



British Food Journal

Consumer views on “healthier” processed meat

Liran Christine Shan, Aine Regan, Frank J Monahan, Chenguang Li, Celine Murrin, Fiona Lalor, Patrick G. Wall, Aine McConnon,

Article information:

To cite this document:

Liran Christine Shan, Aine Regan, Frank J Monahan, Chenguang Li, Celine Murrin, Fiona Lalor, Patrick G. Wall, Aine McConnon, (2016) "Consumer views on “healthier” processed meat", British Food Journal, Vol. 118 Issue: 7, pp.1712-1730, <https://doi.org/10.1108/BFJ-11-2015-0447>

Permanent link to this document:

<https://doi.org/10.1108/BFJ-11-2015-0447>

Downloaded on: 27 August 2018, At: 08:16 (PT)

References: this document contains references to 57 other documents.

To copy this document: permissions@emeraldinsight.com

The fulltext of this document has been downloaded 856 times since 2016*

Users who downloaded this article also downloaded:

(2017), "Consumer preferences towards healthier reformulation of a range of processed meat products: A qualitative exploratory study", British Food Journal, Vol. 119 Iss 9 pp. 2013-2026 https://doi.org/10.1108/BFJ-11-2016-0557

(2016), "Who cares for nutrition information at a restaurant? Food-related lifestyles and their association to nutrition information conscious behaviors", British Food Journal, Vol. 118 Iss 7 pp. 1625-1640 https://doi.org/10.1108/BFJ-09-2015-0303

Access to this document was granted through an Emerald subscription provided by emerald-srm:126269 []

For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.

Consumer views on “healthier” processed meat

Liran Christine Shan and Aine Regan

*School of Public Health, Physiotherapy and Sports Science,
University College Dublin, Dublin, Ireland and*

Institute of Food and Health, University College Dublin, Dublin, Ireland

Frank J. Monahan and Chenguang Li

*School of Agriculture and Food Science,
University College Dublin, Dublin, Ireland, and*

Celine Murrin, Fiona Lalor, Patrick G. Wall and Aine McConnon

*School of Public Health, Physiotherapy and Sports Science,
University College Dublin, Dublin, Ireland and*

Institute of Food and Health, University College Dublin, Dublin, Ireland

1712

Received 19 November 2015

Revised 15 March 2016

Accepted 16 March 2016

Abstract

Purpose – The purpose of this paper is to investigate consumer attitudes towards and interest in enriching processed meat with healthy ingredients (“functional processed meat”).

Design/methodology/approach – Seven focus groups across age and gender were conducted. Discussions were analysed using an inductive thematic approach.

Findings – Strategies that participants felt as important for improving the healthiness of processed meat mainly included the use of better quality meat and less salt, fat, preservatives and other additives. “Functional processed meat” was a new concept for participants. Four themes were constructed to reflect participants’ attitudes towards functional processed meat: opposing views on processed meat as a carrier of healthy ingredients; belief in the health benefits of functional processed meat; perceived value of functional processed meat for different consumer groups; and trust and perceived risk surrounding the functional food concept. A large proportion of the participants were unconvinced about the concept of functional processed meat; however many of the participants expressed an openness to purchase this food product if taste and price remained uncompromised.

Research limitations/implications – The sample size of the current study is small. Complementary quantitative research with a more representative sample should be implemented. Adopting a quantitative approach, the findings from this study should be explored further to investigate their application in a representative sample of the population.

Originality/value – This study represents a first exploratory investigation of consumer views on functional processed meat. It can inform further consumer and market research in relation to the development of “healthier” processed meat.

Keywords Functional food, Health, Attitudes, Focus group, Consumer, Processed meat

Paper type Research paper

Introduction

Processed meat includes meat preserved by smoking, curing or salting, or by addition of chemical preservatives. If preserved chemically, even minced meat can be considered “processed” (World Cancer Research Fund, 2007). Processed meat is viewed by many consumers as unhealthy due to perceived high levels of sodium, fat and harmful additives (Cho *et al.*, 2003; Tobin *et al.*, 2014; Van Wezemael *et al.*, 2010). The announcement of the World Health Organisation (WHO) in October 2015 on the



elevated cancer risk associated with consumption of processed meat has brought the healthiness of this food category once again into the public eye (WHO International Agency for Research on Cancer, 2015). Despite negative public perception, a large proportion of the meat regularly consumed is in the form of processed meat (Bolger *et al.*, 2016; Linseisen *et al.*, 2006; Verbeke *et al.*, 2010). In satisfying consumers' demands for convenient, cheap, and appealing products, processed meat is likely to remain a staple food in the diet of many consumers (Grunert, 2006; Verbeke *et al.*, 2010). Whether there is a market for “healthy” processed meat has yet to be investigated. The current study aims to investigate consumers' attitudes towards “functional processed meat”: processed meat enriched with healthy ingredients that provide health benefits beyond the basic nutrition of the meat products.

The market potential for functional foods is believed to be considerable (Global Industry Analysts Inc., 2010; Scrinis, 2008; Siro *et al.*, 2008). There have been successful cases of fortification of processed foods to alleviate large scale public health challenges (e.g. mandatory fortification of folic acid and iodine in bakery products in Australia and New Zealand to reduce the incidence of birth defects and address iodine deficiency in the population), and to improve micronutrient intakes in the population (Food Standards Australia New Zealand, 2009, 2013; Hannon *et al.*, 2007; Hennessy *et al.*, 2013; Kloosterman *et al.*, 2008; Siro *et al.*, 2008). In a similar way, processed meat could be improved by the addition of health promoting nutrients (Decker and Park, 2010; Jimenez-Colmenero *et al.*, 2001; Tobin *et al.*, 2014; Toldra and Reig, 2011). Enriching different processed meat products with healthy ingredients including dietary fibre, minerals, vitamins, natural antioxidants, probiotics and bioactive peptides has been the subject of considerable research in recent decades (Decker and Park, 2010; Hathwar *et al.*, 2012). Among the product prototypes developed, only a few have been commercialised, notably in Japan (Grasso *et al.*, 2014; Toldra and Reig, 2011).

There is, however, lack of understanding of how accepting consumers would be of this new product concept (Grasso *et al.*, 2014; Zhang *et al.*, 2010). Much of the existing research focuses on non-processed meat, for example, consumer acceptance of fresh meat-based functional foods (Cox *et al.*, 2011), the influence of health claims on consumer perceptions of pork chops (Lahteenmaki *et al.*, 2010) or the technological aspects of the enrichment (i.e. consumer acceptance of beef processing technologies such as marinating by injection and enzyme binding) (de Barcellos *et al.*, 2010). To our knowledge, there are two studies that have investigated processed meat specifically. The first study was a brief online survey which assessed consumers' willingness to purchase processed meat enriched with bioactive compounds (Tobin *et al.*, 2014). It concluded that European consumers are unsure about processed meat as a functional food; however it did not investigate consumers' attitudes and concerns in depth. The second study, published at the time of writing this paper, was a qualitative study investigating consumer reactions towards the idea of replacing nitrite with natural extracts (i.e. phytochemicals extracted from onion, rosemary, grapes, green tea, coffee, etc.) (Hung *et al.*, 2016). This study found that consumers' concerns mainly related to the products' taste, healthiness and shelf life. The study suggested that, to be successful, the meat products with added phytochemicals would have to possess desirable sensory characteristics and proven health benefits compared with regular meat products.

The addition of healthy ingredients can be classified as either mandatory or voluntary. The mandatory approach is always set down by government regulation (Ewen and Vatanparast, 2013). A mandatory approach to adding healthy ingredients to

foods is generally established when a large proportion of a given population has an unacceptable health risk, or is at high risk of becoming deficient in a specific micronutrient; therefore, this approach is limited to specific bioactive and micronutrients (e.g. folic acid) (World Health Organization, 2006). In comparison, voluntary enrichment is a more common practice (International Food Information Council Foundation, 2014). It allows food manufacturers to freely choose to enrich particular foods in response to consumer needs (Ewen and Vatanparast, 2013). In Europe, Regulation 1924/2006 (European Commission, 2006) has established rules regarding the use of nutrition and health claims on food stuffs. In addition, EU Regulation 432/2012 has established a list of all of the approved claims and the conditions applying to them, and a list of rejected health claims and the reasons for rejection (European Commission, 2012).

The voluntary approach is generally favoured over the mandatory approach, partly due to a lack of public support for overly paternalistic public health policies (Diepeveen *et al.*, 2013; Regan *et al.*, 2016). In addition, the voluntary approach is favoured as it enables the industry to respond to consumer demands in a more market friendly and timely manner. In the current study, we kept the focus group discussions centred on voluntary enrichment of processed meat because this is a more common practice. The aim of this study was to explore consumer attitudes towards enriching processed meat with healthy ingredients.

Methods

Study participants and recruitment

Participants were food shoppers who ate meat products at least once a week. Based on a predetermined sampling scheme consisting of seven groups across age and gender (three female groups aged between 18 and 30; 31 and 40; and 41 and 50; two female groups over the age of 50; one male group between 18-50; one male group above 50). In total, 40 participants were recruited in the vicinity of shopping centres in Dublin, Ireland, with the assistance of a market research agency. A decision was made to include more women and middle aged people given that females may feel more responsibility for the well-being of the family as a whole and middle aged and elderly people are more likely to be concerned with diet-related disease (Nocella and Kennedy, 2012; Siro *et al.*, 2008; Verbeke, 2005). All participants received an information leaflet prior to the focus group discussion, and informed consent was obtained from each individual. Participants were offered monetary compensation (30 EUR) to cover their time and travel cost. This study was approved by an institutional Human Research Ethics Committee. Characteristics of the participants are summarised in Table I.

Study design

A qualitative study using a semi-structured focus group method was carried out. A discussion guide was designed to investigate participants' ideas on, and attitudes towards, making processed meat healthier. Drawing from Grasso *et al.* (2014) and the World Cancer Research Fund (2007), a definition of "processed meat" was given shortly after the warm-up session: "For this study, processed meat refers to pork, beef, poultry and fish products that undergo preservations such as smoking, curing, salting, and addition of chemical preservatives. Examples are ham, bacon, sausages, deli meat products, smoked salmon, meat patties, chicken nuggets, etc. Pre-packaged fresh, chilled or frozen meat is not considered as processed meat". Participants were then guided through short discussion sessions about their shopping habits in relation

Characteristics	<i>n</i> (%)	Consumer views on “healthier” processed meat	
<i>Gender</i>			
Male	10 (25.0)	1715	
Female	30 (75.0)		
<i>Age</i>			
18-30	10 (25.0)		
31-40	8 (20.0)		
41-50	5 (12.5)		
Over 50	17 (42.5)		
<i>Highest level of education</i>			
Primary school	0 (0.0)		
Secondary school	11 (27.5)		
Technical or vocational education Certificate	3 (7.5)		
Bachelor’s degree	4 (10.0)		
Higher	7 (17.5)		
No answer	12 (30.0)		
	3 (7.5)		
<i>Occupation</i>			
Student	8 (20.0)		
Employed (part-time)	4 (10.0)		
Employed (full-time)	11 (27.5)		
Self-employed	3 (7.5)		
Unemployed	5 (12.5)		
Retired	3 (7.5)		
No answer	6 (15.0)		
<i>Monthly income (euro)</i>			
0-800	6 (15.0)		
801-1,600	5 (12.5)		
1,601-2,400	6 (15.0)		
More than 2,400	13 (32.5)		
No answer	10 (25.0)		
<i>Number of children living at home</i>			
0	20 (50.0)		
1	2 (5.0)		
2	10 (25.0)		
3	6 (15.0)		
More than 3	2 (5.0)		
<i>Consumption frequency of fresh meat products (e.g. chicken fillet, steak, fresh pork chops, minced meat, etc.)</i>			
Never	0 (0.0)		
Rarely	1 (2.5)		
1-3 times a month	1 (2.5)		
1-3 times a week	15 (37.5)		
More than 3 times a week	23 (57.5)		
<i>Consumption frequency of processed meat products (e.g. sausage, ham, bacon, deli meat product, beef burger, stuffed turkey, salami, smoked salmon, smoked meat products, chicken nuggets, etc.)</i>			
Never	0 (0.0)		
Rarely	3 (7.5)		
1-3 times a month	9 (22.5)		
1-3 times a week	25 (62.5)		
More than 3 times a week	3 (7.5)		
Note: <i>n</i> = 40			

Table I.
Characteristics of the focus group participants

to processed meat (topic 1), perceptions and concerns over the healthiness of processed meat (topic 2), their ideas on how processed meat can be made healthier (topic 3), followed by longer discussion sessions focusing on their attitudes and product preference in relation to two specific strategies, namely, salt and fat reduction (topic 4) and the addition of health-beneficial ingredients (topic 5). In topic 5, the product concept was introduced as “The idea is to add healthy ingredients to processed meat. Such ingredients will provide health benefits beyond the basic nutrition of the meat products. Examples are vitamins, minerals, omega 3, plant sterol, etc.” In topics 4 and 5, consumer attitudes were explored from three angles – what are participants’ opinions on functional processed meat? Do they like it? And would they be willing to purchase a functional processed meat product? This design is based on the theory that the attitude towards a product can be defined by three components: a cognitive component (the knowledge and opinions on it), an affective component (positive or negative feelings towards the object) and a behavioural component (purchase intention) (Barrios and Costell, 2004). Lastly, participants were presented with information cards of four examples of functional processed meat products (Figure 1) to elicit their comments (topic 6). These products are hypothetical ones, and the associated health claims are permitted in the EU (European Commission, 2013).

The discussion guide was tested for clarity, flow and duration with three pilot focus groups and refined prior to implementation. Focus group discussions were held between February and May 2014, before the WHO announcement on cancer risk associated with processed meat (WHO International Agency for Research on Cancer, 2015). All focus groups were facilitated by the lead investigator (LCS) with assistance from two professionals from a market research agency. Each focus group discussion was audio recorded and lasted between 88 and 100 minutes. The recordings were transcribed verbatim. Participants’ names were replaced with pseudonyms to ensure anonymity.

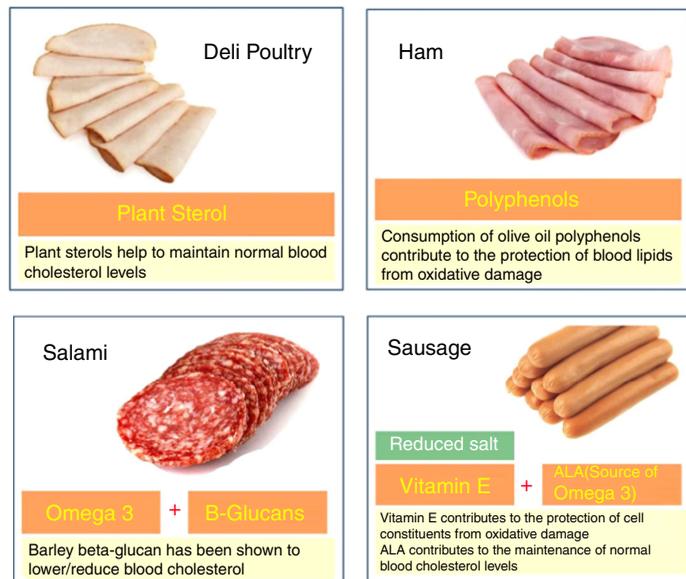


Figure 1. Information cards showing four hypothetical functional meat products

Data analysis

An inductive, data-driven thematic approach (Braun and Clarke, 2006) was adopted to analyse the data, with the assistance of NVivo 10 qualitative software for data management. Researchers (LCS and CL) first read and became familiarised with the data. A preliminary coding was then carried out (by LCS.) to identify and code information related to the research questions. The coding framework was continuously developed using a method of “constant comparison” – emerging codes were compared with established codes to merge similar codes together. A third researcher (AR) was invited to code 30 per cent of the data, and any disagreements in coding were resolved through further discussions. In the next stage, coded data were reviewed, codes were refined and similar codes were merged together to build up themes. The validity and accuracy of themes in terms of reflecting the meaning of the data was checked (by CL). In the final stage, themes were reviewed amongst the wider research team, and the illustrative names and reporting of themes were finalised.

Results

The analysis aimed to understand how the concept of functional processed meat fitted into participants’ overall preferences and expectations around making processed meat healthier. We first present participants’ overall ideas on measures that can be taken to make processed meat healthier and then report the four primary themes derived from participants’ comments on functional processed meat specifically.

Consumers’ ideas on making processed meat healthier

Strategies that participants felt were important for making processed meat healthier covered almost the entire food supply chain and called for action by multiple stakeholders including farmers, meat processors, scientists and regulatory bodies (Table II).

Most of the comments were from the food processing dimension. Participants called for reformulation of the products, especially the use of better quality meat to make processed meat more wholesome, and the reduction of salt, fat, preservatives and other additives, which were believed to be the main cause of the health risks associated with processed meat. A few participants who were mothers reported that they were surprised when they found high sugar content in salty meat products. Given that sugar was perceived as the culprit in obesity and diabetes problems in youth cohorts, they suggested reducing sugar as well. Some participants acknowledged that the aforementioned reformulations may influence the processing and product features that were important to certain consumers such as shelf life and taste. Therefore, they suggested meat processors and scientists exploring alternative measures to preserve and flavour the product, for instance, the use of natural flavourings (e.g. herbs, species and fruits) and chemical-free preservation techniques (e.g. high-tech packaging, pickling, dehydration and freezing). Underlying this discussion was an ambition to make the products as close to the natural state of meat as possible. At these early stages of the discussions, enriching processed meat with healthy ingredients was not a strategy widely suggested by the participants – only one male participant mentioned it. A number of participants requested a transparent and easy-to-understand labelling system and supportive resources (e.g. Quick Response code, list of E numbers). These participants believed this would enable them to make more informed choices

Strategies	Illustrative quotes
<i>Agriculture dimension</i>	
Healthier animal diet and raising (5/3) ^a	“If you’re worried about taking the fat out artificially if you just give the animal a better diet [...] like you hear about things like growth hormones and stuff being given to animals” (female, 18-30)
<i>Food processing dimension</i>	
Increasing the content of the actual meat (12/6)	“Instead of using just the leftovers of the meat for processed food, you use the actual meat part [...] rather than having all the horrible bits at the end” (female, 18-30) “And increase the meat, the actual meat” (female, 50+, group 2) “What they really need to do is have higher meat content”(male, 18-50)
Reducing salt, fat, sugar, additives, preservatives, and minimising the processing (19/7)	“Less ingredients that are E60, 49, 346, like things without words” (female, 18-30) “When I’m eating meat and then I see all these other things, and then I just think they’re all added, which I don’t want” (female, 41-50) “I am always very worried about the sugar content, because if you look at all the diseases that younger crowds are having, it’s more related, like diabetes and everything [...]. Even if you’re buying salty stuff here, you still see sugar in it. So if they could reduce the sugar levels” (female, 41-50) “The more you can reduce salt, fat, preservatives, the better”(male, 50+) “No artificial colourings and flavourings”(female, 31-40)
Using natural preservatives, flavourings, new packaging and preservation techniques (10/5)	“If they could come up with natural forms of preservatives” (female, 41-50) “You can use a lot of like fruits to flavour things. I just think they haven’t thought outside the box” (female, 50+, group 1) “A more human friendly versions of the chemicals or something” (male, 18-50) “Some things are packed in a protective atmosphere, so maybe being in a vacuum pack where you wouldn’t need as much salt” (male, 50+) “Is there a natural way of processing foods? The smoked salmon and all those meats that are cured naturally” (female, 31-40)
Adding in health-beneficial chemicals (1/1)	“Unless they put in chemicals that had a health benefit” (male, 18-50)
Reducing the portion size of each package (2/2)	“If they see it in a smaller package, it’s then like a treat, like Coke craving satisfied without being the whole 2-litre bottle” (female, 41-50) “What they could do would be if you made smaller portion sizes” (male, 50+)
<i>Food labelling and consumer dimension</i>	
Sensible labelling and education to enable informed food choices (9/3)	“On the labelling it should be more transparent but in an actual way [...] a lot of low fat health food stuff isn’t actually that much better than the original product” (female, 18-30) “It is not just making the food self-healthy but making people more conscious of what is in there and giving them the choice” (male, 18-50) “People need to be educated more about what is what in food, because you look at the back, I can’t read half of this” (female, 31-40) “There was a list and it had all the E numbers from 100 to 500, and it had all the good ones and bad ones listed” (female, 31-40)
Note: ^a Numbers in brackets after each strategy indicate number of participants who mentioned the strategy/number of groups where the strategy was mentioned	

Table II. Strategies suggested by participants to make processed meat healthier

based on a better understanding of all the ingredients going into the product and the overall risks and benefits associated with the product. They also believed that improved labelling systems would force food companies to become more accountable for what they put into meat.

Consumer attitudes towards enriching processed meat with healthy ingredients

In general, participants in the focus groups held opposing attitudes towards functional processed meat. Some participants gave very favourable responses to the concept. Over half of the participants were uncertain and ambivalent about processed meat as a functional food. These participants were cautious and critical about the end value of enriching processed meat with healthy ingredients. Four themes, presented in a schematic map (see Figure 2) were identified from participants' discussions.

Theme 1 – opposing views on processed meat as a carrier of healthy ingredients. A few participants were open-minded about any endeavours aimed at improving the processed meat. From their point of view, processed meat was already processed, thus they viewed no issue with adding another ingredient into the mix, particularly one which would be beneficial for the consumer:

Gillian: I think it's processed so if you're going to add more in that's better for you, it doesn't really matter (female, 41-50).

Some participants adopted a simple logic: processed meat is viewed as an "unhealthy choice" yet people still eat these products and therefore, any reformulation (including adding healthy ingredients) that could make this product somewhat healthier should be considered:

Gillian: I do eat some of them and my kids eat some of them, but I do try not to buy them, but I do buy some of them. And I think they're all processed and I think they're all bad for you [...] I think if they can be improved on they should be (female, 41-50).

However, in almost all focus groups, there was an expression by some participants that health benefits should be intrinsic to the meat itself, and the artificial addition of healthy ingredients was "unnatural" and "unreal". Many participants indicated that they currently bought, and had no difficulties in accepting, certain functional foods (e.g. probiotic yoghurts, fortified breakfast cereals, etc.). However, when it came to processed meat as a carrier, participants became uncomfortable with this idea. The first lies in the low familiarity with functional processed meat:

Liam: There're some yoghurts that are supposedly good for your digestion [...] but putting stuff in processed meat or cheese – that wouldn't settle with me (male, 50+).

Sylvia: It just seems [...] you don't associate meat with omega 3 or vitamins (female, 41-50).

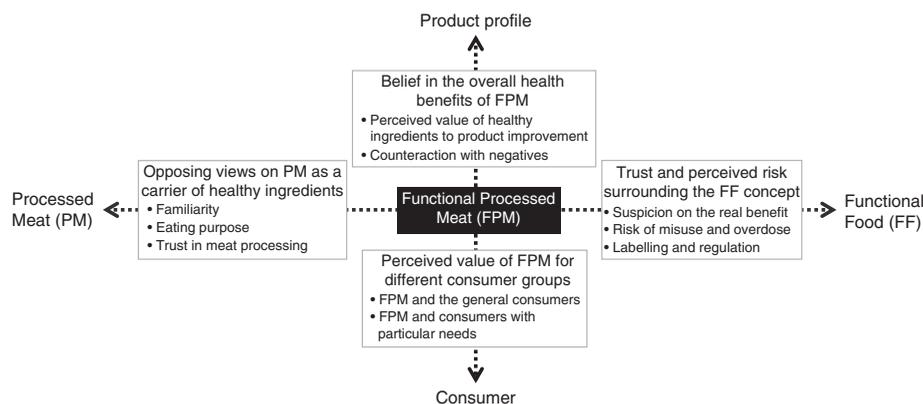


Figure 2. Illustration of themes derived from participants' comments on healthy ingredient enrichment as a way to make processed meat healthier

In addition, processed meat, in many cases, was not viewed as a product to be eaten for health benefits, but for flavour and cheap price. These participants did not view processed meat as a significant source of nutrition. For them it was not a product which they would easily associate with nutrition and health. Moreover, meat was described as a natural and enjoyable product. Participants were attached to it and had a tendency of protecting it from “over-handling”:

Ashling: If you're lacking in something then find out what you're lacking and go and find a real food that has it in it, as opposed to, oh, I'm just going to have my processed meat intake (female, 31-40).

Emma: Meat is a natural enough product. I know we have to have your preservatives to make it last longer, but forcibly adding something into it just doesn't sit very well with me (female, 41-50).

Several female participants raised trust issues in relation to meat production and processing. They indicated that the recent horse meat adulteration incident had impaired their trust in the regulatory system and in the honesty of meat processors. They also referred to other narratives, such as water-pumping in meat processing, and a perceived hidden reality behind the positive image of “free range”. All of these made them doubt if meat processors could balance quality and profit in a proper manner when developing functional processed meat:

Ciara: I think with all the scandal with like the horse meat and stuff that people are more conscious about what's in their meat, and especially the processed meat because it could be anything like, so that would have, I don't know, an aspect overall (female, 18-30).

Kate: In order for that to sell and to keep the price down [...] So maybe what started off as a piece of beef or a piece of chicken is almost reduced in its quality at the very start in order to add something in at the very end (female, 50+, group 1).

Theme 2 – belief in the overall health benefits of functional processed meat. Another salient theme derived from participants' discussions related to the perceived impact that adding healthy ingredients would actually have on the overall health profile of the processed meat product. While some participants believed that the addition of healthy ingredients to processed meat would indeed make it healthier, a considerable number of participants were critical and suspicious about the end health benefits for the consumer. A belief featuring strongly in almost all of the focus groups was that many participants perceived that functional processed meat signalled an “even more processed” product. These participants did not believe in the value of the healthy ingredient, instead, perceiving it to be no different to any other additive. Some even believed it would make processed meat an unhealthier choice:

Sylvia: Yes, I would agree, I think there's no point in adding anything to processed meat. There is enough in it (female, 41-50).

Mairiad: I think the perception would be that it would be less healthy by adding all these things into it (female, 50+, group 2).

Echoing the discussions on strategies they recommended for making processed meat healthier in the previous section, participants indicated that better options were available. They felt that the functional processed meat concept did not tackle the fundamental problems related to processed meat, namely, the high salt and fat content and the excessive use of preservatives and additives. Participants felt that the benefit of the end product was limited to what the ingredient could do, and could not improve

the overall healthiness of processed meat. Several participants (mostly males) weighed up the overall risks and benefits of functional processed meat. They believed that, at least for those very salty and fatty products, such as salami and sausages, the healthy ingredient was unlikely to counteract the negatives, but instead lead to a false impression that the end product was healthy:

Paul: You can't just throw in minerals or vitamins and say that's on the cover of pop tax. It's not going to change the fact that they're bad for you. So it might improve it slightly but, in the long run, it's not going to make that much of a difference (male, 18-50).

Linda: with salami for me like it would encourage me to buy it if it had less of the white in it [...] It wouldn't encourage me to buy it because it's got more of the health in it. It's all about taking away the bad and not putting in the good (female, 18-30).

Theme 3 – perceived value of functional processed meat for different consumer groups. The perceived value of and necessity for functional processed meat to various sections of the population was frequently spoken about amongst participants.

Some participants doubted the necessity of functional processed meat and claimed that they and their families were healthy and had a balanced diet, thus they did not perceive any personal relevance of the product. Some participants were also doubtful that functional processed meat was necessary in a developed country like Ireland where people had abundant natural food resources for nutrients:

Marian: To be quite honest with you, I suppose all my kids and myself, we do actually have a kind of balanced diet or whatever else, and these things really don't [...] (female, 31-40).

While participants disagreed with each other on the value of functional processed meat to public health in general, there was agreement that these new products were potentially helpful for some consumer groups, including people who have nutritional deficiencies, and people at certain life stages with increased nutrition needs. Another group that participants identified as important was those who were less likely to have a balanced diet, such as children who were fussy eaters, older people who lived alone and people with hectic lifestyles:

Tara: I think my friend, sausages are key, like all kids seem to eat them and I suppose you worry about your child's nutrition and you want them to eat something rather than starve.

Ashling: If there was a healthier sausage to give your children (female, 31-40).

Interestingly, the presentation of four hypothetical products (see Figure 1) (three were associated with lowering cholesterol) triggered a debate on whether consumers with cholesterol problems and concerns would be interested in these products. One argument was that these people would have been advised to avoid processed meat and in any case would be more likely to rely on medication as a solution. The counterargument, made by other participants (including some of those participants who stated that they had cholesterol problems) was that in practice it was difficult to exclude processed meat from the diet. Products with cholesterol-lowering ingredients may possibly offer some help and at least make them feel less guilty when consuming them:

Rosemary: Like the deli poultry, if you're trying to reduce your cholesterol, are you really going to eat that? You're not.

Caoimhin, Rebecca: No.

Rosemary: Even though it says, plant sterol. You're not going to eat that (female, 50+, group 1).

Caroline: I would have to get it [blood cholesterol] down every six months. I'd be very interested in something that would bring it down [...] my husband likes salami, and I like a little too, but you kind of wouldn't feel so bad about yourself (female, 50+, group 2).

Theme 4 – trust and perceived risk surrounding the functional foods concept. In most focus groups, there were participants who were sceptical about the actual benefits from the healthy ingredient as presented in functional processed meat, and more widely, functional food.

On the one hand, participants were doubtful if these added functional ingredients would deliver real benefits. They felt there was a possibility that food companies use functional ingredients as a “gimmick” or “clever language” to promote their products over competitors. There was a feeling that food companies may use ingredients of low quality or quantity which would be insufficient to achieve any health benefits associated with the claim. From the conversations, it was clear that participants were generally unaware of the rigorous regulations involved in making health claims in EU countries. In addition, several participants believed that the added nutrient could be destroyed during cooking and digestion. Furthermore, conflicting and uncertain food risk and benefit messages had impaired some participants' trust in the benefits of healthy ingredients in general:

Liam: The people who are making the meat, putting the plant sterols in to sell more deli poultry or for the benefit of the public. And I would say it's a marketing ploy (male, 50+).

Brian: I'd be thinking some vitamins are destroyed at a certain temperature and people generally put a sausage into a deep fat fryer or a grill (male, 18-50).

Sheila: But you hear so many bad things as well now. Then they say you shouldn't be taking all these Omega whatever because it increases [...] I don't know (female, 31-40).

On the other hand, participants expressed worries that once the healthy ingredient was mixed with food, it would be hard to keep track of the intake of that ingredient. Participants felt that, depending on what the added ingredient was, there might be a risk of taking too much of a given ingredient: some nutrients people need in trace amounts only and they might be widely available in other types of functional food and popular supplements. They also felt that there might be a risk of misuse: consumers could unknowingly take a healthy ingredient which is not complementary to their needs. Considering processed meat is a product consumed by a large proportion of the population, and some consumers eat it in a large quantity, participants stressed that the aforementioned risks should never be ignored:

Marian: These things you're not meant to actually overload on it because it might be hard for the body to eliminate it.

Aoife: But surely would you not be assessing what you're getting from this?

Marian: Not if you just happen to have a child who just eats fish fingers or just eats chicken nuggets. [...].

Sheila: This is not things that we buy all the time, though it looks a lot.

Ashling: But then, because they are such cheap products and they're for people that don't have a huge amount of money sometimes that they live on this as a diet. You know? (female, 31-40).

Elaine: If I'm buying ham that has some of this medication in it, I don't know how much extra medication am I having then. And if I eat lots of ham this week and I don't eat any next week, what's that going to do to my cholesterol? [...]. You'd think if somebody with normal cholesterol eats lot of this stuff, what does that do? (female, 50+, group 2).

To increase the trust and confidence in using functional processed meat products, many participants requested careful selection of healthy ingredients and clear labelling of information including the content of the added ingredient and how it compared to the recommended dietary allowance. They also called for independent verifications from health experts and more transparency in the regulation of functional food:

James: If the Department of Health supported it, I wouldn't have difficulty with them (male, 50+).

Consumer purchase intention

Many participants expressed that they were willing to try functional processed meat products under certain conditions (e.g. reasonable price, pleasant taste and relevant health benefits). If the functional processed meat and the conventional product were similar, they would be open to choose the functional one:

Rebecca: I think if there were two packs side by side made by the same company and one had this has added calcium or brain food, whatever, I would.

Caoimhin: Yes, I agree. I think I would. I think it might swing it if you were choosing between two similar ones. And yes, like price, I think, you would probably go for the one (female, 50+, group 1).

Sean: If they'd make their food healthier, like, I think it would be worth a try, although if the price wasn't raised too much. I'd give it a go, and if it tasted nice, definitely (male, 18-50).

Susan: It would depend an awful lot on what was on that label, to be honest. What was the claim being made? Because some of the claims are outrageous that are made and it's amazing what they get away with on labels (female, 41-50).

Participants expected that the added healthy ingredient may increase the price and they were not prepared to pay significantly extra. In addition, they were not willing to make any compromises on the taste. This implies that, for these participants, the added health benefit may offer an extra reason to purchase, however it is a less-influential factor when compared to price and sensory qualities:

Ciara: It just depends like are these going to be marked the same kind of price as the original or are they going to be higher like.

Facilitator: OK, would you be willing to pay extra for the healthy ingredients?

3 participants: No.

Amy: Not in a processed meat. Not in something that's already unhealthy.

Alexandra: If it was something that is healthy then maybe, but if it's something like this that already has fat in it and it's just a tiny bit that will [...] (female, 18-30).

Claire: I'd need to know that the taste would be similar.

Jacqueline: Same. I'd be the same as you. If the taste is altered by any of these, it's a no (female, 50+, group 1).

It is interesting to note that participants who expressed a willingness to purchase functional processed meat also included some of those who were cautious and critical about the concept. This indicates they were not completely against the product, although it is known that intention to purchase does not always translate to behavior.

Discussion

Recent innovations in the meat industry are focused towards the production of healthier meat products (Toldra and Reig, 2011). Exploring consumer interest and attitudes at the early stage of product development is important (Collins and Bogue, 2015; Rudder *et al.*, 2001). This study exposed the gap between consumers' expectations of "natural meat" and the concept of functional processed meat. The participants in the current study expressed more support for the development of "healthier" processed meat through using fewer ingredients such as salt, fat and additives, than through the addition of healthy ingredients. This echoes previous studies on consumer acceptance of food processing: more acceptable strategies are characterised by a low degree of technological interference (Korzen *et al.*, 2011; Landstrom *et al.*, 2009). The high appreciation of "naturalness" can be attributed to two factors. First, naturalness is perceived to be closely connected with food safety, product healthiness and healthy eating (Drescher *et al.*, 2012; Holm, 2003; Jauho and Niva, 2013; Margetts *et al.*, 1997). In general, from lay perspectives, meat healthiness is believed to decrease with the degree of processing (Verbeke *et al.*, 2010), and healthy eating is conceptualised as eating "pure" foods and avoiding additives (Holm, 2003). Second, owing to the increased complexity of the food supply and regulatory systems and the occurrence of high-profile meat safety incidents in the past few decades (e.g. the BSE and dioxin contamination incidents, the horse meat scandal), consumers have less confidence in the meat supply chain (Drescher *et al.*, 2012). Additionally, consumers cite concerns including inadequate food labelling systems (e.g. not being fully informed about the presence of harmful ingredients) (Marotta *et al.*, 2014), and overwhelming and conflicting food risk and benefit reporting (Barnett *et al.*, 2011; Regan *et al.*, 2014). To help cope with this complexity, participants are eager to go back to the basics – the natural and original status of food.

A previous quantitative survey observed that, in comparison with functional yogurts, consumers were unsure of their feelings towards functional processed meat, and the reason was interpreted as "lack of familiarity" (Tobin *et al.*, 2014). Our findings demonstrated that consumers' uncertainty with this new product was far more complicated than the single issue of "familiarity". Other issues, such as the perceived purpose of eating processed meat, trust in meat processing, and the perceived healthiness of functional processed meat products also contribute to consumers' uncertainty. If the study had been carried out after the WHO announcement on cancer risk associated with processed meat consumption, there would probably have been more discussion on whether or not an unhealthy product like processed meat was suitable to be a carrier of healthy ingredients. In addition, participants expressed concerns about the necessity and value of this new product to different consumers, and the perceived risks associated more generally with the concept of functional foods. These concerns are not unique to processed meat, but echo consumers' attitudes towards functional foods in general (Urala and Lahteenmaki, 2004, 2007).

From product design and food marketing perspectives, the findings from the current study offer some interesting insights. Participants are not willing to compromise on price and taste when it comes to functional processed meat. This echoes a previous study which concluded that depending on consumer willingness to compromise on the taste of functional foods for a health benefit is a highly speculative and risky strategy (Verbeke, 2006). Another important issue is the match between the carrier (e.g. processed meat) and the proposed added health benefits. Interactions between the carrier and the enrichments are important determinants of the perceived healthiness of the product (Bech-Larsen and Grunert, 2003). For instance, in our focus groups, participants did not perceive a match between “cholesterol-lowering” health claims and processed meat products that have a high fat content. Furthermore, we found that many participants were not confident about the claimed health benefits. They were not aware that in EU countries, health claims made by food companies are heavily regulated, and that a significant burden of proof is on manufacturers to prove the claim before the product is launched on the market (Lalor and Wall, 2011). Participants acknowledged the value of functional processed meat for specific population groups, such as children who were fussy eaters, busy people and people with particular nutrition-related needs. To reach this potential, the product design has to be careful and targeted, taking into account, for instance, existing eating habits and the bioactive compound consumption level in the target population (Decker and Park, 2010).

It is worth noting that meat manufacturers may have to face another challenge in developing and marketing functional processed meat. In many countries, including the US, nutrient label claims are not allowed for healthier meat products (Decker and Park, 2010). In the EU, Article 4 of Regulation 1924/2006 carries a nutrient profile provision. This declares that food products containing significant quantities of certain nutrients and other substances (i.e. fat, saturated fatty acids, trans-fatty acids, sugar and salt/sodium) shall not bear nutritional and health claims for the added nutrients (European Commission, 2006). Despite the presence of the nutrient profiling provision however, the actual nutrient profiles have not been agreed by the European Union and future discussion on the subject is anticipated. It is likely that due to the nutrient profiles, regulation may cause a barrier to the marketing of processed meat products that are improved solely by adding healthy ingredients. For the meat industry, if functional processed meat is shown to be worth pursuing, it may have to be combined with the reduction of excessive level of undesirable components.

When it comes to reformulating food products for the benefit of health, voluntary industry-led initiatives are more common than mandatory government-led approaches. However, even for voluntary approaches there is an important role for public policy. This has been the experience with numerous salt reduction policies around the world, where it has been found that voluntary reformulation of food products by industry tends to work best when coupled with government activity (Arcand *et al.*, 2013; Traill, 2012). Such activities can include the publication of nutrient-specific benchmarks to guide reformulation efforts, a co-ordinated monitoring and evaluation programme to reward success and/or to hold industry accountable, and regulations which drive, guide, and support industry reformulation efforts. Considering the case of functional foods, it may be beneficial to raise consumer awareness of the similar regulatory processes and public policies which are in place to control the introduction of functional foods onto the market. Such engagement with the public may not initially lead to direct uptake of these products,

but it would begin to address some of the consumer concerns raised in the current study, and build more trust in the concept.

The current study represents a first exploratory qualitative investigation of consumer attitudes to functional processed meat. Further quantitative research with a representative sample should be carried out to generalise these findings amongst the wider population of meat eaters, and to assess whether and how individual participant characteristics may influence their attitudes and interests. Furthermore, it is of importance to measure what impact specific features of the functional processed meat product may have on its acceptance (e.g. the base carrier – the specific processed meat product targeted, the functional ingredient and the benefit it serves and, importantly, the price and the sensory qualities). It will also be interesting to explore if the awareness and knowledge level of the regulatory system around functional food will influence consumers' concerns around functional processed meat.

Conclusions

In our study, the strategy of adding healthy ingredients to processed meat did not align with many participants' expectation of "healthier processed meat". From our findings, it can be implied that widespread consumer acceptance of functional processed meat faces several challenges: uncertainty and low familiarity with processed meat as a functional food, minimal belief in the impact that additional healthy ingredients would have on the overall healthiness of processed meat, and a lack of trust and perceived risks of the overall functional food concept. However, some participants were open to the concept if the price and sensory quality of the functional processed meat product remained the same as the conventional product. Some participants also saw the value of this product to specific consumer groups. Future research should seek to investigate the findings in the context of the wider population of meat eaters, and test how individual characteristics and product features would influence consumer acceptance.

References

- Arcand, J., Mendoza, J., Qi, Y., Henson, S., Lou, W. and L'Abbe, M.R. (2013), "Results of a national survey examining Canadians' concern, actions, barriers, and support for dietary sodium reduction interventions", *Canadian Journal of Cardiology*, Vol. 29 No. 5, pp. 628-631.
- Barnett, J., McConnon, A., Kennedy, J., Raats, M., Shepherd, R., Verbeke, W., Fletcher, J., Kuttischreuter, M., Lima, L., Wills, J. and Wall, P. (2011), "Development of strategies for effective communication of food risks and benefits across Europe: design and conceptual framework of the FoodRisC project", *BMC Public Health*, Vol. 11, pp. 308-316.
- Barrios, E.X. and Costell, E. (2004), "Review: use of methods of research into consumers' opinions and attitudes in food research", *Food Science and Technology International*, Vol. 10 No. 6, pp. 359-371.
- Bech-Larsen, T. and Grunert, K.G. (2003), "The perceived healthiness of functional foods – a conjoint study of Danish, Finnish and American consumers' perception of functional foods", *Appetite*, Vol. 40 No. 1, pp. 9-14.
- Bolger, Z., Brunton, N.P., Lyng, J.G. and Monahan, F.J. (2016), "Comminuted meat products – consumption, composition and approaches to healthier", *Food Reviews International*, available at: www.dx.doi.org/10.1080/87559129.2016.1149861 (accessed 25 May 2015).

- Braun, V. and Clarke, V. (2006), “Using thematic analysis in psychology”, *Qualitative Research in Psychology*, Vol. 3 No. 2, pp. 77-101.
- Cho, S.H., Park, B.Y., Chin, K.B., Yoo, Y.M., Chae, H.S., Ahn, J.N., Lee, J.M. and Yun, S.G. (2003), “Consumer perception, purchase behavior and demand on ham and sausage products”, *Journal of Animal Science and Technology*, Vol. 45 No. 2, pp. 273-282.
- Collins, O. and Bogue, J. (2015), “Designing health promoting foods for the ageing population: a qualitative approach”, *British Food Journal*, Vol. 117 No. 12, pp. 3003-3023.
- Cox, D.N., Evans, G. and Lease, H.J. (2011), “The influence of product attributes, consumer attitudes and characteristics on the acceptance of: (1) novel bread and milk, and dietary supplements and (2) fish and novel meats as dietary vehicles of long chain omega 3 fatty acids”, *Food Quality and Preference*, Vol. 22 No. 2, pp. 205-212.
- de Barcellos, M.D., Kugler, J.O., Grunert, K.G., Van Wezemael, L., Perez-Cueto, F.J.A., Ueland, O. and Verbeke, W. (2010), “European consumers’ acceptance of beef processing technologies: a focus group study”, *Innovative Food Science & Emerging Technologies*, Vol. 11 No. 4, pp. 721-732.
- Decker, E.A. and Park, Y. (2010), “Healthier meat products as functional foods”, *Meat Science*, Vol. 86 No. 1, pp. 49-55.
- Diepeveen, S., Ling, T., Suhrcke, M., Roland, M. and Marteau, T.M. (2013), “Public acceptability of government intervention to change health-related behaviours: a systematic review and narrative synthesis”, *BMC Public Health*, Vol. 13, pp. 756-766.
- Drescher, L.S., de Jonge, J., Goddard, E. and Herzfeld, T. (2012), “Consumer’s stated trust in the food industry and meat purchases”, *Agriculture and Human Values*, Vol. 29 No. 4, pp. 507-517.
- European Commission (2006), “Regulation (EC) No. 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods”, *Official Journal of the European Union*, Vol. 49 No. L404, pp. 9-25.
- European Commission (2012), “Commission regulation (EU) No 432/2012 of 16 May 2012 establishing a list of permitted health claims made on foods, other than those referring to the reduction of disease risk and to children’s development and health”, *Official Journal of the European Union*, Vol. 55 No. L136, pp. 1-40.
- European Commission (2013), “EU register of nutrition and health claims made on foods”, available at: <http://ec.europa.eu/nuhclaims/> (accessed 17 October 2014).
- Ewen, S. and Vatanparast, H. (2013), “Current mandatory fortificants in developed nations compared to developing nations”, in Preedy, V.R., Srirajaskanthan, R. and Patel, V.B. (Eds), *Handbook of Food Fortification and Health: From Concepts to Public Health Applications*, Vol. 1, Springer, New York, NY, pp. 15-30.
- Food Standards Australia New Zealand (2009), “Australian user guide: mandatory folic acid fortification”, available at: www.foodstandards.gov.au/code/userguide/Documents/Mandatory%20Folic%20Acid%20Fortification%20User%20Guide.doc (accessed 10 January 2015).
- Food Standards Australia New Zealand (2013), “Mandatory fortification brochure for health professionals”, available at: www.foodstandards.gov.au/consumer/nutrition/folicmandatory/Documents/Mandatory%20Fortification%20Brochure%20for%20Health%20Professionals.pdf (accessed 19 November 2014).
- Global Industry Analysts Inc. (2010), “Functional foods and drinks – a global strategic business report”, available at: www.strategyr.com/Functional_Foods_And_Drinks_Market_Report.asp (accessed 20 November 2014).

- Grasso, S., Brunton, N.P., Lyng, J.G., Llorca, F. and Monahan, F.J. (2014), "Healthy processed meat products – regulatory, reformulation and consumer challenges", *Trends in Food Science & Technology*, Vol. 39 No. 1, pp. 4-17.
- Grunert, K.G. (2006), "Future trends and consumer lifestyles with regard to meat consumption", *Meat Science*, Vol. 74 No. 1, pp. 149-160.
- Hannon, E.M., Kiely, M. and Flynn, A. (2007), "The impact of voluntary fortification of foods on micronutrient intakes in Irish adults", *British Journal of Nutrition*, Vol. 97 No. 6, pp. 1177-1186.
- Hathwar, S.C., Rai, A.K., Modi, V.K. and Narayan, B. (2012), "Characteristics and consumer acceptance of healthier meat and meat product formulations – a review", *Journal of Food Science and Technology-Mysore*, Vol. 49 No. 6, pp. 653-664.
- Hennessy, A., Walton, J. and Flynn, A. (2013), "The impact of voluntary food fortification on micronutrient intakes and status in European countries: a review", *Proceedings of the Nutrition Society*, Vol. 72 No. 4, pp. 433-440.
- Holm, L. (2003), "Food health policies and ethics: lay perspectives on functional foods", *Journal of Agricultural & Environmental Ethics*, Vol. 16 No. 6, pp. 531-544.
- Hung, Y., Verbeke, W. and de Kok, T.M. (2016), "Stakeholder and consumer reactions towards innovative processed meat products: insights from a qualitative study about nitrite reduction and phytochemical addition", *Food Control*, Vol. 60, pp. 690-698.
- International Food Information Council Foundation (2014), "Food fortification in today's world", available at: www.foodinsight.org/Newsletter/Detail.aspx%3Ftopic%3DFood_Fortification_in_Today_s_World (accessed 8 March 2016).
- Jauho, M. and Niva, M. (2013), "Lay understandings of functional foods as hybrids of food and medicine", *Food, Culture & Society*, Vol. 16 No. 1, pp. 43-63.
- Jimenez-Colmenero, F., Carballo, J. and Cofrades, S. (2001), "Healthier meat and meat products: their role as functional foods", *Meat Science*, Vol. 59 No. 1, pp. 5-13.
- Kloosterman, J., Bakker, M.I., de Jong, N. and Ocke, M.C. (2008), "Framework for intake simulation of functional ingredients", *Public Health Nutrition*, Vol. 11 No. 3, pp. 279-287.
- Korzen, S., Sandoe, P. and Lassen, J. (2011), "Pure meat – public perceptions of risk reduction strategies in meat production", *Food Policy*, Vol. 36 No. 2, pp. 158-165.
- Lahteenmaki, L., Lampila, P., Grunert, K., Boztug, Y., Ueland, O., Astrom, A. and Martinsdottir, E. (2010), "Impact of health-related claims on the perception of other product attributes", *Food Policy*, Vol. 35 No. 3, pp. 230-239.
- Lalor, F. and Wall, P. (2011), "Health claims regulations: comparison between USA, Japan and European Union", *British Food Journal*, Vol. 113 No. 2, pp. 298-313.
- Landstrom, E., Hursti, U.K. and Magnusson, M. (2009), "Functional foods compensate for an unhealthy lifestyle. Some Swedish consumers' impressions and perceived need of functional foods", *Appetite*, Vol. 53 No. 1, pp. 34-43.
- Linseisen, J., Rohrmann, S., Norat, T., Gonzalez, C.A., Iraeta, M.D., Gomez, P.M., Gomez, P.M., Chirlaque, M.D., Pozo, B.G., Ardanaz, E., Mattisson, I., Pettersson, U., Palmqvist, R., Van Guelpen, B., Bingham, S.A., McTaggart, A., Spencer, E.A., Overvad, K., Tjonneland, A., Stripp, C., Clavel-Chapelon, F., Kesse, E., Boeing, H., Klipstein-Grobusch, K., Trichopoulou, A., Vasilopoulou, E., Bellos, G., Pala, V., Masala, G., Tumino, R., Sacerdote, C., Del Pezzo, M., Bueno-de-Mesquita, H.B., Ocke, M.C., Peeters, P.H., Engeset, D., Skeie, G., Slimani, N. and Riboli, E. (2006), "Dietary intake of different types and characteristics of processed meat which might be associated with cancer risk – results from the 24-hour diet recalls in the European Prospective Investigation into Cancer and Nutrition (EPIC)", *Public Health Nutrition*, Vol. 9 No. 4, pp. 449-464.

- Margetts, B.M., Martinez, J.A., Saba, A., Holm, L. and Kearney, M. (1997), “Definitions of ‘healthy’ eating: a pan-EU survey of consumer attitudes to food, nutrition and health”, *European Journal of Clinical Nutrition*, Vol. 51 No. S2, pp. S23-S29.
- Marotta, G., Simeone, M. and Nazzaro, C. (2014), “Product reformulation in the food system to improve food safety. Evaluation of policy interventions”, *Appetite*, Vol. 74, pp. 107-115.
- Nocella, G. and Kennedy, O. (2012), “Food health claims – what consumers understand”, *Food Policy*, Vol. 37 No. 5, pp. 571-580.
- Regan, A., Shan, L.C., Wall, P. and McConnon, A. (2016), “Perspectives of the public on reducing population salt intake in Ireland”, *Public Health Nutrition*, Vol. 19 No. 7, pp. 1327-1335.
- Regan, A., McConnon, A., Kuttschreuter, M., Rutsaert, P., Shan, L., Pieniak, Z., Barnett, J., Verbeke, W. and Wall, P. (2014), “The impact of communicating conflicting risk and benefit messages: an experimental study on red meat information”, *Food Quality and Preference*, Vol. 38, pp. 107-114.
- Rudder, A., Ainsworth, P. and Holgate, D. (2001), “New food product development: strategies for success”, *British Food Journal*, Vol. 103 No. 9, pp. 657-671.
- Scrinis, G. (2008), “Functional foods or functionally marketed foods? A critique of, and alternatives to, the category of ‘functional foods’”, *Public Health Nutrition*, Vol. 11 No. 5, pp. 541-545.
- Siro, I., Kapolna, E., Kapolna, B. and Lugasi, A. (2008), “Functional food. Product development, marketing and consumer acceptance – a review”, *Appetite*, Vol. 51 No. 3, pp. 456-467.
- Tobin, B.D., O’Sullivan, M.G., Hamill, R. and Kerry, J.P. (2014), “European consumer attitudes on the associated health benefits of neutraceutical-containing processed meats using Co-enzyme Q10 as a sample functional ingredient”, *Meat Science*, Vol. 97 No. 2, pp. 207-213.
- Toldra, F. and Reig, M. (2011), “Innovations for healthier processed meats”, *Trends in Food Science & Technology*, Vol. 22 No. 9, pp. 517-522.
- Traill, B.W. (2012), “Economic perspectives on nutrition policy evaluation”, *Journal of Agricultural Economics*, Vol. 63 No. 3, pp. 505-527.
- Urala, N. and Lahteenmaki, L. (2004), “Attitudes behind consumers’ willingness to use functional foods”, *Food Quality and Preference*, Vol. 15 Nos 7-8, pp. 793-803.
- Urala, N. and Lahteenmaki, L. (2007), “Consumers’ changing attitudes towards functional foods”, *Food Quality and Preference*, Vol. 18 No. 1, pp. 1-12.
- Van Wezemael, L., Verbeke, W., de Barcellos, M.D., Scholderer, J. and Perez-Cueto, F. (2010), “Consumer perceptions of beef healthiness: results from a qualitative study in four European countries”, *BMC Public Health*, Vol. 10, pp. 342-351.
- Verbeke, W. (2005), “Consumer acceptance of functional foods: socio-demographic, cognitive and attitudinal determinants”, *Food Quality and Preference*, Vol. 16 No. 1, pp. 45-57.
- Verbeke, W. (2006), “Functional foods: consumer willingness to compromise on taste for health”, *Food Quality and Preference*, Vol. 17 Nos 1-2, pp. 126-131.
- Verbeke, W., Perez-Cueto, F.J.A., de Barcellos, M.D., Krystallis, A. and Grunert, K.G. (2010), “European citizen and consumer attitudes and preferences regarding beef and pork”, *Meat Science*, Vol. 84 No. 2, pp. 284-292.
- WHO International Agency for Research on Cancer (2015), “IARC monographs evaluate consumption of red meat and processed meat”, available at: www.iarc.fr/en/media-centre/pr/2015/pdfs/pr240_E.pdf (accessed 16 November 2015).

BFJ
118,7

World Cancer Research Fund (2007), "Food, nutrition, physical activity, and the prevention of cancer: a global perspective", available at: www.dietandcancerreport.org/cancer_resource_center/downloads/Second_Expert_Report_full.pdf (accessed 9 January 2015).

World Health Organization (2006), "Guidelines on food fortification with micronutrients", available at: www.who.int/nutrition/publications/micronutrients/9241594012/en/ (accessed 8 March 2016).

1730

Zhang, W.A., Xiao, S., Samaraweera, H., Lee, E.J. and Ahn, D.U. (2010), "Improving functional value of meat products", *Meat Science*, Vol. 86 No. 1, pp. 15-31.

Corresponding author

Frank J. Monahan can be contacted at: frank.monahan@ucd.ie

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgroupublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com

This article has been cited by:

1. SchnettlerBerta, Berta Schnettler, SepúlvedaNéstor, Néstor Sepúlveda, BravoSilvana, Silvana Bravo, GrunertKlaus G., Klaus G. Grunert, HuecheClementina, Clementina Hueche. 2018. Consumer acceptance of a functional processed meat product made with different meat sources. *British Food Journal* **120**:2, 424-440. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
2. TalaveraMartin, Martin Talavera, Chambers IVEdgar, Edgar Chambers IV. 2017. Using sensory sciences help products succeed. *British Food Journal* **119**:10, 2130-2144. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
3. ShanLiran Christine, Liran Christine Shan, ReganÁine, Áine Regan, MonahanFrank J., Frank J. Monahan, LiChenguang, Chenguang Li, LalorFiona, Fiona Lalor, MurrinCeline, Celine Murrin, WallPatrick G., Patrick G. Wall, McConnonÁine, Áine McConnon. 2017. Consumer preferences towards healthier reformulation of a range of processed meat products. *British Food Journal* **119**:9, 2013-2026. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]