

Explaining Stated Importance of Production Process, Color and Price in Quebec Veal Meat Purchases

Animal scientists can produce extremely pale grain-fed veal, thus achieving high quality grade, while averting concerns over unethical treatment and excessive antibiotic use in milk-fed veal production. Consumers, however, may reject pale cuts of veal labeled as "grain-fed." This paper uses questionnaire data from six groceries in Quebec to investigate frequency of veal purchases and perceived importance of price, color and production type as determinants of veal purchases.

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Introduction

Between 1988 and 1995, the production of both grain-fed and milk-fed veal calves rose significantly in Quebec (MAPAQ, 1996). Calves slaughtered in Quebec account for 60 percent of the Canadian volume. In Quebec, as all of North America, veal is purchased infrequently and in small amounts. In 1992, the average annual per capita consumption of veal by urban Canadians was 1.04/kg (Statistics Canada, 1992). The annual US per capita consumption of veal was about 0.7/kg from 1982 to 1987 (Bowers, Craig, & Williams, 1989), while French per capita consumption fluctuates around 6kg/year (MAPAQ, 1995). Many claim that the most prominent explanations for recent shifts in meat consumption patterns are concerns over health risks from fat and residues and for animal welfare (Senauer, Asp, & Kinsey, 1991). These concerns are present in the veal market. Issanchou (1996) notes that veal consumption in France dropped sharply in 1973 and 1989 during boycotts caused by hormone scares. Milk-fed veal production in the US, Canada and Europe is criticized by animal rights groups claiming that milk-fed calves are treated unethically, and the incidence of disease and medication use has been found to be higher among milk-fed veal calves.⁴

Nearly two thirds of US consumers purchase at least three different types of meat per week (Piedra et al., 1995). Studies of individual economic behavior have linked market participation and frequency of consumption to perceptions of meat product attributes (Lin, 1991; Richardson, Shepherd, & Elliman, 1992). The perceived "quality" of meat depends on "appearance", and appearance encompasses numerous attributes such as color, shape, texture and presentation (Issanchou, 1996). In extensive literature reviews on consumer responses to meat attributes, Steenkamp et al. (1994) and Munoz (1998) found that most studies assessed perceptions of only four attributes: tenderness, juiciness, color and flavor. While these attributes may be important for repeat purchases, attributes that are visible prior to purchase are the major determinants of meat selection.

Most researchers have relied on trained expert panelists to predict consumer responses to meat attributes. Munoz (1998) and numerous others argue that expert panelists do not accurately reflect responses of ordinary consumers. Consumers appear to know very little about meat quality (Jeremiah, 1982); cannot detect visual differences in different grades of beef (Savell et al., 1989); cannot detect color differences between bullock and steer beef (Shackelford et al., 1991); and misinterpret the significance of the color of hamburger meat (Trinkaus, 1994). Grunert (1997) and Jeremiah (1982) point out that consumers have made dysfunctional associations between meat attributes and meat quality. For example, perceived fat content negatively influences perceptions of steak quality, yet fat contributes to tenderness, juiciness and taste, all of which are desirable meat qualities.

Importance of Meat Attributes

Price

Meat is expensive, usurping a large proportion of most household food budgets. Consumers tend to purchase cheaper cuts and other products. While consumers may have upper and lower price limits for foods, Issanchou (1996) suggests that buyers may not feel constrained by these limits when selecting infrequently purchased products, such as veal. Consumers may compare prices, yet select infrequently purchased products based

on attributes perceived as being better quality indicators. Piedra et al. (1995), Beharrell and Denison (1991), Jeremiah (1982) and Hui, McLean-Meynsse and Jones (1995) conclude that price is a less sensitive factor conditioning meat consumption. Low importance ratings for price suggests that meat is a peculiarly price-inelastic commodity in the minds of consumers. Freshness, taste and appearance all receive higher importance ratings. Grunert (1997) found that consumers interpreted perceived costs as an indicator of relative value. Perceived costs can act as a proxy for relative value, but a link from expected quality to perceived costs has been identified, with higher expected quality often leading to lower perceived costs. Perceived costs appears to be a compromise involving price and quality. Nayga and Capps (1993) found that of 21 disaggregated meat products, veal was the most expensive, averaging \$6.92(US)/lb between 1986-1988 and it seemed to be highly sensitive to price, but not to income. Issanchou (1996) argues that veal consumption is conditioned not simply by price, but by numerous factors, including color.

Color

Consumers use food color as an indication of freshness and flavor. Color influences product acceptability, preference and selection. When color does not meet expectations, even highly trained sensory panelists become confused (Bender, 1981; Clydesdale, 1994; Francis, 1995). The influence of color results more from "learned associations" than actual inherent properties of foods (Bender, 1981; Clydesdale, 1994; Francis, 1995). For example, many consumers falsely believe that brown-shelled eggs and brown sugar are superior to white (Bender, 1981) or that maroon indicates old meat, while cherry red indicates fresh meat (Trinka, 1994). Consumers appear to have very definite color preferences for beef and pork chops (Shackelford et al., 1991; Jeremiah, 1993). Jeremiah (1982) and Grunert (1997) found that consumers judge beef quality mostly on color and fat/lean. Unfortunately, red color negatively affects even expert judgements of fat content in beef (Gerrard et al., 1995). Shackelford et al. (1991) found that ordinary consumers were unable to detect differences in color between darker and lighter beef cuts. Grunert (1997) and Jeremiah (1982) also found that color preferences for beef varied between countries and by regions within a country. Quality grades for beef steaks are primarily based on color and marbling (Gerrard, Gao & Tan, 1995). It has been assumed that consumers prefer "cherry red" beef; however, consumer surveys have found that they prefer darker. US and Canadian veal grading standards dictate that as color darkens, grade decreases (Johnson et al., 1992; Johnson, et al, 1988). Johnson et al. (1992) note that most studies of veal production assert that the "light color of veal muscle is one criterion by which the consumer evaluates its quality and, presumably, palatability." However, no studies have confirmed this presumption.

Production Process

Meats and meat products use processing claims to encourage consumers to make distinctions between meat attributes. Examples include free-range or organically produced. Issanchou (1996) determined that, for French consumers, a label evoking traditional pork production methods was a positive quality cue. However, free-range labeling was positively perceived only by Dutch consumers who had some prior knowledge of free-range pork. Richardson, Shephard and Elliman (1992) found that attitudes toward cruelty to animals were significant predictors of the frequency of eating beef, pork and lamb in England. However, a study on perceptions of beef steaks found that breeding and feeding information had no effect on quality perceptions (Grunert, 1997). To date, no studies appear to have assessed consumer perceptions of milk-fed versus grain-fed veal.

Methodology

Data was collected in six groceries in Quebec City and Montreal regions in 1998. In each grocery, two trained interviewers randomly approached grocery shoppers and asked them to participate in a university study about veal in exchange for one dollar. Shoppers who did not consume veal were also asked to participate. A total of 1,027 consumers were interviewed. The interviews took on average 5.6 minutes (s=2.0). The questionnaire measured consumption frequency, attitudes and beliefs about veal and socio-demographic characteristics.

Frequency of veal consumption is measured by a single question (0=never, 3=weekly). Those who ate veal at least once a year were asked how many of five different cuts of veal they had purchased in the past. The primary place of purchase was measured by a ratio of the frequency of purchase at supermarkets versus butcher shops. Respondents were also asked the frequency with which they ate veal with their parents as a child (0=never, 2=monthly), eat veal in restaurants (0=never, 3=always), buy veal to diversify their diet (0=never, 4=always), and buy veal on sale (0=never, 4=always). Three questions measured the stated importance of pale color, low price and

milk-fed production process (0=not important, 3=very important). To assess knowledge of extrinsic veal attributes, respondents were asked which type of veal (milk or grain) was generally lighter in color and which generally cost less. A scale of beliefs about intrinsic veal attributes was created by adding responses to three questions about which type of veal is more tender, more nutritious and less fat. High scores (6) indicated a favorable milk-fed bias and low scores (0) a favorable grain-fed bias. A second scale measured beliefs about veal compared to other meats. Respondents were asked whether they believed that veal is more tender, more nutritious, less fat and more flavorful than other meats. High scores (8) indicated a favorable bias toward veal, while low scores (0) indicated no bias. Our analysis aims to explain frequency of purchase and stated importance of color, type and price. Given that the data is categorical, ordered probit models are used to identify and evaluate the strength of the linkages between preferences and socio-demographic variables. The ordered probit model was developed to analyze responses expressed as ordinal rankings. The dependent variable takes values of 0,1,2,...,j. These values are not interval in nature, but reflect categories of arbitrary width. The ordered probit model is structured around a latent variable whose level is influenced by explanatory variables such that $y_i^* = \beta' x_i + \varepsilon_i, \varepsilon_i \sim N [0,1]$. Unlike standard regression, the variance of the error component is assumed to be one and y_i^* is not observed. However, a closely related variable, y_i , is observed. The relationship between y_i and y_i^* is assumed to be function of cutoff points (μ 's) which are estimated along with the regression coefficients.

$$\begin{aligned}
 y_i &= 0 \text{ if } y_i^* \leq \mu_0 \\
 y_i &= 1 \text{ if } \mu_0 < y_i^* \leq \mu_1 \\
 y_i &= 2 \text{ if } \mu_1 < y_i^* \leq \mu_2 \\
 &\dots \\
 y_i &= j \text{ if } y_i^* > \mu_{j-1}
 \end{aligned}$$

The frequency of purchase was analyzed with the ordered probit estimator. For the importance of veal type, color and price, the probability of purchasing veal at least once was endogenized. Accordingly, a sample selection equation was estimated on the full sample and an ordered probit equation was estimated on a truncated sample of respondents. The two-equation model was estimated with FIML. The significance of endogenizing the probability of purchase can be assessed by testing the null of a zero covariance between the residuals of the two equations. When the null could not be rejected, the ordered probit equation was reestimated alone. In all cases, only the results from the ordered probit equations are reported.

Results

Table 1 indicates that there are significant regional differences in consumer perceptions and knowledge. Part of this can be attributed to Montreal's diverse ethnic market. In Table 2, the model explaining stated frequency of purchase had a predictive success rate of 0.4051. Having eaten veal with parents as a child, frequently eating veal in restaurants, using veal as a means to diversify one's menu and a favorable perception of veal compared to other meats had significant positive effects on stated veal consumption. Being older, female and of an ethnic background also had positive significant effects on frequency. While the relationship between income and frequency of consumption is positive, it is surprising that it was insignificant.

Forty-eight percent of those sampled said that milk-fed veal is "Not at all" important. However, the importance of milk-fed veal was rated higher in the Montreal sample than in the Quebec City region sample (Table 1). The model explaining stated importance of milk-fed veal (Table 2) had a predictive success rate of 0.5481. Table 2 shows significant positive effects of number of veal cuts purchased, veal meat bias, milk-fed veal bias, importance of pale color, and age on importance ratings for milk-fed veal. Consumers who have purchased a large variety of veal cuts are more inclined to state that milk-fed veal is important. Perhaps in experimenting with different cuts and different cooking methods, these consumers have concluded that milk-fed veal is somehow superior to grain-fed. Those who believe that veal has superior qualities relative to other meats and those who believe that milk-fed veal is superior to grain-fed veal are inclined to highly rate the importance of milk-fed veal. When a consumer rates pale color as being highly important, they are also likely to highly rate the importance of milk-fed veal. Yet, knowledge that milk-fed is usually paler than grain-fed veal was not a significant variable, perhaps due to multicollinearity. Older consumers who rate milk-fed veal higher in importance than younger consumers are likely expressing a generational bias or learned preference for a more familiar product.

Table 1

Regional differences in stated veal consumption, beliefs, knowledge and importance

	Quebec	Montreal	p-value of χ^2
Eat veal weekly	21.4 %	28.0 %	0.026
Never ate veal with parents	23.8 %	25.6 %	0.748
Never purchase veal at restaurant	58.5 %	64.7 %	0.081
Ratio butcher/grocery greater than 1.00	51.9 %	38.7 %	0.000
Buy veal on sale	50.1 %	65.5 %	0.000
Buy veal to diversify diet	81.5 %	78.3 %	0.212
Have purchased 5 different veal cuts	14.5 %	23.2 %	0.002
Believe veal is better than other meats	15.1 %	20.6 %	0.005
Believe milk-fed is better than grain-fed	19.2 %	11.6 %	0.001
Know milk-fed is paler	71.7 %	67.3 %	0.134
Know milk-fed is more expensive	11.1 %	18.4 %	0.001
Rate milk-fed as very important	7.4 %	23.7 %	0.000
Rate pale color as very important	10.0 %	25.6 %	0.000
Rate low price as very important	20.8 %	42.2 %	0.000

Table 2

Ordered Probit Model for Stated Frequency of Veal Consumption

Variable	Stated frequency		Importance milk-fed		Importance pale		Importance price	
	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
Constant	-0.8129	-3.63160	-1.6500	-5.73794	-0.3035	-1.10330	0.8016	2.80083
With parents	0.1561	5.78149	0.0598	1.69957	0.0049	0.15030	0.0005	0.01647
Restaurant	0.4378	7.04660	-	-	-	-	-	-
Butcher ratio	-0.0687	-1.69617	0.0600	1.18313	-0.0460	-1.01767	-0.0577	-1.05175
Buy on sale	-0.0086	-0.23989	-	-	-	-	0.3993	12.89000
Diversify	0.2353	5.94435	-	-	-	-	-	-
No. of cuts	-	-	0.0801	2.38144	0.0297	0.90377	-0.0130	-0.44865
Veal bias	0.0625	4.22477	0.0582	3.22995	0.0334	2.04316	-0.0251	-1.50271
Milk bias	0.0111	0.54461	0.1141	4.42201	0.0225	0.91430	-0.0173	-0.73450
Know pale	-0.0672	-0.84059	-0.0199	-0.21303	0.0544	0.63836	0.0208	0.25097
Know price	0.0238	0.31255	-0.0458	-0.52043	0.0065	0.07674	-0.0620	-0.73569
Impt milk	-	-	-	-	0.2167	7.68613	0.0192	0.55214
Impt pale	-	-	0.2700	7.46070	-	-	0.0222	0.64480
Impt price	-	-	0.0176	0.49255	0.0271	0.89607	-	-
Age	0.0050	2.29896	0.0120	4.51426	0.0038	1.57683	0.0029	1.20245
Sex (0=M)	0.1120	2.30833	-0.0990	-1.99446	0.0052	0.10918	-0.0337	-0.72976
Education	0.0140	0.47132	-0.0397	-1.17672	-0.0307	-0.92533	-0.0829	-2.55152
Income	0.0097	0.56962	0.0174	0.89484	0.0334	1.73057	-0.0253	-1.32824
Ethnicity	0.3107	5.31346	-0.0234	-0.36663	0.0614	0.83014	-0.0328	-0.44229
Hshld w/kids	0.0240	0.76155	0.0182	0.53058	-0.0298	-0.92247	0.03158	0.85149
Quebec City	-	-	0.0470	0.32197	0.1624	1.08627	0.4207	2.43867
Rural village	-	-	0.0338	0.22253	0.1221	0.76997	0.3138	1.84246
Mtrl suburb3	-	-	-0.0026	-0.01545	-0.2106	-1.21177	-0.0016	-0.00800
Mtrl suburb4	-	-	-0.3071	-1.87828	-0.2820	-1.80130	-0.0065	-0.03746
Mtrl suburb5	-	-	-0.2646	-1.54424	-0.0843	-0.48706	0.0516	0.26725
Log-L	-1255.13		-977.31		-1108.32		-1093.56	
Log-L(0)	-1374.73		-1108.86		-1194.6		-1200.72	
p-value model fit	0.0000		0.0000		0.0000		0.0000	
Success rate	0.4051		0.5481		0.4337		0.4534	

The model explaining stated importance of pale color (Table 2) had a predictive success rate of 0.4337. Stated importance of pale color was significantly related to the importance of milk-fed veal and a favorable veal meat bias. Attaching great importance to milk-fed veal significantly increased the probability of attaching great importance to pale color. This likely reflects the reality of the paler milk-fed veal. Perhaps favorably rating veal meat in comparison with other meats results from consumers associating high quality veal meat with pale color.

When respondents stated that they purchased veal on sale, they were significantly more likely to highly rate the importance of low price (Table 2). This likely reflects a general tendency for people who purchase foods on sale to be concerned over food prices. Education had a statistically significant and negative relationship with importance of low price. Education was positively correlated with income, thus the higher incomes of highly educated consumers probably make them less concerned with price. However, income had no significant relationship with importance of low price. Perhaps educated consumers were expressing their willingness to pay more for a high status luxury good. Living in Quebec City had a significant positive relationship with importance of low price. Compared with Montreal consumers, Quebec City consumers were significantly younger and lived in households with children. These socio-demographic characteristics may account for their greater preoccupation with low price.

Conclusions and Implications

Veal is one of the most infrequently purchased meats and, as a result, many consumers have limited knowledge of veal prices and characteristics. This study shows that frequency of veal purchase is influenced more by variables of habit formation, than by price, income or education. Having eaten veal as a child, eating veal in restaurants, using veal to diversify meat purchases, believing that veal meat's intrinsic attributes (tender, nutritious, low fat) are superior to other meats and being of older age, of female gender and of an ethnic background other than Canadian were all positively related to frequency of purchasing veal for home consumption. A favorable perception of veal's intrinsic attributes compared to other meats was also significantly related to stated importance of milk-fed production process and pale color. The importance of milk-fed production process was positively affected by beliefs that the intrinsic attributes (tender, nutritious, low fat) of milk-fed veal are superior to grain-fed veal, number of veal cuts purchased and age. There was consistency in the significant positive relationships between stated importance of milk-fed veal and pale color; however, knowledge that milk-fed production leads to paler meat had no significant effect on the importance of the milk-fed process or pale color. Finally, stated importance of low price had significant relationships with buying veal on sale, higher educational status and living in Quebec City. Given these findings, the veal industry might be advised to encourage current non-consumers to try veal in restaurants and then to use veal to diversify their household meat menu. They could also attempt to confirm whether the intrinsic attributes of veal meat are truly superior to other meats and to capitalize on any favorable findings. The very low percentages of consumers who attached great importance to milk-fed veal production process, who believed that milk-fed veal has intrinsic attributes superior to those of grain-fed veal and who know that milk-fed production leads to paler meat all translate into market potential for grain-fed producers who can also capitalize on more humane treatment of animals and lower veterinary medication use.

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Endnotes

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⁴ In Johnson et al. (1992), 48 separate medications were given to milk-fed calves, while no medications were given to grain-fed calves.