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Consumer attitudes toward new technique for preserving organic meat using herbs and berries

Pernille Haugaard [a,*], Flemming Hansen [b], Martin Jensen [c], Klaus G. Grunert [a]

[a] MAPP Centre for Research on Customer Relations in the Food Sector, Aarhus University, Bartholins Allé 10, DK-8000 Aarhus C, Denmark
[b] Danish Meat Research Institute, Technological Institute, Maglegaardsvej 2, DK-4000 Roskilde, Denmark
[c] Department of Food Science, Aarhus University, Kirstinebjergvej 10, DK-5792 Aarslev, Denmark

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ABSTRACT

This study aims to explore consumers' attitude toward a new preservation technique using herbs and berries in organic meat production, which enables to minimize the amount of chemical additives and to reduce the salt content in meat products. Consumer acceptance of the preservation technique using herbs and berries and intention to purchase products preserved with herbs and berries were investigated through a qualitative approach by means of three focus groups. In general, most participants were positive toward the preservation technique using herbs and berries and there were only few concerns related to the technique. Concerns were related not as much to the technique but more to the products. Four factors seem important in this relation: shelf life, taste, appearance and texture. The intention to purchase products preserved with herbs and berries is generally high, but is dependent on taste and appearance of the products, the price and information level.

1. Introduction

Since ancient times food processing has been a central part of human lives. Operations such as washing, drying, cooling, heating and storing, but also extracting, concentrating, irradiating and microwaving are examples of how processing of food is accomplished and these have over time evolved to become more and more complex to meet the challenges of consumers and society (Floros et al., 2010). A number of objectives are related to food processing for instance securing the safety and quality of the food, but preservation is probably the oldest and most common objective, aiming at increasing the shelf life of food products. Food preservation refers to the processes directed against food spoilage due to microbial action and three different directions can be used: physical methods (food is subjected to a physical treatment like pasteurization or drying), chemical methods (added preservatives) and biological methods (e.g. protective microbial starter cultures) (Lück & Jager, 1997). Some of the first preservation techniques involved drying and salting, were followed by the use of alcohol, smoke, heat treatment, sugar, sulphur dioxide and other organic acids as acetic and lactic acid. In the wake of industrialization, preservation techniques had to meet the need for commercial mass-production, leading to the development of chemical additives.

Organic food is produced according to standards that take into account environmental and animal welfare. An important principle of organic farming is that farmers use a minimum of chemical substances in organic cultivation. The standards for processed organic foods follow the ecological ideas of naturalness, with an emphasis on careful processing using the fewest possible additives. In the EU, 49 out of the 370 authorized additives (E numbers), are permitted in organic products. According to the EU regulations it is allowed to use the preservative nitrite in organic meat production, but the Danish producers have agreed on not to add nitrite in organic meat products. Instead, organic meat producers are using preservation techniques that are as natural as possible, and some of the most commonly used preservation techniques are smoking, curing, fermentation or cooking. However, organic meat producers request new preservation techniques, since for example the use of smoke in meat adds a distinctive taste to the product. Furthermore, due to agreement on not adding nitrite to the meat products and expert advice on reduction in salt intake, new and natural preservation techniques are needed.

During the last decades, scientific studies have shown that plant extracts, herbs and berries can possibly be used as natural preservatives (Burt, 2004; Davidson & Naidu, 2000; Søltoft-Jensen & Hansen, 2005; Viskelis et al., 2009). Using herbs and berries as natural preservatives will enable organic meat producers to employ a new preservation technique, minimizing the use of salt and smoke. In addition, by using different herbs and berries, it becomes possible to develop new organic meat products with new and interesting flavor variants. The preservation technique is not only interesting for the organic industry, but is also highly relevant in conventional production, as a natural preservative will minimize the amount of chemical additives needed or even make them superfluous.

* Corresponding author. Tel.: +45 8716 5404.
E-mail address: pernilleh@asb.dk (P. Haugaard).

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When developing new food processing technologies, it is important to explore consumer attitudes toward and acceptance of the technology, as this will enhance the likelihood of consumers buying the meat products once they are developed and available on the market. Consumer attitudes are central, as consumer rejection can prevent application of a technology in practice (Olsen, Grunert, & Sonne, 2010). A study on twenty different food-processing technologies has shown that some technologies are easily accepted by consumers, whereas others are rejected (Cardello, 2003). For instance, consumer attitudes toward food irradiation, a preservation method that involves exposing food items to ionizing radiation (gamma rays, X-rays or electrons), tends to be viewed as negative (Rollin, Kennedy, & Wills, 2011), which has restricted widespread application of the technology (Henson, 1995). This emphasizes the importance of understanding consumer attitude formation with regard to new food technologies.

The aim of this study is to investigate consumer attitudes toward a new preservation technique using herbs and berries in organic meat products, and to identify drivers and barriers for accepting the technique and forming intentions to purchase the products resulting from the use of the technique.

2. New preservation technique with herbs and berries

The preservation technique using herbs and berries is about reducing the specific additives nitrite and salt in meat products by replacing these components with suitable herbs and berries. Usually meat products are preserved by heat treatment to 75 °C in the product, hereby eliminating all the live bacteria. However, during the subsequent slicing and packaging, meat products might become re-contaminated by i.e. *listeria monocytogenes* found in the environment. Thus, it is important that the meat products also contain preservative agents to control this specific organism. In most products, a certain amount of salt, nitrite, lactic acid/lactate, vinegar (acetic acid/acetate) or other chemical preservatives, inhibit growth of the bacterium *listeria monocytogenes* to a level where it becomes dangerous for humans consuming the product. If these preservatives are removed from the meat products, complete growth inhibition can no longer be guaranteed and subsequently the shelf life must be shortened to avoid risk of listeriosis. In products that are not heat-treated to 75 °C, the growth inhibition is secured by i.e. low pH obtained by fermentation with lactic acid bacteria ("yogurt-bacteria") in combination with a rather high amount of salt (for instance salami, pepperoni etc.). In organic products, nitrite is unwanted, due to a possible long-term, carcinogenic effect and the general organic principles. Furthermore, an excessive intake of salt has been correlated with an increased risk of coronary heart diseases and an increased mortality, and thus health authorities urge the food industry to reduce the amount of salt in their products. The new idea is to exploit the natural content of antimicrobial compounds that can be found in herbs and berries, and replace the nitrite and a fraction of the salt with herbs and berries. The amount should be at a level that maintains the same growth inhibition as the original meat products in order to have the same shelf life, and at the same time provide the product with a unique new taste and visual appearance.

3. Method

The study sought to give insight into Danish consumers' attitudes toward a new preservation technique using herbs and berries in organic meat products. The study was qualitative, conducted by means of three focus groups. A qualitative method was chosen, because the preservation technique is in the earliest states of being developed and new in a commercial context, thus no consumers have yet any knowledge of the preservation technique. In such a case, focus groups are relevant and useful, because participants throughout the focus group interview will form attitudes toward the preservation technique as they become exposed to information from the moderator and reactions from the other participants. The strength of using focus groups in this study is that it is the interaction in the social context that produces data (Morgan, 1997) i.e., the participants can talk, share and comment on each other's statements and interpretations (Halkier, 2008). The focus groups were carried out in March and April 2011 in Denmark by a professional agency.

3.1. Design of study

An initial framework for understanding consumer attitude formation and acceptance of the new technique for preserving meat products with herbs and berries was developed as a basis for constructing an interview guide (Fig. 1). This framework was inspired by the work of Ronteltap, van Trijp, Renes, and Frewer (2007), who designed a conceptual framework for consumer acceptance of technology-based food innovations, and by the Response Hierarchy Model by Lavidge and Steiner (1961). The consumer acceptance or rejection of the new technique is influenced by the attitude toward it, which in turn is affected by the perception of risks and benefits. The analysis of risks and benefits is related both to applying the technique and to purchasing products that have applied the new technique (Olsen et al., 2010). The risk/benefit analysis is based upon the consumers' knowledge at the time of evaluating the new technique, which in this case includes knowledge of the organic concept, preservation techniques in general, and the specific herbs and berries that might be used as preservatives (see list with herbs and berries in Table 3). Furthermore, as the technique would be new in commercial production, consumer knowledge is primarily based on the information about the new technique given to the participants during the focus groups.

The process of attitude formation is affected by how information on the new technique is communicated to consumers, including the effect of different sources of communication. Further the attitude formation is affected by the characteristic of the consumers, who for instance may be classified related to their consumption patterns (low-, medium- or high users of organic products), but also related to how fast they adopt new innovations (innovators, early adopters, early majority, late majority and laggards) (Rogers, 2003).

Based on the conceptual model, an interview guide was developed. The interview guide consisted of open-ended questions designed to solicit information about (1) consumer knowledge about preservation techniques in organic food production, (2) consumer attitude toward preservation with herbs and berries, (3) consumer attitude toward specific herbs and berries, (4) barriers against acceptance of the

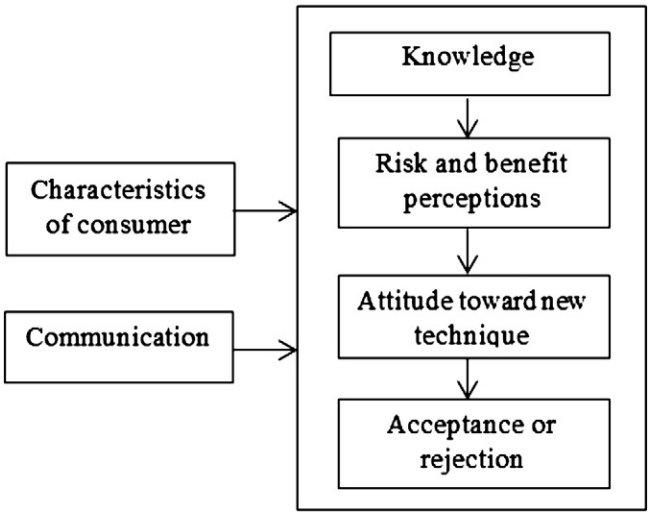

Fig. 1. Conceptual framework for attitude formation toward new technique preserving organic meat using herbs and berries.