importance* (i.e. quantitative differences between the importance of attributes as determined by conjoint analysis) attributed to technologies relative to other attributes (averaged importance and utilities).

3. Aims

The aims of the current study were firstly, to identify which attributes of products (described as regular farmed prawns or prawns treated using novel technologies) consumers would perceive differently. The second aim was to see whether a treatment effect (information) would reduce the disutility of technology.

In the first stage of a two stage study, qualitative information was sought to establish the importance of product attributes, which were subsequently used as the basis for the conjoint study profiles. Conjoint analysis is an established validated method (Green and Srinivasan, 1978; 1990) that has been applied to many choice behaviours and products including the study of foods (for example, Grunert, 1997; Helgesen, Solheim, & Naes, 1998). It is particularly suited to the study of new concepts (Bech-Larsen & Grunert, 2003; van Kleef et al., 2005) including understanding consumer responses to some novel foods or novel food technologies (Bech-Larsen & Grunert, 2003; Cardello & Schutz, 2003; Frewer et al., 1997).