

Willingness-to-Pay for Fresh Brand Name Beef

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Willingness-to-pay (WTP) for hypothetical brand name fresh beef products was measured using the Becker-DeGroot-Marschak experimental auction procedure. Auctions were conducted in a field setting in and around Winnipeg, Manitoba during the summer of 2006. Four hypothetical brands were developed to individually represent local/Canadian, natural, guaranteed tender, and Angus attributes, respectively. It was found that WTP was highest, approximately \$1.31 per 12 ounce steak, for branded steaks associated with the natural, guaranteed tender, and Angus attributes. It was further discovered that WTP is positively affected by preference for the brand name, frequency with which beef is consumed, and the male gender. Conversely, confidence in selecting beef tended to reduce WTP, while effects of age, education, and income were uncertain. It is concluded that the industry should explore opportunities to market higher value products both domestically and abroad if the cost of doing so does not exceed WTP premiums.

Nous avons évalué, à l'aide de la procédure d'enchères expérimentales Becker-DeGroot-Marschak, la volonté de payer (VdP) des consommateurs pour des produits de bœuf frais de marques hypothétiques. Nous avons organisé des enchères à, et aux alentours de, Winnipeg au Manitoba, au cours de l'été 2006. Quatre marques hypothétiques ont été élaborées pour représenter respectivement les caractéristiques suivantes: bœuf canadien ou local, bœuf naturel, bœuf à tendreté garantie et bœuf Angus. Nous avons noté une VdP plus élevée, soit d'environ 1,31\$ par bifteck de 12 onces, pour le bœuf naturel, le bœuf à tendreté garantie et le bœuf Angus. Nous avons également observé que la préférence pour la marque, la fréquence de consommation de bœuf et le sexe masculin avaient une influence favorable sur la VdP. Réciproquement, la confiance dans le choix du bœuf avait tendance à diminuer la VdP, tandis que l'influence de l'âge, de la scolarité et du revenu était incertaine. Nous avons conclu que l'industrie devrait examiner les possibilités de vendre des produits à plus grande valeur, tant au pays qu'à l'étranger, si le coût n'exède pas les bonifications que les consommateurs sont prêts à payer.

INTRODUCTION

Brand names have now been appearing on fresh beef products in the United States for 30 years, beginning with the introduction of Certified Angus Beef in 1978. Development of brand name fresh beef products in Canada has been comparatively slow, with almost no such products being marketed until very recently. Froehlich (2007) surveyed major Canadian grocers in 2005 and discovered that offerings were very limited, with few national brands available.¹ Given that the U.S. beef supply chain has evolved in

such a way that brands play a prominent role in signaling quality to consumers and mitigating purchasing risks, the dearth of fresh brand name beef products in Canada is puzzling.

Froehlich (2007) discusses four possible reasons for the lack of fresh brand name beef products in Canada. First, if brands are a source of competitive advantage within the industry, particularly at the retail level, a relatively more concentrated industry could be less prone to branding. The Canadian beef packing and grocery retailing sectors are both more concentrated than their U.S. counterparts (Agriculture and Agri-Food Canada 2006; Grain Inspection, Packers and Stockyards Administration 2006). A second reason for the discrepancy may be the differences in the size of the two countries' cattle supplies. Though the percentage of top-grade cattle in the two countries is virtually indistinguishable, Canada's overall supply of cattle is much smaller, and a considerable proportion of those are exported for slaughter to the United States.

Institutional factors may comprise a third reason for the relatively few fresh brand beef offerings in Canada. One such factor is the evolution of the beef packing industry in Canada into one whose firms, due in part to a series of labor disruptions, no longer have the considerable brand equity that was possessed by members of the previous generation, such as Canada Packers, Burns, and Schneiders. Another institutional factor that might hinder brand development for fresh beef products is a lack of trust between packers and feeders. Schroeder (2003) notes that trust levels between the two seemed to disintegrate during Canada's Bovine Spongiform Encephalopathy (BSE) crisis, when Canadian packers reaped windfall profits while feeders, unable to export to competing plants, incurred massive losses. This may hinder branding efforts because of the high degree of supply chain coordination branding efforts often require.

A fourth potential reason why there are so few fresh branded beef products available from Canadian grocers may be that there is insufficient consumer willingness-to-pay (WTP) for products representing brandable attributes. Additional costs related to segregation, distribution, and marketing would necessitate charging higher prices for these products. If it is the case that consumers are not willing to pay the premiums typically associated with such offerings, it may be infeasible for supply chain members to offer them for sale. This study focuses upon this fourth potential reason for the small number of brand name fresh beef offerings in Canada.

The objectives of the research reported in this paper are to determine whether consumers are willing to pay for fresh branded beef products in Canada and to identify the factors that affect WTP. Four hypothetical beef brands were developed, each associated with a specific beef steak attribute. Experimental auctions using the Becker-DeGroot-Marschak (BDM) method were carried out at grocery stores in and around Winnipeg, Manitoba to measure the premiums consumers would pay for the branded products. This research is unique because the experiment was conducted in a field rather than laboratory setting, and is the only Canadian WTP field experiment that employs the BDM auction mechanism.

The remainder of the paper is divided into seven sections. First, roles played by brands are discussed and the hypothetical brands developed for this research are introduced. After that, a description of the experimental auction procedure is presented, followed by an introduction of the theoretical model for determining WTP premiums. Next is a description of the empirical procedures used for modeling WTP, then results

and implications are presented. The final section draws conclusions from the research findings.

BRAND EFFECTIVENESS AND DEVELOPMENT

Brands are important, powerful, and effective because they integrate a consumer's rational evaluation of a product's functional performance with the emotional value of a brand (de Chernatony 2001). Brands are important to both consumers and producers of products and services. Keller (2003) notes there are numerous reasons why brands are important to consumers. One is that brands offer consumers utility through product attributes and consistent performance. Brands also identify the manufacturer of a product, helping create accountability and earn the trust of consumers.

Manufacturers, producers, and other supply chain members may be held responsible for the quality of brand name products. Keller (2003) suggests that brands reduce the risks that consumers face when they purchase a product. de Chernatony (2001), Keller (2003), and Schroeder (2003) agree that brands have more accountability than generic products and that a goal of branding is to mitigate the risks associated with purchasing a product. New and unfamiliar brands, however, reduce risk less than tried and trusted brand names. Brands are also a tool that consumers can use to distinguish between various products in a product category when they are visually quite similar yet may vary significantly in quality (Bredahl 2004). For example, two steaks could appear quite similar visually but could be quite different in eating quality due to discrepancies in aging. Brands simplify product decisions through past experiences. Bredahl (2004) explains that brands are particularly important for food items because food purchasing decisions are made frequently and often under time pressure.

A brand helps signal to consumers the level of quality inherent in a product (Keller 2003). Schroeder (2003) reiterates this and states that brands convey value and information to the consumer. Further, consumers perceive branded products as being more reliable, higher quality, and having less of a chance of not performing up to their expectations than products that are not branded. Previous research suggests that when a product's quality is difficult to determine instore, consumers rely more heavily on extrinsic quality cues such as brand, packaging and price (Zeithaml 1988; Bredahl 2004). This may be particularly true for beef, which can be classified as an experience good because its quality is generally very difficult for consumers to determine instore.

Much research carried out in the United States has measured impacts of various factors upon WTP for steaks with attributes similar to those represented by the brands developed for this study. Lusk et al (2004) evaluated the effects of a number of "procedural issues" on valuation of generic, guaranteed tender, natural, USDA Choice and Certified Angus Beef steaks. They found that the amount participants were willing to pay to exchange their generic steak for one with a specific quality attribute varied by auction method, and that various characteristics of the participants were statistically significant in explaining consumers' WTP. A related paper by Lusk and Schroeder (2004) used steaks representing a similar set of attributes to test for hypothetical bias in a laboratory choice experiment and discovered that hypothetical responses predicted a higher probability of steak purchases than did their nonhypothetical counterparts. Feldkamp et al (2005) used an experimental auction to elicit WTP for steaks with the list of attributes mentioned above, while Lusk

et al (2001) measured instore valuations of steak tenderness. Feuz et al (2004) used a variant of the random n th-price auction to measure laboratory participants' WTP for steaks differing with respect to marbling, method of aging, country of origin, and tenderness. Lusk and Fox (2002) used a contingent valuation mail survey to measure consumer WTP for mandatory labeling of beef from cattle produced using growth hormones or having been fed genetically modified (GM) corn, and Thilmany et al (2003) conducted a mail survey of Colorado consumers and found they would pay a 24% premium over prevailing prices for a "natural" ground round product. It was estimated that such an offering would capture between 50% and 70% of the market.

Since there are very few fresh branded beef products currently marketed in Canada and their recognition is not widespread, hypothetical brands were developed for assessing consumer WTP. Each of the hypothetical brands was created to have similar attributes to popular beef brands in the United States. The brand name categories created were intended to represent, respectively, a local/Canadian brand, a guaranteed tender brand, a natural beef brand, and an Angus brand.

To determine the most appropriate brands for this research, hypothetical "brand candidates" were developed for each category. A survey was developed and administered to an undergraduate agribusiness class and a graduate agricultural economics class to determine which names the students liked best in each category. In total, 45 students were surveyed to determine the most appropriate and best-liked names for each of the categories.

Brand logos were then designed by a professional graphic designer using branding principles. Serif and nonserif fonts were used in the appropriate places; it is generally desirable to have a mix of serif and nonserif lettering in a logo. Serif is more conservative, sophisticated, elegant, and authoritative in appearance; sans serif stands out more and is cleaner, simpler, more contemporary and friendlier. Upper- and lower-case letters were also used in appropriate places to ensure that the message was conveyed to the respondent. Upper-case letters convey strength, power, and authority while lower-case letters convey simplicity and approachability. Colors are also important brand elements and must be chosen to convey the image of an appetizing and appealing food product. Red and orange signal something appetizing, blue is relaxing and green is organic and natural (Perry and Wisnom 2003).

The branding literature indicates brands that appeal to consumers' emotions are more successful than brands that purely use the brand's quality and physical attributes to sell the product (Mahajan and Wind 2002). A local or Canadian beef product is targeted to consumers who prefer to buy home-grown products. One goal of this type of brand may be to appeal to consumers' sense of patriotism or their desire to support local producers and local communities. Consumers also may believe products originating in their home country are of higher quality and are safer (Loureiro and Umberger 2005). Quagraine et al (1998) conducted a stated preference survey of consumers in four Western Canadian cities and found that being of Albertan and Canadian origin both exerted a positive effect on consumers' probability of steak purchase. They further discovered that price reductions of approximately 15% would be required for consumers to be as likely to purchase non-Alberta-origin Canadian beef as they were to purchase Alberta-origin beef. By contrast, being of U.S. origin exerted a negative influence on probability of steak purchase. For this study, the brand developed to represent the Canadian attribute was called "Prairie



Prairie Prime is Canada's premium beef offering.

"For a taste that is truly Canadian choose Prairie Prime every time".

Cattle were born and raised in the Canadian prairies to certify you get consistent premium beef every time.

All beef branded as Prairie Prime is graded at least Canada AAA or higher to ensure you enjoy some of the most flavourful, tender and juicy beef in the world.

Cattle are grain fed and aged 14 days so you get that premium prairie taste every time.

"For Beef as Beautiful as a Prairie Sunset Choose Prairie Prime".

Figure 1. Logo and information for prairie prime hypothetical brand

Prime"; its logo and the information provided to BDM auction participants about this brand are shown in Figure 1.

Research has shown that for most consumers, the most important eating attribute of beef is tenderness (Lusk et al 2001). The current Canadian quality grading system is based on the level of intramuscular marbling in beef—the more intramuscular marbling, the higher the grade the beef receives. However, Wheeler et al (1994) found that intramuscular marbling only accounts for 5% of tenderness in a cut of beef. A tender beef brand would offer a consistently tender beef product every time and the degree of tenderness would not be based on the level of intramuscular marbling or beef grade. Figure 2 displays the logo for the hypothetical "Tender Grill" brand, along with the information provided to experiment participants.

Desirable characteristics of a natural beef product may include that it be derived from a bovine given no hormones or antibiotics, fed no animal by-products, and raised with stringent animal welfare and environmental practices. Such a product would target consumers who are conscious of how their meat has been produced and desire natural raising practices. This type of brand also appeals to consumer emotions to some extent. The brand developed for this research to represent the natural beef product was called "Nature's Diamond" and is presented in Figure 3.

Angus is a breed of cattle that has traditionally been associated by consumers with quality, flavor, juiciness, and tenderness because of its natural marbling. The Angus breed has become very popular in the last couple of decades due to promotion of Certified Angus Beef from organizations, such as the American Aberdeen Angus Association (AAAA) (Lusk et al 2004; Lusk and Schroeder 2004). The AAAA introduced one of the first and most successful beef brands in the world, Certified Angus Beef. Certified Angus beef is only available in restaurants and a few select grocery stores in Canada. Numerous other Angus brands have been introduced in the United States with success as



Tender Grill beef is guaranteed tender every single time because tenderness is what consumers like you are demanding.

Tender Grill beef is the only beef in Canada tested using Warner-Bratzler shear force values so you get guaranteed perfectly tender beef every time.

Tender Grill is grain fed and aged 21 days to ensure the utmost in tenderness, juiciness and flavour.

“Every Tender Grill beef product comes with a double your money back guarantee so if you are not happy with the tenderness of Tender Grill we’ll double your money back”.

Figure 2. Logo and information for tender grill hypothetical brand



- No added hormones
- No antibiotics
- Cattle are fed an ALL VEGETARIAN diet
- No animal by-products
- All feed tested to be free of chemical residues
- Pasture fed from birth to 15 months
- Grain fed 120 days to ensure tender beef
- Animal welfare practices are followed to ensure
- Low stress
- Friendly animal surroundings
- Clean water
- Natural feed
- Environmental practices are followed to respect land

Figure 3. Logo and information for nature’s diamond hypothetical brand

well. It is thought that there is also some emotional consumer attachment to the Angus breed, causing feelings of superiority, tradition and the ability to grill a good steak. The hypothetical “Original Angus” brand, seen in Figure 4, was developed for this study to represent Angus beef.



Original Angus beef is Canada's premiere Angus product. Only Canada Prime and the top 33% of Canada AAA black and red Angus cattle qualify to be branded as Original Angus.

Original Angus beef is always flavourful, juicy and tender because of its high standards. Angus cattle are always evaluated by independent government agents, not by in-house graders or plant employees, to ensure that only the best red and black Angus cattle become Original Angus beef.

Because the integrity of Original Angus beef is so important, Original Angus beef is monitored all the way from producers, to packers and distributors, to supermarkets by the non-profit Canadian Angus Association.

Original Angus is grain fed, aged 14 days and Angus in origin so you can always expect consistent quality when you choose Original Angus beef.

Figure 4. Logo and information for Original Angus hypothetical brand

EXPERIMENTAL AUCTIONS

Experimental auctions are valuation tools that can be used to elicit participants' WTP values in a less biased manner than other potential methods. WTP is determined by having participants bid for a product or certain attributes, using real money at the time of the auction, as opposed to a hypothetical situation that is simply presented in a survey (Lusk et al 2001). Experimental auctions have come into favour with agricultural economists because they provide incentives for participants to accurately reveal their true WTP (Lusk et al 2001; Umberger and Feuz 2004).

Several forms of auction mechanisms have been developed to elicit a consumer's WTP. The most popular and widely used mechanisms are the English auction, the Vickrey (1961) second price auction, the 5th price auction, the random n th price auction, and the BDM method. Although all formats of auction mechanisms have incentive compatibility as a goal, the elicited values can vary slightly between mechanisms. The BDM method has emerged as one of the most commonly used in agribusiness WTP research, and as a result was selected for this study.

Becker et al (1964) introduced their auction as an incentive compatible mechanism to elicit reservation prices in lotteries. The BDM method has also been used quite often in agribusiness for determining WTP; a few examples include Lusk et al (2001), Feldkamp et al (2005), and Lusk and Fox (2003). The BDM method is not a conventional auction in which participants bid against one another. Instead, they are presented with the product(s) in question and are asked to submit a bid detailing how much they would pay for a product with particular attributes. If the bid exceeds some randomly generated price, the participants win the product and must purchase it. Participants do not pay what they bid; rather, they pay the randomly drawn price. Similar to the other auction formats, BDM participants have the incentive to truthfully reveal their WTP. If they overstate their bid, they will pay more than the good is worth to them. Conversely, if they understate their

bid, they will lose out on a good that is of good value to them. Thus, it is also best for BDM participants to follow truth-telling as their weakly dominant strategy.

An instore auction usually does not have to remunerate its participants as much as other auctions for participating since they do not have to go out of their way to participate (Lusk et al 2001; Feldkamp et al 2005). In certain circumstances, remuneration has been shown to have some affect on how participants behave (Lusk et al 2004; Corrigan and Rousu 2006). Lusk et al (2001) argued that zero bidding may be higher in BDM nonlaboratory settings because the customer may not be the actual consumer of the good. Zero bidding should not be of significant concern for two reasons: first, it is often the case in the nonlaboratory world that the regular purchaser of beef may not be the consumer. Second, if the auction is conducted solely beside a meat counter; only customers in the meat department will be asked to participate making a few zero bids for the branded steak legitimate. Some customers are genuinely not willing to pay anything for a branded beef product.

BDM auctions are usually conducted in the field. One could argue that this translates into higher external validity (McDaniel and Gates 2001). In other words, results from the auction would be more applicable to the nonexperimental world because participants' decision-making process is very similar to that used to make purchase decisions by consumers. Since BDM auctions may be conducted in the field, it is possible to target the population of interest (Lusk et al 2001); in this case, supermarket meat shoppers. Having the auction in a supermarket allows the researcher to target consumers who are actually doing the meat shopping.

Experimental auctions were conducted in June and July of 2006 in Winnipeg and Selkirk, a town just outside of Winnipeg.² A total of 274 people, an average of 39 per store, participated in the auctions at seven stores from two major grocery chains. Auctions were conducted on weekdays and weekends, and were conducted to represent store hours and thus were conducted at various times during the day, from store opening to meat department closing. Approximately three-fourths of the persons invited to participate in the auctions agreed to do so.

Auctions took place near the meat counter in each grocery store. Each customer who approached that location was asked to participate in the auction. For participating, a customer was endowed with a 340 gram (~12oz) generic ribeye steak of A or AA grade and were told that the value of the steak was \$8.49; this was to serve as the reference price upon which bids could be based. Participants could then bid to exchange their generic steak for the brand name steaks—which, it should be noted, they could not in fact “win”; rather, participants could only “win” the AAA steak, though they did not know it when bidding. Endowing each participant with a generic steak allowed the value of the brand to be isolated. Participants were informed that a zero bid meant that they forfeit the chance of winning a value-added product, but any positive bid had a chance of winning. Participants were also informed they would pay only the randomly drawn price, which would be less than their bid price if they won the auction. As is typically done in BDM auction procedures, participants were also advised that it was in their best interests to not over-or-underbid to exchange for the branded steaks.

Prior to bidding on each of the value added steaks, participants were asked to read a two-page fact sheet of promotional material containing information about each of the brand name steaks, containing the logos and information shown in Figures 1 through

4. Participants were then asked to submit sealed bids of their maximum WTP for each of the branded steaks along with a Canada AAA steak, which they were informed was Canada's second-highest beef grade and that only 2% of beef is graded higher than AAA. They were told that they would randomly draw one of the steak names and a random price between zero and \$10 out of a hat after they submitted their sealed bids. The values between zero and \$10 were chosen because it is desirable to greatly exceed the realistic market price when setting the upper bound (Feldkamp et al 2005). One random steak was chosen as binding to prevent diminishing marginal returns. If a participant's bid for the randomly drawn steak exceeded the value of the randomly drawn price for that steak, they would exchange their generic steak for the randomly drawn steak and pay the randomly drawn price at the checkout counter. If their bid did not exceed the randomly drawn price, they keep the generic steak and pay nothing for it at the checkout counter. When the participants completed the auction, they were asked to complete a short questionnaire outlining their beef preferences and demographic characteristics. Auctions took approximately 5–7 minutes for each participant to complete. Feldkamp et al (2005) note that practice rounds are not required for the BDM auction and so none were used; the auction procedure was carefully explained to participants beforehand and elicitation of bids did not proceed until participants were fully prepared.

THEORY

Most applications of consumer preference for any good or service begin with a discussion of the utility function. This is because it is assumed a consumer's preference relation is summarized by a utility function (Jehle and Reny 2001). In this study, the respondent's purchase decision for a branded steak is characterized by the utility function:

$$u = u(x_j) \quad (1)$$

where x_j is a vector of n steak attributes for steak j (Lancaster 1966). The consumer maximizes their utility subject to their budget constraint y and set of m prices p to get the indirect utility function:

$$v(p, y) = \max u(x) \text{ s.t. } y = px \quad (2)$$

The indirect utility function $v(p, y)$ gives the consumer's maximum utility, given p and y .

Given the above assumption about utility, steak attributes are separable. Therefore, the important variables determining WTP can be grouped as follows (Hui 1999):

$$WTP_{ij} = f(x_j, y_i, r_i(b_i, l_j, c_i, g_i, a_i, e_i, y_i), s) \quad (3)$$

where i and j subscripts denote individual respondents and individual steaks respectively; WTP is the respondent's willingness-to-pay; x is a vector of steak attributes; y is income; r is tastes and preferences; b is the number of times per week beef is eaten; l is the respondent's preference for the brand; c is the respondent's confidence in selecting beef; g is gender; a is age; e is education; and s is prices of substitutes and complements. This demand equation is used for WTP for each of the respective brand name steaks. Each of

the determinants of demand, tastes and preferences identified above have been included in a number of previous economic, agribusiness and marketing research studies, including but not limited to Umberger and Feuz (2004), Menkhaus et al (1992), and Capps (1989).

In the case of brand name beef products, consumer tastes and preferences are represented by the degree to which the respondent likes the brand name, logo, and attributes that go along with the steak product. To determine how much the consumer liked the brand name steaks in the auction and surveys, each participant was asked to rate how much they liked the brand on a seven-point Likert scale. An increase in preference shifts the consumers demand curve outward. This is why the amount that the respondent likes the brand name is important theoretically in determining WTP for each of the brand name steaks.

The number of times the respondent eats beef per week and beef grade typically purchased by the consumer also represent consumer tastes and preferences. For example, it may be a consumer's preference to consume beef n times per week and chicken and pork m times per week. Similarly, some consumers prefer leaner beef grades, such as Canada A and AA, while others prefer the amount of marbling in the Canada AAA grade. As tastes and preferences are theoretical determinants of demand, and number of times beef is consumed per week and beef grade typically purchased represent tastes and preferences, these were included as explanatory variables.

The amount of confidence a consumer has in selecting and purchasing a quality product should also affect the consumer's WTP for a brand name product. Consumers with less confidence in their ability to select a quality product are more likely to use aids that signal quality, such as brands and branded products. As a result, consumers with less confidence in their ability to assess steak quality at the grocery store are more likely to be willing to pay a premium for brand name steaks. Consumers with more confidence in their ability to choose quality steaks at the grocery store are theoretically less likely to be willing to pay a premium for brand name steaks. Confidence was self-assessed by auction participants on a seven-point Likert scale.

Gender, education, age, and income are important theoretical determinants of tastes and preferences as well (Bourdieu 1984; Tomlinson 1998). This is because consumers in different age, education, and income categories have different tastes and preferences for various goods and services. Males and females can also have significantly different valuations of various products. Income is a special variable because not only is it a theoretical determinant of tastes and preferences, it is also directly a theoretical determinant of demand and WTP.

Agribusinesses, economists, and market researchers can separate consumers into groups with similar demographic characteristics. Being able to segment consumers into these groups allows marketers to target consumers who are most likely to purchase the products they are trying to sell. Consumers do not necessarily need to be segmented demographically; they can also be segmented behaviorally, psychographically, geographically, etc. However, this type of information can be harder and more expensive to extract from consumers and has not been tried and tested in WTP, economic, and marketing studies to the extent that demographic characteristics have been.

Income and budgetary constraints are typically identified as determinants of demand. In theory, additional income is thought to shift a consumer's demand curve to the right and exert a positive effect on WTP for normal goods. However, in this study

branded steaks are considered as luxury items. Thus in theory, only people with higher incomes levels would be willing to pay for premium (luxury) products. This generally holds true for big ticket, luxury items, such as premium cars or yachts. However, this rule does not always hold true for luxury items that make up a smaller portion of the consumer's budget, such as luxury brands of gum or coffee.

The Canada AAA and brand name steaks in this study are thought to be premium offerings in the beef category. This suggests higher income consumers are their target market. However, while meat may make up a high percentage of the food budget, it clearly does not make up a large portion of the typical consumer's overall budget. Therefore, perhaps consumers with lower incomes may be interested in spending a modest amount of extra money to get a luxury item when possible within their budget.

ECONOMETRIC PROCEDURE

The dependent variable for the experimental auction model was elicited from the WTP questions pertaining to each of the brand name steaks. The dependent variable in a model using data from experimental auctions is often continuous and censored in nature, as is the case here. Consistent with the theory discussion presented above, independent variables include the number of times per week beef is eaten in the respondent's household, respondent preference for brand name, confidence in selecting a beef product, and demographic characteristics including gender, age, education, and income.

Responses become censored when they are transformed into a single value by respondents due to being above or below a level permitted by the valuation mechanism (Lusk and Shogren 2007). Though various types of censoring exist, left-censoring is the type of censoring that can occur in BDM auctions. Bids become left-censored when respondents are not permitted to submit a bid lower than zero. In other words, if a respondent would have to be paid to be given a product, their valuation would be negative. However, since zero bids are usually not permitted, the respondent records a zero as their bid.

Using ordinary least squares (OLS) for left-censored observations would result in a biased and inconsistent estimator (Amemiya 1973). As a result, the tobit and double hurdle models have been developed to handle censored data. The tobit model was developed to account for the fact that latent (unobservable) dependent variables may not necessarily always take on nonnegative values and thus may be censored (Tobin 1958). For example Amemiya (1973) notes, if y_i is the latent dependent variable, y_i^* is the actual observed bid, and participants are not allowed to bid less than zero; then

$$\begin{aligned} y_i &= \begin{cases} y_i^* & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \end{aligned} \quad (4)$$

The principle behind the tobit model is that it describes the relationship between a latent, nonnegative dependent variable y_i and independent variables x_{ij} . This is similar to a simple regression model that describes the relationship between a dependent variable and independent variables. Amemiya (1973) was able to show that the tobit model maximum likelihood estimator is consistent, thus making it a more appropriate choice for censored data than OLS.

The double hurdle model is calculated in a two-step process and was first suggested by Cragg (1971). He suggested that censored and uncensored bids should not be treated equally since they may be affected differently by the independent variables. In other words, an independent variable may positively affect the probability that the respondent bids zero, but have the opposite effect on observed bids (Lusk and Shogren 2007). To deal with the issue, Cragg (1971) suggested that first, a binomial probit model be estimated to find the determinants of the independent variables on the probability that bids will be greater than zero. Then a truncated regression of the bids that are greater than zero takes place.

Lusk and Shogren (2007) describe how the choice is made between the tobit and double hurdle models. In order to determine which estimation method is most appropriate, a likelihood ratio statistic is calculated as:

$$LR = -2[\ln LF_{\text{Tobit}} - \ln LF_{\text{BinomialProbit}} - \ln LF_{\text{TruncatedRegression}}] \quad (5)$$

where LF is the value of the likelihood function. The null hypothesis is that the tobit is the correct specification; the tobit model is rejected in favor of the double hurdle model if the calculated likelihood ratio statistic is greater than the chi-squared critical value. The degrees of freedom for the chi-squared critical value is the number of independent variables. The joint likelihood function for the simple double hurdle model—a combination of the probit and truncated regression—is written as (Lusk and Shogren 2007):

$$LF = \prod_{i=1}^N \Phi(-X_i\beta_1)^{(1-t_i)} \left(\Phi(X_i\beta_1) \left[\frac{1}{\sigma} \phi\left(\frac{y_i - X_i\beta_2}{\sigma}\right) / \Phi\left(\frac{X_i\beta_2}{\sigma}\right) \right] \right)^{t_i} \quad (6)$$

Observe that $t_i = 1$ when $y > 0$ and $t_i = 0$ when $y = 0$. It should be noted that because there are two hurdles, there are two separate vectors of coefficients, β_1 and β_2 . Econometric models were estimated using the QLIM procedure in SAS (SAS Institute Inc. 1999).

RESULTS AND IMPLICATIONS

Table 1 provides summary statistics and describes how variables were coded for estimation. Figure 5 shows the mean WTP from the BDM auction for each of the branded steaks as well as the Canada AAA steak. It is important to note that it is the *attributes* represented by the brands that consumers are willing to pay for, not the brands themselves. Participants in the experimental auctions were likely not bidding on their valuation of the brands *per se*, but rather bids would be expected to communicate consumers' valuation of the attributes contained in each of the branded steaks.

WTP premiums for the Tender Grill, Nature's Diamond, and Original Angus steaks were the highest at \$1.32 (a 15.5% premium), \$1.31 (15.4%), and \$1.31 (15.4%), respectively, per 12 ounce steak. The lowest WTP for a branded steak was \$1.20 (14.1%) for Prairie Prime, which was higher than the \$1.12 (13.2%) elicited by the unbranded Canada AAA steak. Nonparametric Wilcoxon–Mann–Whitney tests were conducted and suggested the WTP for the top three brands were not statistically different, but that WTP

Table 1. Summary statistics and variable coding

Variable	Mean	Std. Dev.	Coding
WTP for Canada AAA	\$1.12	\$1.08	Continuous
WTP for Prairie Prime	\$1.20	\$1.25	Continuous
WTP for Tender Grill	\$1.32	\$1.15	Continuous
WTP for Nature's Diamond	\$1.31	\$1.43	Continuous
WTP for Original Angus	\$1.31	\$1.30	Continuous
Times beef eaten per week	2.50	1.45	Continuous
Prairie Prime brand preference	1.54	1.17	7-point Likert scale -3 (strongly dislike) to 3 (strongly like)
Tender Grill brand preference	1.71	1.24	7-point Likert scale -3 (strongly dislike) to 3 (strongly like)
Nature's Diamond brand preference	1.18	1.54	7-point Likert scale -3 (strongly dislike) to 3 (strongly like)
Original Angus brand preference	1.73	1.25	7-point Likert scale -3 (strongly dislike) to 3 (strongly like)
Confidence in selecting beef	1.43	1.41	7-point Likert scale -3 (very unconfident) to 3 (very confident)
Gender	0.41	0.49	Female = 0; male = 1
Age	5.01	1.51	Under 18 = 1; 18-24 = 2; 25-34 = 3; 35-44 = 4; 45-54 = 5; 55-64 = 6; 65-74 = 7; 75+ = 8
Education (highest level)	3.00	1.38	Less than high school = 1; completed high school = 2; some university = 3; completed postsecondary diploma (not degree) = 4; undergrad degree = 5; graduate degree = 6
Household income	2.51	1.08	Under \$30,000 = 1; \$30,000-\$59,999 = 2; \$60,000-\$89,999 = 3; \$90,000-\$119,999 = 4; \$120,000 and over = 5
No. of persons in household	2.69	1.28	Continuous

for each of the top three brands was statistically higher than for both Prairie Prime and Canada AAA. WTP for Prairie Prime was also statistically greater than for AAA beef.

It may be possible for beef supply chain participants to tailor some offerings to consumers in accordance with the findings reported here. For example, the brand (Tender Grill) representing the attribute valued most highly by auction participants differed substantively from the next two highest valued brands only in terms of its tenderness. This finding may guide industry participants to consider a guaranteed tender product if verification costs can be overcome. If there are opportunities to profitably target-specific market segments with individuals who are willing to pay for beef products with brandable

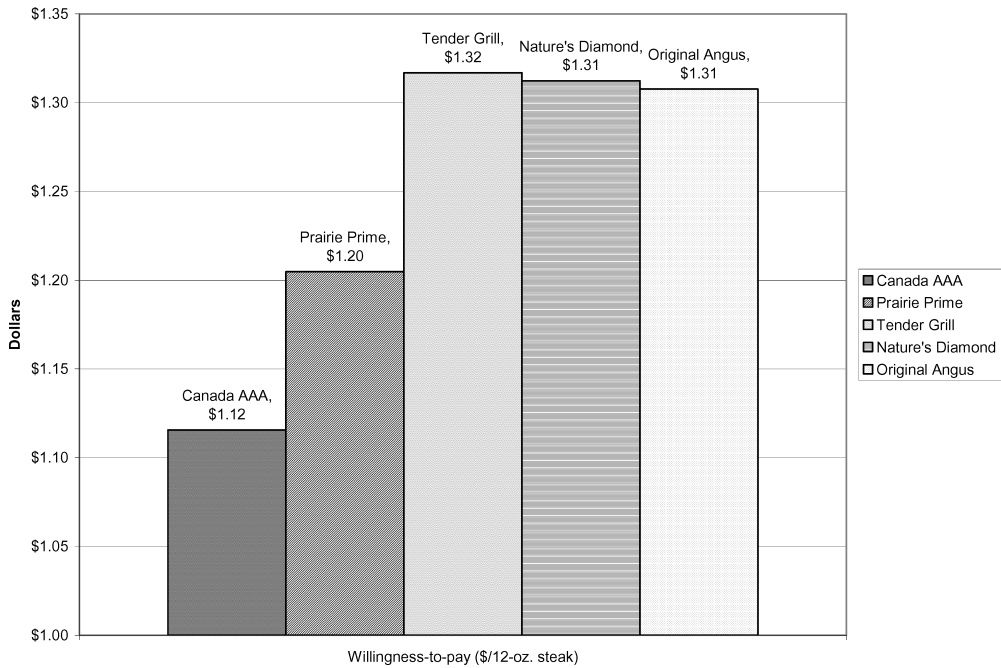


Figure 5. Mean WTP premiums, experimental auctions for hypothetical brands

attributes, the beef industry may be able to increase both its overall share of the market for meat products and financial returns for individual supply chain members. Any alliances between producers, feeders, and packers dedicated to bringing fresh brand name beef products to market will have as a central issue the distribution of any profits arising from these new products.

Estimates for the tobit/double-hurdle models of WTP are presented in Table 2. For the BDM experimental auction, the number of times per week a respondent consumes beef at home exerted a positive and statistically significant effect on WTP for Canada AAA, Tender Grill, and Original Angus steaks, each of which promises higher eating quality, but there was no effect upon WTP for Prairie Prime or Nature's Diamond. This may suggest people who consume beef more frequently are familiar with the beef grading system and prefer better-marbled beef. This group of consumers may recognize that Prairie Prime does not promise much more in terms of eating quality than AAA beef, and that Nature's Diamond, without a AAA guarantee, may actually offer lower eating quality.

The strength of the respondent's preference for brand and logo was the only variable significant for each of the brand name steaks, and exerted a positive effect upon WTP for each brand. Preference for each brand name was measured on a seven-point Likert scale. A one-point increase in the respondent's preference for the Nature's Diamond brand name, for example, increases their WTP by \$0.39 for that steak versus the generic steak. This suggests developing a likeable brand name and logo is critically important in marketing a new beef product to Canadian consumers. It also implies that great care should be taken in brand design in order to fully realize the benefits to branding discussed above.

Table 2. Econometric estimates for experimental auction data

	AAA ^a	Prairie Prime ^a	Tender Grill ^b	Original Angus ^a	Nature's Diamond ^a
Intercept	0.222	-0.687	0.850*	-0.710	-3.341*
(Std. Err.)	(0.740)	(1.052)	(0.446)	(0.702)	(1.753)
Beef eaten	0.190**	0.104	0.124**	0.240**	0.057
(Std. Err.)	(0.082)	(0.108)	(0.059)	(0.091)	(0.159)
Like name	n/a	0.341**	0.259**	0.236**	0.387**
(Std. Err.)	n/a	(0.141)	(0.061)	(0.106)	(0.146)
Confidence	-0.102	-0.257**	-0.113*	-0.102	-0.271**
(Std. Err.)	(0.072)	(0.108)	(0.059)	(0.083)	(0.136)
Gender	0.176	0.726**	0.214	0.582**	0.132
(Std. Err.)	(0.186)	(0.262)	(0.149)	(0.207)	(0.357)
Age	-0.109	-0.162	-0.069	-0.180*	0.036
(Std. Err.)	(0.093)	(0.140)	(0.054)	(0.093)	(0.176)
Income	0.201**	0.012	0.015	0.142	0.058
(Std. Err.)	(0.093)	(0.153)	(0.064)	(0.113)	(0.229)
Education	0.008	0.162	-0.070	0.085	0.764**
(Std. Err.)	(0.080)	(0.168)	(0.054)	(0.079)	(0.361)

Notes: **Indicates significance at $\alpha = 0.05$.

*Indicates significance at $\alpha = 0.10$.

^aIndicates the double-hurdle model was used.

^bIndicates the tobit model was used.

A respondent's confidence level in determining steak quality at the grocery store was also an important factor in determining the respondent's WTP for a brand name steak. The more confident the respondent was in determining steak quality at the grocery store—again, as measured on a seven-point Likert scale—the less they were willing to pay for brand name steak. Brands are used by consumers as guides for quality; if there is a brand listed on a product, it implies that someone is accountable for the quality of that product. Thus, if experienced quality is not up to expectations, the producer/manufacturer/retailer may be held accountable for the product inadequacy. As a result, if a consumer is fairly unsure about steak quality in a retail setting, they are more willing to pay for a brand name that is a good indicator of steak quality.

While a one-point increase in confidence led to a decrease in the amount the respondent was willing to pay for each of the brands, it was only a significant decrease for the Prairie Prime, Tender Grill, and Nature's Diamond brands. For example, a one-point increase in confidence in determining quality of beef led to a \$0.26 decrease in WTP for the Prairie Prime steak. One implication of these findings is that segmenting the consumers who think they know quality and judge quality by visual appearance and experience, not a brand, might be difficult. This may imply that a store brand would appeal to these consumers, who may shop at a specific retailer because of its beef quality, and may judge steaks by appearance rather than brand *per se*.

Interestingly, male respondents were willing to pay more for each of the steaks than female respondents, and in general seem to be more interested in the attributes brand name steaks offer. Feuz et al (2004) also found males significantly more willing to

pay than females for steaks with varying levels of quality attributes. However, this does not necessarily mean that brand name steaks should be targeted exclusively toward male shoppers, for two reasons: First, more often than not, the female member of the household still does most of the grocery shopping. For example, in the experimental auction, 59% of shoppers were female. Second, other experiments have found the opposite effect, that is, that females have a higher WTP (Lusk et al 2004) or that gender does not statistically affect WTP (Lusk et al 2001; Lusk and Fox 2002). Thus, advertising campaigns may want to persuade males to encourage their female partners to purchase brand name steaks.

For AAA, Prairie Prime, and Tender Grill steaks, the coefficient on respondent age was negative but statistically insignificant. Only for Original Angus was the coefficient statistically different from zero and indicative that the older the respondent, the less likely they were to pay more for the value added steaks: each unit increase in reported age category resulted in a \$0.18 decrease in the respondent's WTP. The general finding that age is negatively related to WTP is supported by the research of Lusk et al (2004) and Feuz et al (2004), while other studies have found the effect to be indeterminate (Lusk et al 2001). For Nature's Diamond, the older the respondent, the more likely they were willing to pay slightly more for the steak, although once again this effect was not statistically significant. This is similar to the results obtained by Lusk and Fox (2002), who discovered a positive relationship between age and WTP for mandatory labeling of beef fed GM corn.

Income had a positive effect on WTP as expected; however, it only had a statistically significant effect on WTP for the Canada AAA steak, for which a one-unit increase in income category resulted in a \$0.20 increase in WTP. A few other researchers have generally found income to positively affect WTP (Lusk and Fox 2002; Lusk et al 2004) though in some cases the effect is not statistically significant (Lusk et al 2001; Feuz et al 2004). It may be the case that beef does not make up a large portion of most consumers' budgets, so they may be willing to pay extra in order to obtain a premium steak, regardless of their income. For the most part, education did not statistically increase or decrease the amount that consumers were willing to pay for the brand name steaks. Nevertheless, education was statistically important for the Nature's Diamond brand, for which a one-unit increase in the respondent's education level resulted in a drastic \$0.76 increase in the WTP for the Nature's Diamond steak. Other studies have found mixed results when testing for a relationship between WTP and education levels—Lusk et al (2001) found the effect to be positive in one experimental treatment but negative in a second; Lusk et al (2004) discovered a negative effect, and Lusk and Fox (2002) found a positive effect upon WTP for mandatory labeling of beef fed GM corn.

CONCLUSIONS

It was hypothesized that one of the reasons for the comparatively few branded beef products in Canada could be that consumers are not willing to pay for such products. Accordingly, the objectives of the research reported in this paper were to determine the WTP for fresh branded beef products in one Canadian location and to identify the factors that affect consumer WTP. Experimental BDM auctions were carried out in and around Winnipeg, Manitoba to measure WTP for steaks bearing one of four hypothetical brands developed for this study as well as Canada AAA beef.

It was found that consumers are willing to pay premiums for steaks with attributes represented by brands as well as Canada AAA steaks above what they would pay for

generic steaks. These premiums ranged from a mean of \$1.12 (13.2%) for AAA steaks to a mean of \$1.32 (15.5%) for a guaranteed tender steak. A few noteworthy implications arise from analysis of these premiums: for example, the natural beef brand and the Angus beef brand did not elicit statistically different premiums, though they represent markedly different products that appear to appeal to distinct market segments, as indicated by the results of the econometric models reported above. Also, the Prairie Prime steak elicited the lowest premiums, which may imply that auction participants were not particularly concerned about “buying Canadian” when other quality attributes are verified. Firms hoping to cash in on demand for Canadian products might therefore be advised to distinguish their offerings based upon other credence and experience attributes, rather than relying upon a sense of patriotism to enhance demand.

Results of tobit and double-hurdle econometric models suggested that certain factors exert a positive effect upon WTP for brand name beef, especially the frequency with which a respondent eats beef and their preference for the brand. The factor most likely to reduce bids for brand name beef in the experimental auctions was confidence in selecting beef. Strong conclusions could not be drawn about the effects of demographic variables upon WTP for brand name beef, potentially due to the relatively small sample size. Nevertheless, it may imply that firms selling such products might well avoid focusing all of their marketing efforts upon members of specific demographic groups. Other factors have been identified as having greater importance in determining WTP.

Results of this research will be of value to beef industry members interested in pursuing value chain alliances focused upon developing brands representing attributes for which consumers are willing to pay. The Canadian beef industry may be able to add value by bringing to market more products promising higher levels of eating quality to consumers who are already knowledgeable about beef products. Firms within the industry may also be able to generate value by offering products with guarantees of credence-type attributes that appeal to consumers with altruistic tendencies or those concerned about food safety. Development of coordinated farm-to-retail supply chains will be required in order to successfully market these products.

It has been shown that consumer demand for beef products with specific attributes represented by brands is sufficient to generate premiums over generic products. Care must be taken in interpreting the results reported here too broadly; it is possible that findings would have changed under a different set of demographic and geographic conditions. Prospective suppliers must now determine whether branded beef products can be supplied at a profit; however, it may be necessary to conduct further study in other areas to ensure the results reported for Winnipeg are applicable elsewhere. The beef attributes most valued by consumers have been identified, which may facilitate more targeted marketing of products with these attributes. This research has also increased the understanding of factors affecting WTP for brand name offerings, which will be useful to producer groups or beef industry alliances interested in marketing such products.

NOTES

¹Though they are closely related concepts, there are important distinctions between branding and certification. This paper focuses on the former, although it is likely that for some of the attributes

discussed (i.e., a “natural” beef product), it would be necessary to develop a certification scheme to provide consumers with assurances regarding the attributes promised by the brand. Tronstad et al (2005) provide a detailed discussion of branding versus certification.

²It may be the case that the results reported here would differ for locations whose population does not demonstrate demographic characteristics that match those of Winnipeg and its surrounding area.

ACKNOWLEDGMENTS

The authors would like to acknowledge research support from the National Beef Industry Development Fund and the Livestock Marketing Information Center, and extend thanks to the two anonymous reviewers and *CJAE* Editors for their helpful suggestions.

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