

CONSUMER STUDIES FOR THE PORK MEAT INDUSTRY

Tania NGAPO

Food Research and Development Centre, Agriculture and Agri-Food Canada, 3600 bld. Casavant West, St-Hyacinthe, Québec, J2S 8E3, Canada, Tania.Ngapo@AGR.GC.CA

Introduction

Consumer studies with meat as the subject have been increasingly reported over the last couple of decades. Many of these are aimed at marketing to different groups of consumers, but a select few are aimed at improving meat quality and/or the meat industry. It is these latter types of studies that this presentation will focus on. In particular, using projects that I personally have been involved with over the last 15 years, I hope to provide an overview of some of the means by which consumer studies can contribute to meat science and ultimately the Meat Industry.

The consumer work that was undertaken in a 5th framework EU project entitled "Sustainability in the production of pork with improved nutritional and eating quality using strategic feeding in out-door production" employed several techniques to study consumer demand of pork. More commonly known as "SUSPORKQUAL", the project comprised seven working groups, called workpackages (WP), of which consumer demands was WP7. The aim of WP7 was to establish the perceived acceptability of pork from different production systems, that is, the interaction between the product, any information and the consumer. Note that the aim this WP was not to define the objective quality of the pork produced, but rather the consumer perception of this pork. Workpackage 5 had the task of characterizing the overall meat quality of the pork produced in the out-door production systems through carcass parameters, technological properties, shelf-life, nutritional value and eating quality measured by both laboratory analyses and sensory evaluation. Sensory evaluation is the study the reactions of any of the five senses to stimuli and so it is not incorrect to define consumer tastings as such. However, in research, sensory evaluation most often refers to studies of a trained panel to determine different levels of given characteristics or to provide descriptive analyses of a product. As a result of much standardization in methods, sensory evaluation is regarded as an objective research tool. Consumer studies, in contrast, determine consumer preferences, perceptions, likes and dislikes. The consumer should not be asked to determine levels of traits of a product, just as a sensory panelist should not be asked a product's acceptability. During tastings, the consumer is generally only asked to evaluate tenderness, juiciness, flavour or taste and overall

acceptability. While sensory panels are small, say 8-10 panelists, consumer panels can range, for example, from 100 consumers for a product tasting to more than a 1000 for a mail-out survey. Generally, the personal characteristics of the consumer are important, such as socio-demographics and eating and purchasing behavior. Such characteristics are not important from a sensory panel, but rather the panelist must be able to consistently discriminate the sought after traits.

Three types of consumer studies were used to achieve WP7, the first of which was a questionnaire to determine consumer perceptions of production practices in the pork industry. Consumers were selected based on regional demographics in Denmark, France, Sweden and England. The questionnaire contained four types of questions: socio-demographics, eating and purchasing behavior, animal production, and "food-related lifestyle". Often demographic, personality, and general attitude variables do not predict individual preference well, and so models based on attitudes and beliefs, have been developed to predict individual preference (Bass & Talarzyk, 1972). The food-related lifestyle model (Grunert et al., 1997) is just one of a number of theoretical models that have been developed to pose a minimal range of attitude-based questions to differentiate consumer groups.

The questionnaire was validated and missing areas of questioning were determined using a series of focus-groups. Focus groups are a series of controlled discussions based on a predetermined questioning route. The discussions are presided over by a mediator and another person takes notes. The groups are usually small, about ten people, and the findings, therefore, qualitative. Focus groups are often used as a precursor to quantitative questionnaires.

Once finalized, the questionnaire was posted to consumers and >500 consumers per country and a response rate of >16% (arbitrarily chosen) were achieved. While not all consumers respond in the same way and therefore results must always be interpreted with caution, the findings regarding sensitive issues and ethnocentricity were not surprising. Sensitive issues, such as intensive production systems, were important to the consumer and the home country was ranked the best producer in each country, being believed to follow rules, pollute less and produce pork that the consumer prefers.

Regardless that most consumers admitted they had little knowledge of production practices, judgments were readily expressed. Such judgments, be they unfounded or well researched, make up consumer perceptions and while these perceptions may be far from reality, they are very real to the consumer. A prime example of such a perception in meat science is that of consumer complaints of blandness leveled against modern lean meat and the frequent reference to the more strongly flavoured meat that was available years ago (Ngapo et al., 2003; Wood et al., 1999). Unfortunately there is little scientific evidence to support or refute these claims. However, regardless of the reality of these assertions, the consumer perception of deteriorated quality is real and presents a challenge for the pork industry.

Perceptions can create expectations and influence purchase decisions and appreciation of a product. This was particularly evident in the responses to the impact of outdoor production on pork where a "halo" effect was observed, such that the consumers perceived all aspects of this production system to be better than the conventional. Consumers expressed the belief that outdoor produced pork is leaner, fresher, healthier, tastier, more tender, juicier, from the home country and free from medical residues. Yet research generally shows that raising pigs outdoors has little impact on most meat quality and nutritional traits (Gandemer et al., 1990; Gentry et al., 2002; Dransfield et al., 2005; Van der Wal et al., 1993), and medical residues and origin of the pigs do not differ as a consequence of outdoor production. Note that while the meat from outdoor production was perceived better in almost every way, consumers were unanimous in their perception that meat from such a production system would be more expensive than that produced conventionally.

So how does the industry use this information? This particular study averts the industry to potential areas of difficulty that may be encountered with the complete transfer to outdoor production systems. The findings of this study suggest that the consumer has expectations of a superior quality meat from such systems. What are the consequences of not meeting these expectations? Will repeat purchases be made if the quality improvement does not meet that expected for the increase in price? Knowledge of quality differences between meats produced indoors and conventionally is essential and not a simple task noting that other production parameters will likely change, such as breed, slaughter age, feed and feeding regime. However, regardless of the objective differences, might the consumer have

an inflated gustative appreciation of the meat as a consequence of the knowledge that the animal has been produced outdoors? Perhaps labeling of the production system can achieve an improved sensory perception, regardless of actual sensory differences? Should the meat chain even contemplate change when the consumer claims that at the point of purchase they dissociate the animal from the meat?

It was hoped that some of these questions would be answered in WP7 for which the second section of work aimed at identifying the most important characteristics of a fresh meat that determine consumer choice. A number of surveys are found in the literature asking the consumer what characteristics of meat they believe important at the point of purchase (Becker et al., 2000; Diamant et al., 1976; Glitsch, 2000; O'Mahony et al., 1991, 1995; Romans & Norton, 1989; Wachholz et al., 1978; Zuidam et al., 1971). Surveys are most often based on self-reported behavior and may not be in-line with consumption data. While, such results do reveal how the consumers themselves see their behavior which was appropriate for the first section of WP7, in this second section the actual characteristics the consumer uses were of interest and not what the consumer believes they use. Furthermore, safety is often concluded as one of the most important characteristics when compared with items such as taste, nutritional quality, or place of purchase. However, safety is an aspect that to a certain level in developed countries is a right, and comparison with aspects that the consumer hopes to achieve through choice appears odd to a meat scientist. The consumer does not choose meat aiming not to be ill, but rather the purchase decision is ultimately aimed at a satisfying eating experience. Not surprisingly, the intrinsic characteristics of meat, particularly colour, marbling, fat cover and drip loss are also self-reported as important at the point of purchase in these studies and it is these characteristics that were used in our study.

A survey method was used in which consumers demonstrated their preference by selecting images. Photographs of 16 commercial pork chops were computer-modified to give two levels of each of fat cover, colour, marbling and drip. The resulting 256 images were published as a book (Dransfield et al., 2001) in which every double-page contains the 16 different chop shapes and each chop shape represents one of the combinations of the four characteristics studied. Shape was not a factor studied, but a distraction and a means to realistically present a range of characteristics to the consumer. Each consumer selected their preferred chop from a double-page. The selection was repeated from

eight different double pages that showed the same 16 appearance characteristics and chops, but in different combinations (Ngapo et al., 2004). Including the countries in WP7, the same images were surveyed by more than 12,000 consumers in 26 countries, including Mexico (Ngapo et al., 2007a,b).

In Mexico, it was observed that colour was the most important of the four characteristics studied with 61% of consumers using this characteristic to make their choice. However, while a deliberate choice, the consumers were equally divided between those who preferred the lighter red meat and those who preferred the darker (Figure 1). Fat cover was also important in choice with the majority of consumers preferring the leaner meat. Marbling and drip were of lesser importance being used by less than 40% of the consumers with little difference in marbling preferences and a preference for no drip. Four clusters of consumers were defined and these were related to the socio-demographic and eating behavior.

Figure 1. Consumer choices of the four chop characteristics studied. Significant differences observed for all four characteristics using χ^2 test are within a chop characteristic.

This survey was undertaken more than 10 years ago now and with Drs Varela and Salud, we are currently repeating the pork survey in Mexico. We have also developed a similar survey in beef and are trialing supplementary images to provide more information on consumer preferences.

On a global scale, preferences differed considerably between individuals, between groups and between countries when comparing equivalent subsets of consumers taken from each country. Most choices were based on two appearance characteristics, but a significant proportion of consumers used three. Overall, both dark and light red pork were preferred equally and often with low fat cover. Preference for light red pork was frequently chosen in association with no drip. Low fat cover was preferred by the majority of consumers, particularly in Poland, Finland and Mexico (Figure 2). Strong pork preferences were given by consumers in Ireland (the majority preferring light red, lean, no marbling and no drip), Australia (light red, lean, no marbling), Korea (marbled), Taiwan (dark red and lean) and Poland (lean).

The findings of this study allow the identification of potential improvements in market satisfaction by comparing meat

produced with consumer preferences for a given country. Where disparity exists, evaluation of the preferred characteristics of the meat at the point of purchase can provide indices for changes in production and processing mechanisms to best achieve the desired traits or where viable, on-line selection.

The aim of the third section of work was to determine the influence of information on acceptability and willingness to pay. The same image survey method was used, but the two characteristics of lesser importance, marbling and drip loss, were replaced by two sources of information, origin and production system (Dransfield et al., 2005). This information was also applied during tastings of meat obtained from pigs raised in the two production systems. And the consumer was asked how much they would be willing to pay for their preferred meat compared to a control price. The vast majority of consumers preferred the pork labeled as originating from their own country as opposed to imported and that labeled raised outdoors as opposed to indoors. Sensory evaluation by trained panel showed that the taste of grilled pork from indoor and outdoor production systems did not differ, but pork labeled as originating from the home country or raised outdoors was more appreciated by the consumer.

Figure 2. Correspondence analysis of choice strategies for consumers from 23 countries.

Willingness to pay varied widely and was higher for those consumers who found more of the characteristics they sought. Consumers only offered about 5% more pork for the home country and raised outside labels. While several methods exist to determine willingness to pay, such as simulated auctions and purchasing situations, or asking proportional or relative prices, all are at best estimations and must be viewed with much caution. With this in mind, it is interesting to note that although the consumer believes pork from outdoor production significantly better than that from indoor production, and these beliefs were sufficiently strong to positively impact on the taste perception, the consumer was only willing to invest 5% more in meat from a system that will likely cost producers significantly more than conventional indoor systems.

In a more recent study, we also added information to meat during tastings to determine the impact on taste perception (Ngapo et al., 2012c). The objective of this study was to compare consumer perception of the sensory quality of grilled Canadian pork destined for

Japanese and domestic markets, with particular reference to export selection criteria imposed by Japanese importers and transportation conditions. Québec consumers tasted local and export quality pork subjected to 'chilled' (43 days at -1.7°C) or conventional ageing (5 days at 3.1°C). Scores were higher in the 'chilled' pork for tenderness, juiciness, taste liking and overall acceptability. When informed that the conventionally aged, domestic quality pork was destined for the domestic market, scores significantly increased to achieve about the same level of appreciation as the 'chilled' pork without labeling. No effect of information was observed on the perception of the 'chilled' export quality meat, perhaps a consequence of the high sensory quality observed prior to labeling.

In the above study, consumer tastings were undertaken to verify that differences observed by a trained panel are sufficiently strong to be perceived by the consumer. While common practice in product development, few studies on meat investigate beyond the sensory panel. Differences between the 'chilled' and conventional pork were detected both by the sensory and consumer panels (Ngapo et al., 2012c, d), but this is not always the case. In a study comparing pork at 2, 4, 6, 8, 10 and 12 days ageing, increases in sensory traits were observed by a trained panel with increasing ageing period suggesting that a small increase in ageing period might provide a tool for improved market competitiveness (Ngapo et al., 2012a). However, no differences were perceived by the consumer demonstrating that increased ageing time would be of no advantage to the industry (Ngapo et al., 2012b).

This general overview of just a few studies in meat science that I personally have been involved with illustrates some of the ways that consumer science can be used in meat science. Attitude-based studies, focus groups, image surveys, labeling studies and tastings are but a few of the tools that those in the meat industry from producer to scientist to manager, can use to complement their work continually improving our meat chains.

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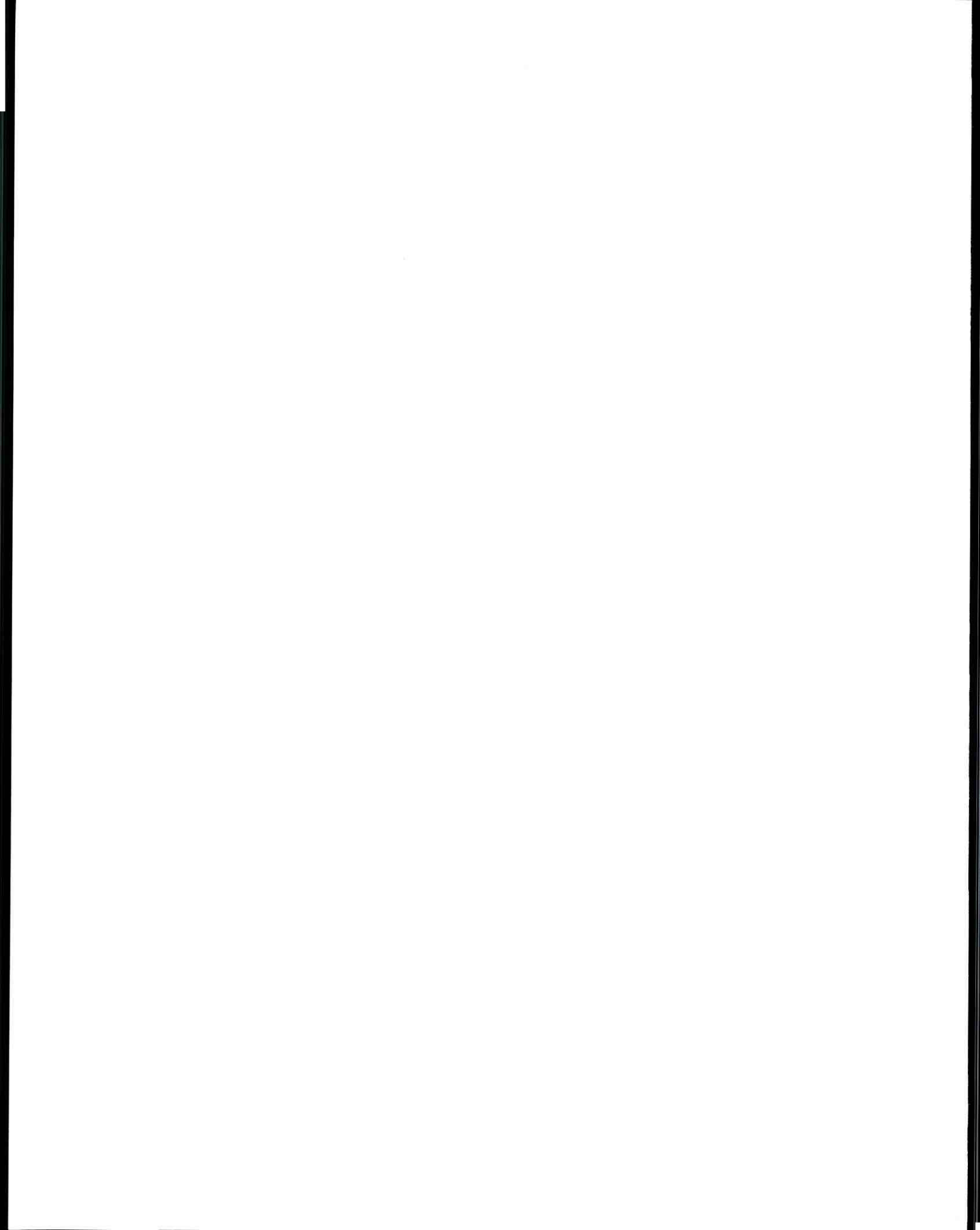
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