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Consumer preferences towards healthier reformulation of a range of processed meat products

Processed
meat products

A qualitative exploratory study

2013

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Abstract

Purpose – In response to increasing public health concerns about processed meat consumption, many innovations in meat technology focus on health-oriented product reformulations. Processed meat is not a homogeneous food category. The purpose of this paper is to explore consumer perception of the “healthier” reformulation of different processed meat products using two approaches: salt and fat reduction; and enrichment with healthy ingredients.

Design/methodology/approach – Seven focus group interviews were carried out with 40 Irish regular meat consumers (30 female, ten male) who were solely or jointly responsible for food shopping. Two rounds of card sorting procedures were employed to reveal perceptions on reformulation of 20 different processed meat products. Thematic analysis was used for analysing transcripts.

Findings – Health and flavour concerns and product popularity were the main factors influencing participants’ perceptions. Some participants were unsure or had misconceptions about the healthiness of certain meat products. Participants suggested reducing salt and fat content in processed meat products they perceived as the least healthy ones (theme 1) and improving the healthiness of products which were favoured by children (theme 2) and those meat products which people consumed regularly as a source of protein (theme 3). Participants were not in favour of any reformulation of speciality-type products (theme 4).

Originality/value – Consumer insights identified in this study can inform future approaches to making processed meats healthier.

Keywords Focus groups, Consumer, Preference, Functional food, Meat

Paper type Research paper



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Introduction

Processed meat refers to all meat items that are processed for preservation by salting, curing (addition of NaCl containing nitrite or nitrate), smoking, marinating or cooking, or those that have been bought as a ready-to-eat product (Linseisen *et al.*, 2006; Food and Agriculture Organization of the United Nations, 2008). Examples of processed meat include ham, bacon, salami, sausages, processed luncheon meats, beef burgers and chicken nuggets (Linseisen *et al.*, 2006; Food and Agriculture Organization of the United Nations, 2008). High consumption of processed meat products has been associated with adverse health effects such as coronary heart disease, diabetes mellitus and cancer (Micha *et al.*, 2010; Rohrmann *et al.*, 2013). In 2015, the International Agency for Research on Cancer announced that they classified processed meat as “carcinogenic to humans”, based on sufficient evidence that the consumption of processed meat causes colorectal cancer in humans (International Agency for Research on Cancer, 2015). This announcement brought the health risks associated with this food category once again into the spotlight. Despite such health concerns, a proportion of the meat regularly consumed is in the form of processed meat (Verbeke *et al.*, 2010). In European countries, the total processed meat intake is between 11 and 48 g per day in women and 19 and 89 g per day in men (Linseisen *et al.*, 2006). In Ireland, processed meat is a major contributor to excessive salt intake and its consumption is negatively associated with the overall diet quality (Cosgrove *et al.*, 2005; Irish Universities Nutrition Alliance, 2011a). Public education and communication campaigns can be implemented to encourage the reduction in processed meat consumption, however, it is known that such campaigns can meet challenges: while consumers can be informed about the scientifically assessed risk, they will draw upon a wider set of values in making their own “risk assessment” and purchase decisions, for example, weighing up their demands for convenient and tasty meat products (Font-I-Furnols and Guerrero, 2014; Grunert, 2006; Verbeke *et al.*, 2010). Another strategy involves healthier reformulations of processed meat products. Public health authorities have long called on the private sector to engage in reformulation of existing products to make them healthier for the consumer (World Health Organization, 2004). This strategy includes approaches like reducing salt, fat and nitrites/nitrates and the enrichment of processed meat with ingredients beneficial to health, such as minerals, vitamins, natural antioxidants and dietary fibre (Grasso *et al.*, 2014; Yadav *et al.*, 2016).

It has been shown that consumers are positive about low salt meat, low nitrite meat, and meat preserved by herbs and berries (Guardia *et al.*, 2006; Haugaard *et al.*, 2014; Hung *et al.*, 2016; Regan *et al.*, 2016), but are unsure about enriching meat products with healthy ingredients, because of their opposition to “over-manipulation” of meat products, low familiarity with processed meat as a functional food, and uncertainties about the overall health characteristics of the final product (Hung *et al.*, 2016; Shan *et al.*, 2016; Tobin *et al.*, 2014). These studies do not differentiate between different types of processed meat products. No study has yet investigated which type of processed meat consumers are willing to see reformulated to be healthier, and the reasons behind their selection. This question is of importance since this food category is large and far from homogeneous, covering a wide range of products. The fat and salt content varies significantly from one type of processed meat to another (Bolger *et al.*, 2016; Chizzolini *et al.*, 1999), as does the processing methods applied (salting, curing, heating, comminuting and mixing, fermentation or drying) (Food and Agriculture Organization of the United Nations, 2008), the consumption (eaten everyday, every weekend, or only on special occasions), eating occasion (eaten with family and friends, or eaten alone), and eating location (at home, or away from home) (Desmond, 2006; Grunert *et al.*, 2011). Furthermore, many studies indicate that the base food (i.e. the food carrier of healthy ingredients) is a key determinant of consumer perception and acceptance of healthier reformulated foods, especially functional foods (Annunziata and Vecchio, 2013; Ares and Gambaro, 2007; Cox *et al.*, 2011; Hailu *et al.*, 2009).

Therefore, the base meat product is likely to be an important factor influencing the acceptance of healthier processed meat.

Food scientists and processors tend to prioritise product composition and technological feasibilities when selecting the base meat product for salt and fat reduction (Colmenero, 2000; Desmond, 2006). In terms of incorporating healthy ingredients, meat products that are compatible with and can best maintain the functionality of the healthy ingredients are considered as the best choices (Khan *et al.*, 2011). Consumers' product preferences may or may not coincide with food scientists' priorities. It is commonly accepted that the failure rate for new products on the food market is between 60 and 80 per cent (Grunert *et al.*, 2004). One explanation for this failure is a tendency to postpone the generation of consumer insights until the physical prototypes of the products are ready (Grunert *et al.*, 2011). To minimise the risk of developing a healthier processed meat product with low probability of consumer acceptance, and to avoid overlooking potential opportunities, it is crucial to explore and take into account consumers' preference. Using Ireland as an example, this study set out to explore if consumers are more likely to accept the reformulation of certain processed meat products over others, and what factors influence this acceptance.

Drawing on the broad literature regarding functional food, consumer preference for the base food product is influenced by the product's health characteristics (Siro *et al.*, 2008). It is unclear which of the "healthier" or the "less healthy" foods would be more appropriate for the incorporation of healthy ingredients. Some studies indicate that the base food should be healthy in its own right, because health claims are evaluated most positively when attached to a healthy food (Siegrist *et al.*, 2008; Roe *et al.*, 1999). In addition, the enrichment of unhealthy foods could potentially lead to a false association with health, which consumers may not approve of (Patch *et al.*, 2005; van der Zanden *et al.*, 2014). Other studies, however, point in the opposite direction: consumers may find enrichment of unhealthy foods more justified, as they may question the necessity of making healthy foods more wholesome (Bech-Larsen and Grunert, 2003; Lampila *et al.*, 2009). Apart from the health characteristics, the consumption level of the base food can be another factor. For instance, consumers may prefer to see healthy ingredients being added into frequently consumed foods, so that they can gain the healthy benefits or alleviate nutritional deficiencies quickly (van Kleef *et al.*, 2005; van der Zanden *et al.*, 2014).

Methods

Study design and sampling

A qualitative approach was used because this study is an initial exploration of consumer preferences regarding healthier processed meats. A focus group study design was chosen to take advantage of group dynamics (i.e. interactions between participants) which allows for a better observation of consensus and disagreements between individuals (Belk *et al.*, 2013). The sampling method and the overall focus group procedure have been described in a previous study (Shan *et al.*, 2016), which was generated from the same focus group but investigated different research questions (i.e. what strategies consumers would recommend to make processed meat healthier?; and what are consumers' attitudes towards the idea of processed meat-based functional food?), and reported different findings.

Participants were recruited based on a predetermined sampling scheme consisting of seven groups: three female groups aged between 18-30, 31-40, and 41-50, two female groups over the age of 50, one male group between 18 and 50, and one male group over 50. The sampling scheme was decided in light of previous qualitative studies investigating consumer insights into functional foods (Cornish, 2012; Lalor *et al.*, 2011; Landstrom *et al.*, 2009). The rationale of including more females and middle aged people was that women typically take the main responsibility for food shopping and preparation – they are the main "gatekeepers" of the family diet; furthermore middle aged and older people are more likely to have diet-related

health challenges, and thus are more active in taking preventative actions (Nocella and Kennedy, 2012; Siro *et al.*, 2008; Verbeke, 2005). Focus groups were divided by age and gender because it is recommended that participants within each group should be relatively homogeneous with respect to socio-demographic characteristics, so that participants would be comfortable talking to the interviewer and to each other (Belk *et al.*, 2013; Rabiee, 2004). In addition, the within-group homogeneity can also aid the researcher to capitalise on people's shared experiences (Kitzinger, 1995). In the current study, we decided to opt for within-group homogeneity and between-group heterogeneity as this not only allowed us to gather truthful and rich data within each group, but also allowed us to capture a diverse range of views. Recruitment was restricted to consumers who ate meat or meat products at least once a week and consumers who were solely or jointly responsible for food shopping. Between five and seven participants attended each focus group. The final sample included 40 participants (30 females and ten males). Nearly half of the participants (47.5 per cent) had a bachelor's degree, and 50 per cent of participants had children living at home. With regard to meat consumption habits, almost all participants consumed fresh meat at a frequency of one to three times a week (37.5 per cent) or more than three times a week (57.5 per cent), and 68 per cent participants consumed processed meat at least once a week.

Focus group procedure and the card sorting tasks

A semi-structured topic guide was used to capture participants' views and preferences (Shan *et al.*, 2016). The main discussions were focused on two product reformulation strategies: reducing salt and fat content, and adding healthy ingredients. For both reformulation strategies, participants expressed their general opinions, followed by a card sorting task to reveal which processed meats they felt were preferable for the indicated reformulation and, more importantly, to understand the reasons why people may or may not prefer certain products. In all, 20 processed meat products were chosen: beef burger, black/white pudding (a common processed meat found on the Irish market consisting of oatmeal, pork or beef fat, and pork blood), breakfast sausage, chicken nugget, chorizo, corned (cured) beef, deli chicken, deli ham, fish finger, frankfurter, herb sausage, leg of ham, liver pate, luncheon roll, Parma ham, pepperoni, rasher (bacon), salami, smoked salmon and stuffed turkey. This range of products covered four main meat species (i.e. beef, pork, poultry and fish) and five processed meat categories (i.e. fresh processed meat products, cured meat pieces, raw-cooked products, precooked/cooked products, and fermented sausages) as defined by the Food and Agriculture Organization of the United Nations (2008).

Pictures of processed meats were presented as cards (4.5 cm × 4.5 cm, see examples in Figure 1) glued on sticky notes of the same size so that the cards could be easily attached on the sorting sheet by category. All cards were provided to each participant. Participants were instructed to individually sort all the 20 cards by placing each of them under one of three categories on the sorting sheet – an A3-size paper board. For the strategy of reducing negative constituents, the three categories were “preferable for salt or fat reduction”, “no opinion”, and “keep it as it is”; for the strategy of adding health

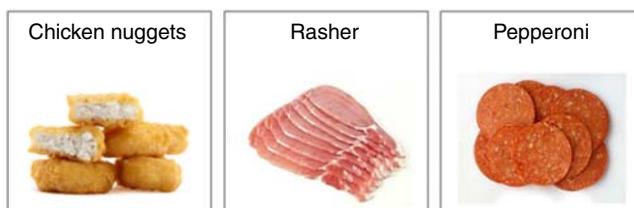


Figure 1.
Example of cards
used in the
sorting task

benefits, the three categories were “preferable for adding health beneficial ingredients”, “no opinion”, and “keep it as it is”. All participants performed, in total, two rounds of sorting and they were allowed to put several or no cards under any category. Researchers were aware that the appearance of the picture might affect the decision making, and participants were informed the pictures were for illustrative purpose only. Once the card sorting was finished, participants were not allowed to move their cards. In the following step, participants were asked to clarify their reasoning as individuals one by one. They were encouraged to comment on each other’s sorting. At the end, the sorting sheets were photographed. The overall card sorting procedure resembles the method used by van der Zanden *et al.* (2014).

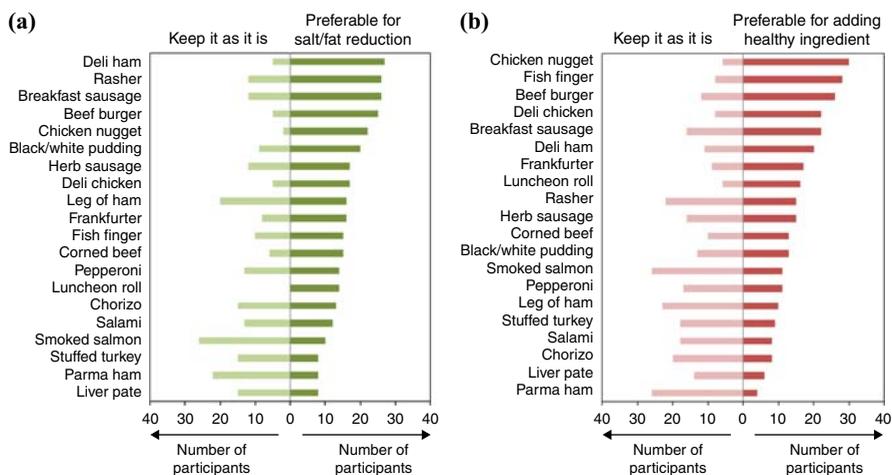
Data analysis

Focus group recordings were transcribed verbatim. Participants’ names were replaced with pseudonyms to ensure anonymity. Following the thematic analysis procedure (Braun and Clarke, 2006), the transcripts were analysed with the assistance of Nvivo 10 (QSR International Pty Ltd, Victoria, Australia, 2012). The first author first read through all the transcripts and marked ideas for coding. By doing so, the first author became familiar with the depth and breadth of the entire data set, and the potential influence of “order effect” (i.e. transcripts from different focus groups were coded in a certain sequence) on data interpretation, in the following steps, was minimised (Braun and Clarke, 2006). In the next step, a preliminary coding was performed to identify and code information related to the research questions. Coded data were read again while codes with similar underlying meanings were merged, and code names were refined. Sub-themes and themes were then built up using a matrix. Data extracts under each theme were reviewed to assess whether they formed a coherent pattern. To test inter-coder reliability, 50 per cent of the data were coded by the second author who is experienced in qualitative analysis. Any disagreements in coding were resolved through further discussion of the coded data. In addition, another author who was not directly involved in data collection and analysis was invited to read the transcripts and check the validity and accuracy of themes in terms of reflecting the meanings of the data. Following further discussions amongst the author team, the illustrative names and reporting of themes were reviewed and finalised. Our analysis indicated that a sufficient level of information saturation (i.e. the point in data collection when new data no longer bring additional insights to the research questions) had been achieved within the seven focus groups carried out.

Results

Card sorting results

On the whole, participants expressed more support for salt and fat reduction than the addition of healthy ingredients (Figure 2). This observation echoes the general impression from our focus groups that participants were more positive about reducing salt and fat than adding healthy ingredients. On a product level, the ranking (Figure 2) is in itself not widely applicable since the research sample is small. However, it gives an impression of participants’ view of different products. Thus, chicken nuggets, deli ham, beef burgers, deli chicken and breakfast sausages ranked high for both types of reformulation. Some other products were preferred for one reformulation, but not necessarily the other. For instance, fish fingers were highly preferred for healthy ingredient enrichment while rasher (bacon) and black/white pudding gained strong support for salt and fat reduction. On the other hand, smoked salmon and Parma ham were the least preferred products for reformulations of any manner, followed by leg of ham, liver pate, stuffed turkey, salami and chorizo.



Notes: $n=40$. (a) Card sorting based on product preference for salt and fat reduction. The x -axis indicates the number of participants that used the sorting option “preferable for salt or fat reduction” (dark green) or “keep it as it is” (light green); (b) card sorting based on product preference for healthy ingredient enrichment. The x -axis indicates the number of participants that used the sorting option “preferable adding health beneficial ingredients” (dark red) or “keep it as it is” (light red)

Figure 2.
Results from
two rounds of card
sorting tasks

It is worth noting that, not all participants had meat products under each available sorting category. For instance, when sorting based on preference for salt and fat reduction was considered, one taste-oriented participant was not willing to see any product altered, and thus put nothing in the “preferable” category. In contrast, a few participants, all female, selected all products for fat and salt reduction except for those they seldom purchased. In the sorting related to adding healthy ingredients, more participants took an extreme approach: several participants (all of them above 40 years old) had no cards in the “preferable” category as a result of lack of interest or opposition to the product concept. Some female participants placed almost all products in the “preferable” category, based on the logic that if processed meats can be improved without too much compromise on taste, they should be.

Reasoning for participants’ preference

Rather than relying on a single criterion, a large proportion of participants used combined reasons in explaining their preference. Health and nutrition concerns in relation to products’ inherent characteristics (e.g. salt and fat content, other non-meat ingredients, processing level, etc.), product consumption among populations, and flavour concerns were the main determinants of participants’ choice. Through thematic analysis of the focus group transcripts, four themes were identified. These four themes were mentioned in all seven focus groups, with only slight differences for age and gender noted.

Reducing salt and fat content in products that are perceived as least healthy (theme 1). In general, participants suggested reducing salt and fat content in processed meat products that were perceived as least healthy, but they were not sure if these products were suitable for healthy ingredient enrichment.

In terms of salt and fat reduction, participants expected to see this reformulation in products which were believed to already contain high levels of salt and fat, and also to

highly processed products believed to contain too many preservatives and non-meat ingredients. Some participants further implied they were willing to try to increase the consumption of certain products if the salt and fat content had been reduced. Participants were not in favour of alteration of meat products they referred to as “natural”, “low salt/fat”, and “healthier”:

James: The one thing I would prefer to see less salt in would be the black and white pudding, sausages, and rashers [...]. Because I think there's too much salt in them, too much preservatives, too processed (male, 50+).

Susan: I'd put the fish fingers in the same category [the “keep it as it is” category] as the smoked salmon and the Parma ham. They're not particularly unhealthy (female, 41-50).

Very few participants expressed different viewpoints: they suggested giving up products that were expected to be unhealthy because nothing would actually change their bad reputation.

It is interesting to see that the specific products perceived as “high salt and fat” and “bad” varied from one person to another. Participants relied on different evidence to make the judgement, such as visual cues (e.g. “you can see the fat”, “pepperoni is red [...] meat is not meant to be that colour”), perceived taste cues (e.g. “horribly salty and almost inedible to me”), cooking experience (e.g. “you don't need to add salt to them”, “an awful lot of fat comes from them when you put them on the grill”) and individual beliefs and knowledge (e.g. “as far as I know corned beef is ground up and mixed with other things”). Our analysis showed that, overall, fermented sausages (salami, chorizo, and pepperoni), rashers (bacon), beef burgers, and chicken nuggets were cited as the least healthy options, whereas, deli chicken, stuffed turkey, fish products, and herb sausages (because of the ingredient herb) were commonly considered “not that bad” or even “healthy”. Nevertheless, very noticeable uncertainties and inconsistencies existed in participants' perceptions. A few participants were unsure about the nutrition facts in sausage-type products. In addition, some had misconceptions around cured and smoked meat, and they based their decision on whether they believed salt was artificially added or naturally existed:

Alice: If it [salt] is added to it [ham], I think it should be taken out. But if it's not and it's just naturally there, just leave it as it is (female, 31-40).

Jacqueline: You [Kate] put it [smoked salmon] in under the salt one, lesser salt, but I don't know that they put salt in it, do they? I think it's just the smoked is what keeps that [...] (female, 50+, group 1).

In terms of selecting products for healthy ingredient enrichment, fewer participants considered product healthiness and they were not sure which of the relatively healthy or unhealthy products would be more suitable for adding health benefits. Some participants suggested working on very unhealthy products because “the least healthy obviously needs more work”. Some others had an opposing view – if the product already contained many harmful components, adding healthy compounds would not make it healthy on the whole; instead, the claims of healthy ingredients and related benefits would probably hide the negatives of the product and give some consumers a good excuse to overindulge in processed meat. The aforementioned uncertainties evoked an intense debate in the male group 18-50. Participants implied that the risks and benefits of functional meat products to individuals and populations must be carefully weighed:

Brian: If you put health benefits and stuff into a lot of fatty foods, would that make some people then feel more comfortable about eating more of them [...]. [...] he [Brian's friend] used to get smoked cod like about three times a week, and his excuse was it has omega oils [...].

Paul: But it's just some people.

David: But it's not just some people [...]. A burger with omega oils versus something a bit less processed – say a rasher with a bit of something else added onto it, [...] the rasher is going to be a little bit more beneficial [...] because the burger has so many dis-benefits to it (male, 18-50).

Improving products commonly eaten by children (theme 2). Participants were strongly in favour of adding nutrients to meat products that are popular among children. Some participants also suggested reducing salt and fat levels in these products.

Participants, mostly females, indicated that children needed a wide range of nutrients as they were growing yet it is common to have kids who are picky or fussy eaters (i.e. those who consume an inadequate variety of foods and refuse to eat fruit and vegetables). To balance the poor nutritional diet of those children, participants suggested adding nutrients to products they tended to eat frequently, such as chicken nuggets, fish fingers, burgers, luncheon roll, sausages and deli meats for school lunch:

Ashling: [...] it's stuff that kids might eat and, therefore, there might be a bit of a benefit for the kids if they do eat a lot of crappy foods (female, 31-40).

Julie: If you have a family of children who maybe are faddy, or who like chicken nuggets [...] if there is something, it might help them [...] You have to kind of win the battles you can (female, 50+, group 2).

In addition to adding nutrients, participants also felt it was crucial to reduce the risks to which children were exposed. They highlighted that food industry targeting at children should be more responsible and reduce negatives in meat products they often eat:

Elaine: The ones that I would change are chicken nuggets, the deli chicken, the luncheon roll etc. [...] my own kids ate them when they were younger, but they are so bad. And the children of the nation are being raised on them, really (female, 50+, group 2).

A male participant (age 50+) provided a different reasoning for the same idea of improving children's food: children were flexible. If children could adapt themselves to less salty and fatty flavours early on, they would benefit from that in later life.

Overall, fewer participants picked up children's foods for salt and fat reduction than for adding health benefits. A possible explanation is that some parents were more worried about sugar than salt, because sugar was perceived by participants as the cause of childhood obesity – an increasingly prevalent disease in younger populations. Furthermore, a few participants thought fat was necessary for children's growth:

Sylvia: If it is for me, I am looking for fat content. But for the kids I am more concerned with salt and sugar. They can eat fat, they need fat (female, 41-50).

Louise: If you look all the diseases the younger crowds are having, like diabetes and everything, that's caused by sugar as opposed to salt (female, 41-50).

Improving products consumers eat regularly as a source of protein (theme 3). Participants pointed to meat products people commonly ate on a daily basis for nutrition purposes for both reformulations.

From participants' perspectives, consumers obviously had more health concerns over products they consumed regularly or a lot of as opposed to those they ate "every now and then". In addition, for products people normally ate at breakfast and lunch (e.g. sandwich fillers and meat products at deli counters), they were eating them more for nutritional value and energy, than for taste. As such, the participants felt it would be worthwhile to make these products healthier:

Lorraine: In the preferable for the salt or fat reduction I put the foods [...] like the deli chicken meat and the deli ham and the leg of ham, like I think they're eating it to eat protein so I think you could do it that way (female, 18-30).

Caoimhin: And the working population at lunch time is going to delis and getting sandwiches, so a lot of this is what people are getting in their sandwiches. So, I think they would be good, general products to reduce the salt (female, 50+, group 1).

Keeping “high-end” speciality-type products as they are (theme 4). Participants were not supportive of any changes, particularly salt and fat reduction, on products they ate for distinct flavour and enjoyment.

In all seven focus groups, participants pointed out that for some products salt and fat were essential to maintain product identity and distinct flavour. Many participants then related products’ distinct flavour to their families’ and the wider meat consumers’ food enjoyment. These participants had affinity with these products – they were fond of them and they bought them. The most frequently mentioned foods were Parma ham, liver pate, smoked salmon, salami, chorizo and pepperoni. These products were described as “a delicacy”, “treat food”, “lovely products”, “starters in a restaurant”, “luxury”, etc.

Participants were not willing to see any changes to these products, because they believed or suspected that reformulations would alter the taste. In addition, participants indicated that they never bought them for “being healthy” in the first place, so why bother developing a less salty or fatty version, or adding health benefits? Several participants also indicated that they only ate these “treat foods” occasionally. If they felt worried about any undesirable healthy effects, they would rather control the consumption amount, than compromise on taste:

Ashling: Yes, I’ve kept all the things that I like occasionally – keep it as is. Don’t change the taste of those. I don’t want any healthy versions or whatever (female, 31-40).

Aideen: The liver pate – it might have a fair bit of fat in it but it’s essential for it. I think it would be gruesome if you tried to take it out (male, 50+).

Compared with salt and fat reduction, this theme was less salient in discussions related to healthy ingredients, and such discussions only occurred in female groups. Participants in general barely thought about or they felt it difficult to estimate the influence of healthy ingredients on the sensory quality of the speciality type of processed meat due to their perceived lack of knowledge and experience.

Discussion

It is expected that consumer insights from this study will usefully inform the various stakeholders involved in food product reformulation. Participants suggested reducing salt and fat content in processed meat products they perceived as the least healthy ones, improving meat products which are favoured by children and those meat products which working people eat regularly as a source of protein. They were not in favour of any alterations to the more “high-end” speciality products. These perspectives overlap with, yet differ from, aspects food scientists normally consider when taking healthier reformulation initiatives. For instance, participants paid more attention to the eating behaviour in relation to the product (i.e. consumption frequency among different population groups, and eating purpose), than some of the inherent product properties that food scientists and processors normally consider for assessing the technical feasibility (i.e. if the product is in whole cuts or comminuted, and if the product is raw or cooked) (Colmenero, 2000; Desmond, 2006; Khan *et al.*, 2011).

Product healthiness is one of the salient factors participants highlighted. From our study, it is obvious that not all of the processed meats were perceived as unhealthy. This implies the entire spectrum of processed meat is too broad to be simply described as “bad”, and thus subdivision or specification of products is necessary for processed meat related research in the future. Participants expressed consensus on giving priority to very unhealthy and overly processed meat products for salt and fat reduction, however they disagreed about

which products would be more suitable for the incorporation of functional ingredients: the “healthier” products or the “less healthy” ones. Their disagreement echoes the controversies among studies in the wider area of functional food (Bech-Larsen and Grunert, 2003; Lampila *et al.*, 2009; Patch *et al.*, 2005; Siegrist *et al.*, 2008; Siro *et al.*, 2008; van der Zanden *et al.*, 2014). Based on the findings and evidence above, we inferred that there is no simple answer as to which of the “healthy” or “unhealthy” processed meat products are more suitable for healthy ingredient enrichment. We speculated that individual differences may play a role in shaping the perceived suitability however, this warrants more research such as consumer segmentation (Hailu *et al.*, 2009; van der Zanden *et al.*, 2015).

Themes 2 and 3 within our study are related to the consumption level of different processed meat products among populations. Our findings suggest that considering “picky eating” is a relatively common problem during childhood (Dovey *et al.*, 2008; Mascola *et al.*, 2010), food scientists can enrich meat products children frequently eat with nutrients they may not have an adequate intake of. Another suggestion made by participants was to improve the health profiles of meat products that working people tend to eat as quick meals on a daily basis, such as deli meats and sandwich fillers. This is in line with previous studies suggesting that from consumers’ viewpoint, appropriate carriers of healthy ingredients should be among those which form a substantial part of their daily diet (van Kleef *et al.*, 2005; van der Zanden *et al.*, 2014).

Taste is another important issue participants raised, especially for salt and fat reduction. Similar to Soldavini *et al.* (2012), this study provides evidence that the indication of salt and fat reduction may influence perceived sensory qualities. For products that are perceived as “treat food” (e.g. Parma ham, liver pate, etc.), this influence may be negative. There has been a trend within the food industry towards “health by stealth” whereby the reformulation is carried out without informing consumers (Sibbel, 2012). If the reformulation is carried out with “treat food”, the “health by stealth” strategy may help overcome the potential negative impact of low public acceptance.

The current study also reveals knowledge gaps among consumers. For instance, some participants were unaware of the added salt in certain smoked and cured products, and were unsure about the fat content in sausage-type products. Government agencies and health experts have invested effort in educating consumers about salt, fat and health, with initiatives such as the salt campaign initiated by the UK Food Standards Agency between 2004 and 2007, the “Shake the Salt Habit” campaign launched by Safefood (an “island of Ireland” healthy eating promotion board) in 2009 and the “Fats of Life” campaign by the Irish Heart Foundation in 2013 (Shankar *et al.*, 2013; Safefood, 2009; Irish Heart Foundation, 2013). However, additional efforts are needed to increase the awareness of food products with high salt or fat properties that consumers do not necessarily know about (Kenten *et al.*, 2013; Samuel *et al.*, 2014). Another knowledge gap is related to children’s salt intake. Our study shows that fewer participants considered the diet of children for salt and fat reduction than for healthy ingredient enrichment, since salt and fat were perceived as less important risk factors for children than for adults. However, according to the Irish National Pre-School Nutrition Survey (Irish Universities Nutrition Alliance, 2011b), Irish children’s salt intake exceeds the recommended level and processed meat is the largest contributor to their salt intake.

Our findings have several implications for achieving both public health and economic goals. For instance, the finding that people preferred the “everyday” meats to be improved is promising, because the most frequently consumed meats would have the most impact on public health. As suggested by the UK Food Standards Agency (2009), food products that contribute the most salt to people’s diets are not necessarily the saltiest, but the ones people eat most often. In our focus groups, participants also highlighted the potential and importance of improving processed meat products that were favoured by children. The designing and marketing of these products ought to be cautiously handled, in order to avoid potential misleading effects (e.g. use the reduction claim or the healthy ingredient to justify the overconsumption of processed meat).

Finally, participants expressed strong support for salt and/or fat reduction in the least healthy products; however, they differed in their views of what products were unhealthy. Considering the most salty or fatty products are usually the tastiest products, which participants were reluctant to see any alterations to, this trade-off between health concerns and the need for tasty products complicates the approaches to improvement of processed meat.

The current study is not free from limitations. To sufficiently represent the main food shoppers in the households, and those who are likely to adopt healthier food products, the sampling was biased towards women and older adults. However, it is evident that females consume less processed meat than males (Linseisen *et al.*, 2006), as such it is essential to recognise that heavy eaters of processed meat were under-represented. Hung *et al.* (2016) suggest that consumers with higher eating frequency of processed meat have higher acceptance of processed meat with natural compounds and reduced nitrite. Thus, it is reasonable to expect that, if the focus group sample had a higher representation of frequent eaters, the consumer insights collected would perhaps be more positive. Furthermore, to fulfil the research aim, the current study distinguished well between different processed meat products, but did not specify or differentiate healthy ingredients. The perceived food carrier-ingredient fit is crucial to the acceptance of functional foods (Krutulyte *et al.*, 2011). It is likely that uncertainties participants raised towards processed meat-based functional food can be partly attributed to the ambiguity around healthy ingredients.

For future research, quantitative studies with a large representative sample of processed meat consumers should be implemented to understand, for instance, at the population level, which processed meat products would be preferred over others for different health formulations, and whether consumer characteristics (e.g. nutrition literacy and level of health consciousness, processed meat consumption frequency, and social-demographic background) may influence consumer acceptance of reformulated processed meats. Another promising aspect to explore is the perceived fit between processed meats and different healthy ingredients.

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