



Stakeholder and consumer reactions towards innovative processed meat products: Insights from a qualitative study about nitrite reduction and phytochemical addition



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ABSTRACT

This focus group study explored stakeholder and consumer reactions towards innovative meat products that potentially contribute to better gut health by means of nitrite reduction and phytochemical addition. This innovation might improve both the healthiness and health image of processed meat products, in spite of concerns and challenges related to safety, taste, price and communication. Stakeholders and consumers held ambivalent reactions towards this concept. The idea of replacing nitrite with phytochemicals, which were referred to as “natural extracts” in the consumer groups, was generally favoured by both stakeholders and consumers, albeit for different reasons. Nitrite received a negative health image among consumers, while phytochemicals were generally perceived as natural and healthy. Stakeholders supported the idea of putting more efforts into the development of these new processed meat products but found it difficult to communicate about this innovation to the public, as they felt an apparent gap between consumers' perceptions and facts might exist. Consumers' concerns mainly laid on the resulting products' taste, healthiness and shelf-life. In order to be successful, the innovative meat products were expected to possess desirable sensory characteristics and proven healthiness compared to conventional meat products. Future studies are warranted to provide quantitative insight into how to design and implement effective market positioning and communication strategies regarding this type of newly developed and innovative processed meat products.

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1. Introduction

Consumers' perceived healthiness of meat products is an important determinant of meat consumption largely influencing contemporary meat industries' legitimacy and competitiveness (Grunert, Verbeke, Kügler, Saeed, & Scholderer, 2011). Processed meat consumption is often ambivalently perceived as partially beneficial and partially harmful for human health (Van Wezemael, Verbeke, de Barcellos, Scholderer, & Perez-Cueto, 2010). The positive effects mainly relate to the nutritional and safety benefits, as meat itself is an excellent dietary source of proteins, iron, zinc and vitamin B12, all providing high biological value for humans (Hathwar, Rai, Modi, & Narayan, 2012). The processing of meat into meat products improves the product's shelf-life and

microbiological safety (Aoki, Shen, & Saijo, 2010). Some negative aspects associated with particular processed meats are such as the high fat and cholesterol content and the possible cancer promoting effects related to high intakes (Valsta, Tapanainen, & Mannisto, 2005). The report of the World Cancer Research Fund (WCRF, 2007) and the American Institute for Cancer Research (AICR) indicated a weak but significant relationship between increased intake of red and processed meats and an increased risk of colorectal cancer. As a consequence, experts recommended to limit red meat and avoid processed meat intake.

Regardless of the negative associations between the consumption of specific meats or meat products and human health, and despite weak signals of meat consumption reduction in some high-income countries (Mathijs, 2015), global meat production and consumption are unlikely to experience any significant decline in the near future (Alexandratos & Bruinsma, 2012; Speedy, 2003). Anyhow, by reducing meat consumption alone, the decrease in cancer risks might not be significant and it could be accompanied

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by several drawbacks such as the loss of nutritional benefits, particularly iron which is still an important nutritional deficiency disorder affecting large parts of the global population. In addition, livestock farmers and meat industries would experience important economic hardship (Demeyer, Honikel, & De Smet, 2008) and consumers would lose the pleasure of eating processed meat products (Pérez-Cueto & Verbeke, 2009; Resano et al., 2011). Therefore, rather than expecting or watching processed meat product consumption to decline, it is more sensible both from a public health and industry commercial perspective to proactively invest in the development and promotion of innovative meat products based on scientific knowledge.

The concept of “innovative meat products” in the context of the present study refers to processed meat products with new ingredients, more specifically phytochemicals or natural bioactive compounds that potentially provide additional health benefits without compromising on safety, taste and nutritional value. Meat products could be an excellent candidate as a functional food due to the suitable matrices for phytochemical addition, the versatility in production, their intrinsic nutritious value and strong consumer appeal (Van Wezemael, Caputo, Nayga, Chryssochoidis, & Verbeke, 2014). Furthermore, adding phytochemicals during processing rather than through the livestock’s feed offers a better control over costs, quantities and overall quality of the end product (Grasso, Brunton, Lyng, Lalor, & Monahan, 2014). The resulting meat products may potentially avail of an improved health image, which could be attractive to the growing segment of health conscious consumers.

There is indeed a growing trend of consumers opting for healthier and more natural meat products (Verbeke, Pérez-Cueto, de Barcellos, Krystallis, & Grunert, 2010), partly due to the confusion and fear created by mass media coverage of information about processed meat products and cancer risk (Verbeke, Frewer, Scholderer, & De Brabander, 2007). When many negative connotations are linked to constituents that are commonly perceived as unhealthy such as food additives and preservatives (Liu, Pieniak, & Verbeke, 2014; Shim et al., 2011; Van Loco, Vandevijvere, Cimenci, Vinkx, & Gosciniy, 2015), a reduction of these substances is seemingly favoured (Kumar et al., 2012). Nitrite is a conventional food additive in various meat products, serving to inhibit the development of food spoilage caused by *Clostridium botulinum*, contributing to desirable colour development and exhibiting anti-oxidative activity that gives the characteristic flavour of cured meats (Deda, Bloukas, & Fista, 2007). However, the intake of nitrite added in meat processing may result in the formation of carcinogenic N-nitroso compounds in the stomach and large intestine in the presence of amino acids (Herrmann, Duedahl-Olesen, & Granby, 2015). In addition, it has been shown that consumers may not favour the use of sodium nitrite, regardless of the presence or absence of detailed information about this additive (Aoki et al., 2010).

With the goal of reducing potentially unhealthy ingredients in meat products, product reformulation has been identified as “probably the private-sector action that brings the most benefits” (Capacci et al., 2012). The (partial) replacement of nitrite with health-promoting substances, for instance phytochemicals, could be a promising solution to attain the goal of improving meat products. Phytochemicals are natural bioactive compounds present in vegetables and fruits, for example, and known to have a health-promoting efficacy (de Kok, van Breda, & Manson, 2008). These compounds may contribute to the preservation of food products in terms of microbiological safety and quality, owing to their strong antimicrobial and antioxidant capacity (Surh, 2003). Substantial anti-carcinogenic and anti-mutagenic properties have been identified in various phytochemicals, which can potentially protect the human gut from adverse health effects by reducing the formation

of carcinogenic N-nitroso compounds such as nitrosamines along with meat product ingestion and preventing the induction of oxidative genetic damage (Chung, Lim, & Lee, 2013; de Kok et al., 2008). Unfortunately, there are no conclusions yet on the most effective bioactive compounds for reducing the formation of N-nitroso compounds or counteracting the nitrosamine induced damage (Oostindjer et al., 2014).

Public health authorities, research institutes and meat industries have been actively searching for possibilities to replace nitrite in meat products. Several evidences suggest that this could be feasible and possibly beneficial, e.g. with the use of plant extracts, herbs and berries as natural preservatives (Burt, 2004; Davidson & Naidu, 2000; Gyawali & Ibrahim, 2014; Søltøft-Jensen & Hansen, 2005; Viskelis et al., 2009). Deda et al. (2007) have shown a promising example of reducing the nitrite level without compromising the processing and quality characteristics of frankfurter sausages by the addition of tomato paste. Haugaard, Hansen, Jensen, and Grunert (2014) reported positive consumer attitudes towards processed meat products with only natural preservatives. The authors stressed that preservation with natural extracts could be highly relevant in conventional meat production, as it minimizes the amount of chemical additives needed.

The aim of this study is to explore, compare and integrate stakeholder and consumer reactions towards innovative processed meat products, i.e. meat products with reduced nitrite and added phytochemicals that potentially contribute to a better gut health. The study aims at providing a broad spectrum of opinions and at facilitating the development, production and marketing of innovative processed meat products. The present study includes both stakeholders and consumers, as they are the main actors in the meat production chain from farm to fork. Stakeholders play a key role in product development, market positioning, marketing and legislation. Specific actions towards the development of innovative meat products will only be effective if stakeholders, in accordance with their respective domains of activity, are supportive of the idea. As the ultimate target user group, consumers are another key player. Their openness to the idea, perceptions or beliefs, and acceptance shape their future food choices and hence the potential marketplace success of innovative processed meat products (Aoki et al., 2010; Grunert et al., 2011; Verbeke, 2006). A study with an integration of reactions by stakeholders and consumers towards the concept of innovative meat products is thus extremely useful to unveil the potential benefits, challenges and chances for success of these innovative meat products.

2. Materials and methods

This study was part of the integrated project “PHYTOME”, Phytochemicals to reduce nitrite in meat products, funded within the 7th Framework programme for Research and Technological Development of the European Commission. Focus group discussion methodology was adopted. This type of qualitative research method is suitable to collect preliminary and exploratory insights, which is relevant in the present case as this innovation is at an early stage of development and new in the commercial context. Hence, stakeholders would have no or little knowledge of the feasibility and outcomes, and also consumers would have no or only limited knowledge about this innovation. Focus group discussions have been shown to be an effective way to gain exploratory insights into reactions, beliefs, attitudes and intentions from a diverse population regarding food in general (Kitzinger, 1995) and meat products in particular (Van Wezemael et al., 2010; de Barcellos et al., 2010). The strength of using focus groups pertains also to the interaction among participants in a social context, which enables the collection of less accessible data and insights and opening to themes that have

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