

CANADIAN CONSUMER CONSISTENCY IN PORK SENSORY AND PURCHASE DECISIONS

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Abstract – Given the importance of credence attributes, such as production system, to consumer preferences, comparisons of pork produced using conventional and traditional production systems are conducted using sensory evaluation and economic stated preference experiments with the same participants. In two separate experiments (2009 and 2011) the consumer demographic and attitude characteristics that inform choice and evaluation are determined. Analysis is conducted using ordinary least squares and multinomial logit regression. The overall quality (sensory) of pork chops is influenced by tenderness, juiciness and flavor, with the individual respondent's age, gender and self reported pork eating frequency affecting their sensory evaluation. For those same participants their choice of packaged pork chop is affected by price, by production system, Canadian Pork and CQA[®] information on the pork chop and age, the presence of children in the household, where the individuals buy pork, education level and whether the individuals trust other people affect the individual's choices. In marketing pork the distinction between characteristics of consumers who like eating certain types of pork versus the characteristics of consumers who purchase certain types of pork are critical to success.

Key Words – production system, credence attribute, sensory evaluation, stated preference

I. INTRODUCTION

Previous research (Goddard et al [1], Dransfield et al [2]) has illustrated the relative importance of physical and credence attributes to meat purchases. Given that optimal combinations of these attributes are essential to success in meat marketing, it is important to know the consumer demographic and attitude characteristics that influence purchase decisions. Since ultimately the sensory experience will influence repeat purchases,

the demographic and attitude characteristics that influence sensory evaluation are of equal importance. The aim of this study is to increase understanding of Canadian consumer purchase intentions and sensory evaluations of pork chops and whether those intentions and evaluations are consistent across time. The focus of the analysis is on three types of credence attributes; production system, national origin of pork and the fact that the pork is produced on a farm that satisfies the requirements for the on farm food safety Canadian Quality Assurance (CQA[®]) system. The robustness of the results are evaluated using the same procedures at two different points in time and with slight variation in the production system attributes considered.

II. MATERIALS AND METHODS

The analysis reported here is part of a much larger study aimed at characterizing the quality of pork produced in two different production systems (2009) and from a specific production system as compared to a mixture of commercial hog producers (2011). In 2009, the comparison was made between pork from hogs produced in a traditionally raised system (pork from a family farm production setting, reared outdoors or in bedded settings, with no subtherapeutic antibiotics or growth promotants and no animal by-products in feed) and a conventional production system (no identified production characteristics). In 2011, pork from hogs produced in a Premium Traditional production system (pork from a family farm production setting, produced with no sub-therapeutic antibiotics or hormones, and no animal by-products in feed) and pork produced from

hogs from a variety of conventional, commercial producers was compared.

In 2009, the hogs produced from the two different hog operations (200 each) were purchased and processed through the same slaughter facility on five different slaughter days between November 4 and December 3, 2009. In 2011, 100 hogs were purchased from one specific hog operation and slaughtered through a particular slaughter facility on four different slaughter days between September 1 and October 15, 2011. For all of these hogs, whole carcasses were chilled overnight. On the next day, both left and right shortloins were removed from each carcass, prepared as boneless, trimmed to the silverskin, packaged and moved to short-term frozen storage. In 2011, 100 loins (prepared in the same fashion) were also purchased from a large commercial processing facility, from hogs slaughtered in the same week as those from the specific operation.

Frozen product was shipped to the Alberta Agriculture and Rural Development Food Processing Development Centre (FPDC; Leduc, AB). From each pair of loins (i.e. the left/right loins collected from a given carcass), samples were prepared for further consumer and economics analysis.

One pork loin from each pair was prepared as a series of 2 cm thick pork chops for use in the economics experiment. The pork chops were placed in pairs (superficial surfaces towards the outside) on dri-loc pads in labelled foam trays (approximately 14 x 20 x 2 cm), and overwrapped with gas permeable stretch film.

For consumer testing, two 2 cm thick chops were cut from one loin in each loin pair, labelled, and individually vacuum packaged (Multivac M855 rollstock thermoformer, Woodbridge, ON). These samples were boxed and placed in refrigerated storage, then transported to the Consumer Product Testing Centre (CPTC: Edmonton, AB) for evaluation two days later.

Consumer panelists were required to be “users and likers” of pork chops. Each of the 197 panelists (completing 2009) and 128 panelists (completing 2011) was compensated with a \$60 honorarium.

With participant targets (200 in 2009, 128 in 2011), the testing of pork chops from each production system (200 each in 2009 and 100

each in 2011), was designed such that each panelist evaluated samples (sample = ½ pork chop) from four different pork loins within each production system treatment. In 2011, consumers were presented with pork chops from the two different production systems in exactly the same combinations as they would later evaluate in the economics experiments (designed using a fractional factorial design incorporating production system, four levels of price and labels (on or off) for Canadian Pork and CQA®), ensuring that their sensory and purchase evaluations were of pork chops from the same pigs. In each period cooking and presentation details for sensory evaluation were identical (reported in Goddard et al [1]). Panelists were asked to judge the appearance, tenderness, juiciness, flavour, and overall acceptability of each sample using 9-point hedonic scales (1=dislike extremely and 9=like extremely). After collection of demographic data, panelists completed the economics experiment.

For the economics experiment, all packaged pork chops were labelled with the normal fresh meat product label containing safe handling instructions, best before date, product price, weight and actual package price. In addition, in 2009, products were labelled as traditionally raised (if they were from that operation), as certified traditionally raised (industry certification), as government certified traditionally raised, as Canadian Pork or as CQA® pork. In 2011, products were labeled as Premium Traditional, as Canadian Pork or as CQA® pork. In both years, products were priced at four different levels (from \$8.82 per kg to \$15.07 per kg.). Panelists were asked to complete a stated preference exercise, for eight pairs of packaged pork chops (choose A or B or neither). Consumer testing sessions were organized between November 19 and December 17, 2009 and between October 16 and November 23, 2011.

III. RESULTS AND DISCUSSION

Consumer panelists evaluated pork chops based on six traits. Least-squares means were generated for each product characteristic, and a Tukey’s test was conducted for means separation. Correlation and regression analyses

were conducted to explore the relationship amongst the consumer test variables. In 2009, although statistically significant difference was noted between treatments (production) for four product characteristics (appearance of outside grilled surface, tenderness, juiciness and overall acceptability), the absolute difference between treatments was never more than 1/2 a scale unit indicating that the observed differences were not of practical importance. The conventional and natural pork evaluated in that study was not different in terms of the acceptability of the eating quality traits assessed by consumer panelists. Working across both production system treatments, correlation analysis indicated a relatively strong, positive relationship ($r=0.82$, $P<0.01$) between overall acceptability and each of tenderness, juiciness, and flavour. Interestingly, stepwise and MaxR regression showed juiciness ($R^2=0.68$), then juiciness + flavour ($R^2=0.81$), to be the most important predictors of overall acceptability.

In 2011, there were no significant differences between the pork chops from pigs harvested in the conventional and Premium Traditional production systems for any of the attributes evaluated. This indicated that pork chops evaluated from these two systems were not different from each other when evaluated by consumer panelists. When exploring the relationship among attributes for each production system, correlation analysis showed strong relationships between juiciness and tenderness ($r=0.78$, $p<0.01$), tenderness and overall acceptability ($r=0.76$, $p<0.01$), juiciness and overall acceptability ($r=0.78$, $p<0.01$) and flavour and overall acceptability ($r=0.84$, $p<0.01$). Regression analysis showed that examining the relationship of various attributes and overall acceptability among both production systems (using MaxR and stepwise regression analysis), flavour ($R^2=0.71$) and flavour along with juiciness ($R^2=0.82$) were the attributes that influenced overall acceptability the most.

In the second phase of the analysis (Aaslyng et al [3]) overall acceptability of the pork chops was assessed using regressions including day of sampling and interactions between the consumer test variables and consumer demographic characteristics. In 2009, these regression results confirmed the importance of tenderness,

juiciness and flavour in the evaluation of overall acceptability. In addition, assessment of quality on the second (of five) day of the analysis was uniformly lower. The data also show that older participants weight tenderness more and weight flavour less in their assessment of pork's overall acceptability; women weight juiciness less than men and weight flavour more than men in their assessment's of pork's overall acceptability and that the more frequently participants report eating pork, the less they weight tenderness and the more they weight juiciness in their assessment of overall acceptability. In 2011, flavour is shown to be highly significant in the evaluation of overall acceptability and there are no effects of day of assessment on overall acceptability. However women weight tenderness and flavor more than men and juiciness less than men in terms of importance to overall acceptability of the pork. The more frequently participants report eating pork, the more they weight juiciness and the less they weight flavour as determinants of pork overall acceptability.

Willingness to pay for pork chops with specific attributes, by consumers, is assessed using multinomial logit regression with the stated preferences participants exhibit in their eight paired choices. The probability of selecting a particular pork chop is evaluated for pork chops with the Canadian Pork logo, with the CQA[®] logo (both samples), traditionally raised, certified traditionally raised and government certified traditionally raised (2009), Premium Traditional (2011). Consumer welfare (willingness to pay (WTP)) for pork chops with these different attributes is provided in Table 1.

Table 1 Calculated WTP for Pork Chops with Different Attributes as compared to a Conventional Pork Chop

Attribute	2009	2011
Traditionally Raised/Premium Traditional	\$0.78	\$4.68*
Certified Traditionally Raised	\$6.64*	NA
Government Certified Traditionally Raised	\$5.14*	NA
Canadian Pork	\$2.29*	\$2.70*
CQA [®]	\$1.95*	\$4.04*

Values are expressed in \$/kg; starred values are statistically significantly different from zero at the 5% level.

The values illustrate that these consumers see value in traditionally raised (Premium Traditional) production practices, at similar levels and in spite of the different definitions of the two systems in both years. In 2009 with the option available of having certification (third party audit) of the system consumers were only willing to pay extra for the government certified traditionally raised pork. Without that option in 2011 they were happy to select the Premium Traditional. This raises a future research question about which particular part of the production system is generating consumer interest – if values are similar for the two definitions then perhaps it is not the housing situation that interests consumers, perhaps it is the animal feed or antibiotic use they find of most interest. The value associated with the Canadian Pork label is similar and consistent while the value associated with the CQA[®] symbol/attribute is higher in 2011. Within these average sample results there are interesting demographic differences. In 2009, people who trust other people are WTP more for conventional pork than less trusting people, people with higher levels of education are WTP more for all types of traditionally raised pork (certified or not), people who purchase their pork at supermarkets are WTP more for conventional pork and pork with the Canadian Pork label, people with children in their household are WTP more for pork with the Canadian Pork label and older respondents are WTP more for the CQA[®] assurance. In the 2011 sample, people who trust other people are WTP more for conventional pork, for pork that is Premium Traditional and WTP less for the CQA[®] assurance. In addition more highly educated respondents are WTP less for the Canadian Pork label, males are WTP less for Premium Traditional pork and people from households with children are WTP more for the Premium Traditional pork.

IV. CONCLUSION

The results highlight the fact that demographic and attitude characteristics are important in marketing pork. Different variables were found to explain sensory evaluation and WTP for credence and labeling attributes. Using sensory assessments

would suggest that there are no differences in the quality of pork from single different production systems or from many conventional hog producers (2011) but the economic value is very different, particularly influenced by consumer's trusting nature. The fact that more highly educated consumers are looking for more information with their pork purchases suggests the need for better industry communication of the current pork production system in Canada. The existence of the CQA[®] system within Canada needs to be more widely broadcast.

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