Meat Science 85 (2010) 788–791

Contents lists available at ScienceDirect

Meat Science

journal homepage: www.elsevier.com/locate/meatsci

# Do pig farmers preferences bias consumer choice for pork? Response to critique of the pork preference studies

T.M. Ngapo [a,*], J. Fortin [a], J.-F. Martin [b]

[a] Agriculture and Agri-Food Canada, Food Research and Development Centre, 3600 Bd Casavant Ouest, Saint-Hyacinthe, Québec, Canada J2S 8E3
[b] Unité de Maladies Métaboliques et Micronutriments, INRA, Theix, 63122 St-Genès-Champanelle, France

ARTICLE INFO

*Article history:*
Received 30 October 2009
Received in revised form 8 March 2010
Accepted 11 March 2010

*Keywords:*
Consumers
Preferences
Pork
Choice
Colour
Fat
Marbling
Drip

ABSTRACT

Québec consumers and pig farmers selected their preferred chop from 16 images that had been modified to give 16 treatments: two levels each of fat cover, colour, marbling and drip. The selection process was repeated eight times from different groups of chops. Fat cover (47% preferred lean) and colour (44%, light red) were the most frequently chosen characteristics. No significant differences were observed between farmers and consumers preferences ($\chi^2$ test, $P < 0.05$). Two preference-based clusters were found; 41% preferring dark red, lean meat and 59%, light red, lean meat, without marbling or drip. Choice-based clusters showed no significant links with either individual socio-demographic items, including pig farmer as occupation, or the three socio-demographic-based clusters observed ($\chi^2$ test, $P < 0.05$). No evidence was found to suggest that the choices of pig farmers differed from those of consumers and, therefore, inclusion of pig farmers in consumer panels would not bias consumer choice for pork.



## 1. Introduction

Using photographic images varying systematically in appearance, a programme was started in France to identify the most important characteristics of fresh pork which determine consumer choice and to show how consumer segmentation in choice relates to socio-demographic differences (Ngapo, Martin, & Dransfield, 2004). This study was undertaken in 23 countries (Chen, Guo, Tseng, Roan, & Ngapo, 2010; Cho et al., 2007; Cipolli, Silveira, Ngapo, & Dransfield, 2003; Fortomaris et al., 2006; Ngapo, Martin, & Dransfield, 2007a, 2007b; Verbeke et al., 2005) and data collection sites in many countries included agricultural shows. These shows provided a cross-section of the general public with great variation in socio-demographic attributes including consumer occupation. Regardless of this demonstrated variability, when the results of this study have been presented, comments have invariably been raised about sample bias due to high participation of pig farmers. While of no consequence to the international study, these comments evoke the question "do pig farmers really have a different preference for pork than the general public?" After all, pig farmers are merely consumers of pork, who happen to raise pigs.

The entire Canadian panel in the international study comprised 248 Quebecers and 802 Albertans, from which a representative sample of 200 consumers was selected (Ngapo et al., 2007a, 2007b). An additional 50 Québec pig farmers were surveyed as a part of the Québec panel, but due to concerns of potential sample bias these responses were not used. These responses provide an opportunity to determine if pig farmers' preferences differ from those of consumers in Québec, the aim of the present study.

## 2. Materials and methods

### 2.1. Pork chops

The method and chop characteristics are described in detail by Ngapo et al. (2004). Briefly, photographs of 16 commercial pork chops were computer-modified to give two levels of each of the characteristics: fat cover, colour, marbling and drip. The resulting 256 ($2 \times 2 \times 2 \times 2 \times 16$) images have been published as a book (Dransfield, Martin, Miramont, & Ngapo, 2001) which can be used as a tool for analysing the importance of those factors in consumer choice. The book is comprised of six series of which series 1 + 2, 3 + 4, and 5 + 6 each contain all 256 images. A series constitutes 16 (A4) pages or eight double-pages. Every double-page contains the 16 different chop shapes and each chop represents one of the combinations of the four characteristics studied. Therefore, every

* Corresponding author. Tel.: +1 450 768 3300; fax: +1 450 773 8461.
*E-mail address:* ngapotm@agr.gc.ca (T.M. Ngapo).

0309-1740/$ - see front matter 
doi:10.1016/j.meatsci.2010.03.022

double-page contains a complete set of all 16 combinations of the two levels of each of the four characteristics. Both the order of representation of the characteristics with respect to the chop shape and the position of the chops in a double-page are randomised. It is important to note that the chop shape was not a factor studied.

### 2.2. Consumers

Consumers were pork eaters older than 15 years of age and chosen at random. Consumers were surveyed in July and August of 2002 in Québec at agricultural shows and workplaces. In total 298 consumers from Québec completed the survey, including 50 pig farmers.

### 2.3. Selection

Each consumer selected their preferred chop from each double-page showing the 16 combinations of two options of each of the characteristics of colour, fat cover, marbling and drip. The selection was repeated from eight different double pages which showed the same 16 appearance characteristics and chops, but in different combinations. The consumers also completed a short questionnaire asking basic socio-demographic and purchase- and eating-behaviour information (Table 1). The questionnaire was an abridged version of that used in the international survey (Ngapo et al., 2007b). Each new consumer was given a series in the order 1–6 so that all series were used approximately equally throughout a survey period.

### 2.4. Data analyses and statistical methods

#### 2.4.1. Analysis of choices

The choices consumers made were divided into three categories for each characteristic; in the first two categories the consumer actually chose one of the two levels of the given characteristic, whereas for the third category the given characteristic was not consistently selected. The results were quantified by the definition that if $\geqslant 6$ of 8 choices for one consumer are the same for a given characteristic, the choice is a 'real' choice ($P < 0.14$). If <6 choices are the same, selection for the given characteristic is considered to be 'inconsistent'. This test assumes a binomial distribution of the results ($P = 0.5$). Significant differences in the number of choices were observed using the $\chi^2$ test ($P < 0.05$).

The number of characteristics used to form consistent choices was then obtained by calculating the percentage of consumers using 0, 1, 2, 3 or all 4 characteristics. For each consumer and using all choices, the sum of the number of times each combination of characteristics was selected is calculated. Using the sums for each combination, a contingency table is constructed comprising the consumers and their choices. Using this contingency table, a correspondence analysis using all 15 dimensions was undertaken accounting for 100% of the variability. The coordinates of each consumer obtained in the 15 dimensions of the correspondence analysis were used as the basis for cluster analyses. Firstly, a hierarchical cluster analysis using Ward distance was undertaken using the SAS CLUSTER procedure (SAS, 1999). The number of clusters to be retained was selected by considering the 'distance' between clusters and the profile of the resulting graph. A disjoint cluster analysis was then carried out using the SAS FASTCLUS procedure (SAS, 1999) forcing the consumers into the different clusters. Links between the consumer choice-based clusters and questionnaire items were determined using $\chi^2$ test. Similarly to the choice data, correspondence and cluster analyses were undertaken to define clusters based on the questionnaire items.

## 3. Results and discussion

### 3.1. Consumers

The socio-economic questionnaire composition and responses are given in Table 1. There were proportionately more consumers

**Table 1**
Questionnaire composition with responses attained for the entire consumer sample, Québec consumers and pig farmers.

| Question | Response options | Consumers (number) | | | Consumers (%) | | |
|---|---|---|---|---|---|---|---|
| | | All | Quebecers | Farmers | All | Quebecers | Farmers |
| What is your age (years)? | <35 years | 84 | 66 | 18 | 28 | 27 | 36 |
| | ⩾35 years | 213 | 181 | 32 | 71 | 73 | 64 |
| Gender? | Female | 189 | 173 | 16 | 63 | 70 | 32 |
| | Male | 107 | 73 | 34 | 36 | 29 | 68 |
| Marital status? | Single | 87 | 81 | 6 | 29 | 32 | 12 |
| | Married | 198 | 154 | 44 | 66 | 63 | 88 |
| How many people live in your household? | 1 | 27 | 25 | 2 | 9 | 10 | 4 |
| | 2 | 132 | 116 | 16 | 44 | 47 | 32 |
| | 3 | 45 | 37 | 8 | 15 | 15 | 16 |
| | 4 | 46 | 33 | 13 | 15 | 13 | 26 |
| | 5+ | 34 | 23 | 11 | 11 | 9 | 22 |
| How often do you eat meat? | Every meal, everyday | 50 | 38 | 12 | 17 | 15 | 24 |
| | Once/day, everyday | 116 | 88 | 28 | 39 | 35 | 56 |
| | Several times/week | 116 | 107 | 9 | 38 | 43 | 18 |
| | Once/week or less | 14 | 13 | 1 | 5 | 5 | 2 |
| *The following make reference to fresh pork and not to sausages, ham or other processed pork products* | | | | | | | |
| How often do you eat pork? | Everyday | 9 | 6 | 3 | 3 | 2 | 6 |
| | >Once/week | 212 | 168 | 44 | 70 | 68 | 88 |
| | <Once/week | 75 | 72 | 3 | 25 | 29 | 6 |
| Has your pork consumption changed in the last few years? | Same | 188 | 151 | 37 | 63 | 61 | 74 |
| | Changed | 106 | 93 | 13 | 36 | 38 | 26 |
| | Increased[1] | 61 | 50 | 11 | 57 | 54 | 85 |
| | Decreased[1] | 22 | 20 | 2 | 21 | 22 | 15 |
| For what reasons do you like pork? | Availability | 54 | 37 | 17 | 18 | 15 | 34 |
| | Nutritional quality | 74 | 55 | 19 | 25 | 22 | 38 |
| | Versatility | 130 | 105 | 25 | 43 | 42 | 50 |
| | Taste | 229 | 190 | 39 | 76 | 77 | 78 |
| | Price | 74 | 60 | 14 | 25 | 24 | 28 |

[1] In the percentage columns, given as a percent of those who claim to have changed their frequency of consumption of pork.