

Supporting Document 3

Summary of available literature on consumers and food irradiation

The Applicant provided a discussion of consumer response in part 6.7 of their Application. The following discussion draws on the literature provided by the Applicant, supplemented through a targeted literature search to identify additional relevant studies. The following electronic abstracts and databases were interrogated: SocINDEX; PsychINFO; Nutrition Abstracts and Reviews; and Food Science and Technology Abstracts. Additionally we draw on a recently published Evidence Review of Public Attitudes to Emerging Food Technologies commissioned in 2009 by the UK FSA (Lyndhurst 2009).

The literature on consumer response to food irradiation is limited, with few studies incorporating Australian or New Zealand samples. The work by Gamble et al. (2002) provides some initial work with both Australian and New Zealand samples. Australian and New Zealand studies that explore consumers' response to food technologies will sometimes include food irradiation (e.g. Cox et al. 2007); these have been included as appropriate. Additionally, FSANZ has commissioned some general studies on consumer attitudes and these may include food irradiation (e.g. TNS Social Research 2008). However the bulk of the published literature is based on US samples, with fewer studies in other countries (Bruhn 1995; International Consultative Group on Food Irradiation 1999; Lyndhurst 2009).

The literature is also limited in its focus. The majority focus on consumers' awareness and attitudes regarding food irradiation. Some will incorporate measures of intention to purchase. Few studies explore actual purchase decisions and behaviour of consumers. The bulk of published US studies focus on meat, in particular beef, as the commodity of concern, with few studies on other commodities. However, there is a growing risk perception literature regarding food technologies that are generally relevant to food irradiation (e.g. Sparks and Shepherd 1994; Frewer et al. 1996; Frewer et al. 1997; Cardello et al. 2007; Henson et al. 2007).

1.0 New food technologies and risk perception

In general consumer responses towards the irradiation of food are not dissimilar to the responses to other new food technologies, for example genetically modified foods and nanotechnology. These have been characterised as one of 'wariness, unease, uncertainty, and sometimes outright negativity' (Lyndhurst 2009). While the use of particular technologies may be new to consumers, the pattern of response is not new, as the initial public opposition to canning and pasteurisation attest (Lyndhurst 2009; Cox et al. 2007). The most recent local survey found that 60% of Australians and 68% of New Zealanders were aware of the term food irradiation (Gamble et al. 2002). Levels of acceptance are lower than levels of awareness; 48% and 22% of aware Australian and New Zealanders reported negative responses to food irradiation (Gamble et al. 2002). The types of concerns identified by Australians and New Zealanders include: exposure to radiation, reduction in nutrition and wholesomeness of foods, damage to the environment, occupational health for workers and the use of irradiation as a substitute for safe food production (Gamble et al. 2002).

The risk perception literature demonstrates the wariness of consumers to new food technologies such as food irradiation is linked to perceptions of risk associated with the technology and perceived lack of benefits accruing to the consumer (Slovic 1987; Frewer et al. 1997; Henson et al. 2007; Cox et al. 2010). Generally the factors that influence risk perceptions include the degree to which the risk is voluntary or involuntary, immediate or delayed, observable or unseen, degree to which the risk is known to science or not, and the degree of control the individual has over the risk (Slovic 1987; Frewer et al. 1997; Cardello et al. 2007; Henson et al. 2007). Food irradiation is often perceived as a high risk, low benefit technology (e.g. Sparks and Shepherd 1994; Frewer et al. 1997; Cardello et al. 2007; Henson et al. 2007). This is not unexpected given the characteristics of food irradiation where the technology may not be voluntarily chosen by the consumer, is not under their control, is unobservable and where there is a perception of uncertainty surrounding the science. Additionally benefits may not accrue directly to the consumer, but rather to others such as producers, exporters and the environment (Frewer et al. 1997; Cox et al. 2010).

2.0 Australian and New Zealand response to food irradiation

As noted above, 60% of Australians and 68% of New Zealanders were aware of the term irradiation, with the levels of acceptance being lower. Australians were significantly more likely than New Zealanders to report negative responses to irradiation (48% in Australia versus 23% in New Zealand) and significantly less likely than New Zealanders to report positive responses (19% in Australia versus 30% in New Zealand). When tested through a set of belief statements, respondents held negative beliefs about food irradiation (Gamble et al. 2002).

Gamble et al. (2002) provided respondents with information about two scenarios – one of which included the use of irradiation to remove insect pests from imported tropical fruit. Following the provision of information respondents were asked to identify their preferred treatment for insect pests on imported fruit: 45% of Australian respondents preferred irradiation, 22% preferred heat treatment and 8% fumigation. Significantly more New Zealand respondents indicated they preferred irradiation at 56%, while 12% preferred heat treatment and 8% fumigation. Sex and age differences were also observed. Those who reported they were aware of food irradiation did not respond differently to those who were not aware. Results such as these suggest that given appropriate information some Australian New Zealand consumers may select irradiated persimmons if offered the choice.

In a representative study of Australian and New Zealand consumers carried out in 2007, 13% of Australian respondents and 11% of New Zealand respondents expressed concern about the irradiation of food or food ingredients (TNS Social Research 2008). In general issues related to food poisoning, food safety, imported foods and obesity were of highest concern to consumers.

Cox et al. (2007) explored Australians' acceptance of a range of technologies to prevent inter-breeding of wild and farmed prawns, a potentially negative outcome for wild stocks of prawns. Irradiated prawns were the least acceptable to Australian consumers, despite being informed of the need to protect wild stocks from the farmed product. The benefit to the consumer, environmental protection, did not outweigh the perceived risks of the technology. The authors used an attitude to technology scale and found that those who held more negative views about technology also held the most negative views about irradiation. The link between attitude to science and technology and acceptance of food irradiation was also demonstrated in Gamble et al (2002), and is consistent with the international literature.

3.0 Impact of information on acceptance

Of those who were aware of food irradiation, 37% of Australians and 25% of New Zealanders believed it would reduce the nutritional quality of the food and 26% and 19% believed it would expose consumers to radiation (Gamble et al. 2002). The lack of understanding and knowledge about food irradiation may contribute to the negative risk perceptions that consumers hold. The provision of information for consumers to enable an informed decision regarding food irradiation may assist in rectifying the lack of knowledge.

Some experimental studies have explored the impact of information provision in the response of consumers to food irradiation. Bruhn (1986) in an early study explored the effects of an education pamphlet and posters on attitude toward food irradiation. She found the provision of information increased reported willingness to buy irradiated foods, even though they retained concerns about the technology. However in the case of consumers who were strongly opposed to food irradiation the information did not affect any change.

In a simulated supermarket study Rimal et al. (2004) found that point of purchase information on irradiation positively impacted actual purchase. Other studies similarly find that information provision about food irradiation will have an impact on consumers' acceptance (e.g. Frenzen et al. 2001; Gunes and Tekin 2006). However, just as positive information may increase acceptance among consumers, negative information may decrease acceptance by consumers (Lyndhurst 2009).



Labelling is a key point of purchase information source and mandatory labelling of irradiated foods ensures that consumers may factor this into their decision making. The voluntary use of the radura¹ symbol (left) may also be used, though it is unclear if Australian and New Zealand consumers are aware of the symbol and its meaning. While labelling may inform consumers that a particular food is irradiated, it is likely that many consumers will not be able to interpret what that means for them. He et al. (2005) report that over 30% of a US sample would consider a beef product

labelled as irradiated as a warning and would avoid the product and 21% would consider it an assurance of safety and buy it. However survey methods such as these that directly question respondents tend to report higher levels of label information use than when consumers are observed shopping (Grunert and Wills 2007).

4.0 Consumers' behaviour in response to food irradiation

Much of the research discussed has focussed on consumers' awareness and attitudes towards food irradiation. However fewer studies have sought to explore purchase behaviour of irradiated foods in a manner that resembles actual purchase situations. The study by Rimal et al. (2004) used a simulated supermarket to study both intended purchase and actual purchase behaviours of consumers with respect to irradiated beef. The study found that there were differences between the levels of intended and actual purchase of irradiated beef. For example 60% of respondents reported they intended to purchase irradiated beef, however only 22% actually purchased irradiated beef. Similarly 10% who reported they would never purchase irradiated beef subsequently did so.

¹ The **Radura** is the international symbol indicating a food product has been irradiated. The Radura is usually green and resembles a plant in circle. The top half of the circle is dashed. Graphical details and colours vary between countries.

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