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ABSTRACT

Auction experiments at locations in the U.S. and Canada are used to determine consumers’ willingness to pay for red-meat traceability and other enhanced food characteristics. Consumers in both countries are found to be willing to pay a positive amount for traceability, but would pay even more if traceability were bundled with other characteristics such as animal welfare or enhanced food safety. The results suggest a larger Canadian market for traceability, on a percentage basis, for beef than in the U.S.
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Introduction

Recent research suggests the United States’ (US) red-meat industry is falling behind many of its major competitors and trading partners in terms of red-meat traceability, transparency, and enhanced quality assurances (TTA) (Liddell and Bailey). In fact, the US pork system ranked last, according to Liddell and Bailey, when compared against the United Kingdom (UK), Denmark, Canada, Japan, Australia, and New Zealand for TTA.

Traceability is sometimes called identity preservation and is defined in Liddell and Bailey as the ability to track the inputs used to produce food products backward and forward to/from their source at different levels of the marketing chain. Transparency refers to the public availability of information on all the rules, procedures, and practices used to produce a food product at each level of the marketing chain (Baines and Davies; Early). Enhanced quality assurances that can be provided by TTA are referred to as “extrinsic” qualities by Baines and are characteristics that affect neither food safety nor typical government grading but which are still valued by some consumers. Examples of these enhanced quality assurances include assurances about the humane treatment of animals used to produce the food product, absence of genetically modified organisms (GMOs) in the product, environmental responsibility, and social responsibility.

The purpose of this paper is to examine consumer willingness to pay (WTP) in Canada and the US for TTA characteristics in red-meat products. Canada and the US are major trading partners and competitors in red-meat markets. The Canadian red-meat industry is moving toward more TTA, especially traceability, while the US red-meat system is much slower in adopting TTA protocols. The analysis uses auction experiments to gauge consumer WTP in both countries for TTA in beef and pork products. The results are very similar for both countries and suggest consumers are willing to pay a non-trivial, positive amount for red-meat (beef and pork) traceability. However, other characteristics such as enhanced food safety assurances and the humane treatment of animals used to produce meat products are more valued in both countries than traceability alone.

**Background**

TTA systems for red meat evolved in the European Union (EU) following the *Bovine Spongiform Encephalopathy* (BSE or “Mad-Cow” disease) crisis in the UK during the late 1990s and in response to the perceived regulatory failure on the part of EU governments to protect consumers from BSE. A new system of assurances was jointly developed in the EU by the public and private sectors requiring accountability for production and manufacturing practices at each level of the marketing channel beginning at the farm level. Traceability became the foundation of this new system. Other countries, including Canada, have been developing TTA systems similar to the EU in order to 1) reduce friction in trade with the EU, 2) as a preemptive measure in case of another BSE or other type of food crisis or 3) as a method to differentiate products as having higher quality characteristics than non-TTA systems.

Since traceability is not mandated in the US, the debate in the US has focused primarily on consumer WTP for these systems. While some individual supply chains in the US are
adopting traceability (e.g., Farmland and Premium Standard Farms), there is still no industry-wide effort in the US to implement traceable systems. Conversely, Canada adopted a mandatory traceback system called the Canadian Cattle Identification Agency (CCIA) in July 2002.

Even though traceability is not an explicit requirement in the US red-meat system, recently adopted country-of-origin labeling (COOL) for red meat and the accompanying stiff penalties for food retailers for non-compliance may become a de facto US traceability system. For example, in a letter to cattle producers Warren Mirtsching, Vice President for Quality Assurance and Food Safety at Swift & Company, indicated that Swift will require third-party verification amounting to a “passport” to document where animals were born and raised.

Implementation of these systems is costly (Coe; Buhr). While there are other efficiencies that may possibly be realized with TTA systems, such as better coordination, tracking, matching, and problem identification, questions regarding WTP remain at the center of much of the discussion about TTA, especially in the US.

A limited amount of research has been conducted on characteristics that could be verified using traceability. These include Lusk, Roosen, and Fox who examined consumer WTP for beef products not treated with growth hormones nor fed genetically modified grain. Another example is Lusk and Fox who investigated the effect mandatory labeling of hormone-treated beef or beef that had been produced with genetically modified grains on beef products. Other work by Grannis, Hooker, and Thilmany measured consumer preferences for selected characteristics in beef marketed as being “natural.” Dickinson and Bailey examined WTP for TTA in the US for beef and ham. This paper represents an extension of Dickinson and Bailey’s findings by extending the analysis beyond just the US.
Methodology

This research examines consumer WTP for TTA basically from the US and Canadian perspective. Since data on WTP for TTA systems in these countries is not publicly available, a laboratory market approach is used to elicit individuals’ WTP for food traceability and enhanced quality assurances.

Auction experiments were conducted for four groups of 13-14 participants for ham and four groups of 13-14 participants for roast beef both at Utah State University in Logan, Utah (October 2001) and the University of Saskatchewan in Saskatoon, Saskatchewan (March 2002). The groups in Logan and Saskatoon represented four separate demographic groups with one group being university faculty, one professional staff, one classified staff, and one university student.

The experiments followed the basic design suggested in Shogren et al. (1994) for eliciting bids to upgrade a meat sandwich. Subjects were given a free lunch, which included a baseline meat sandwich and US $15 or CND $20 in cash at the beginning of the one-hour experiment. Subjects were allowed to bid on what they would have been willing to pay to exchange or upgrade their existing sandwich for a sandwich with the meat described as having one or more extra-verifiable attributes. Subjects were aware that their baseline sandwich met current standards enforced either by the US of Canadian governments, depending on the location of the experiment.

A sealed-bid, Vickery-style auction was held to elicit bids from participants to upgrade to four different sandwiches. Sandwich 1 was delineated as making assurances about humane treatment of the animal that produced the meat. Sandwich 2 had assurances about enhanced food safety (extra tests for pathogens were performed). Sandwich 3 had assurances about being able
to track the source of the meat to the farm on which the animal was raised. Finally, Sandwich 4 provided the combined assurances of Sandwiches 1-3. A total of ten bidding rounds were conducted for each group for each sandwich (40 total bids per participant). Participants also completed a survey following the experiments that collected demographic and other relevant information.

The final five rounds of bidding for each sandwich are used to calculate the average bids and the cumulative density functions (cdf) for beef and ham in both countries. The final five rounds are used to calculate these averages assuming that participants became familiar with the bidding process over time and that their true WTP tended to stabilize the more times they were asked to bid on the same sandwich. The cdfs of bids reveals which of the characteristics (sandwiches) received the highest average bids from participants. Estimates of the retail value of the baseline sandwich were used to calculate percentage bids of subjects (US $3 and CND $5 for sandwiches in the respective countries). This standardization allows for a comparison of bid premiums across countries, although caution is still advised since such relative comparisons are only as accurate as the baseline sandwich values chosen.

**Results**

Average US bids (in the final five auction rounds) to upgrade from the baseline roast beef sandwich were US $0.48 (16% premium) for assurances about humane animal treatment, $0.60 (20% premium) for extra assurance about food safety, $0.21 (7.0% premium) for traceability, and $1.05 (35% premium) for all three characteristics combined (Figure 1). For ham, US participants’ average bids were USD $0.60 (20% premium), $0.69 (23% premium), $0.54 (18%
premium), and $1.29 (43% premium) to upgrade to Sandwich 1, 2, 3, and 4, respectively (Figure 3).  

Average bids for upgrading the baseline roast beef sandwich in the Canadian experiments were CND $0.95 (19% premium), $0.90 (18% premium), $0.45 (9.0% premium), and $1.85 (37% premium) for Sandwiches 1, 2, 3, and 4, respectively (Figure 2). Average bids for upgrading the baseline ham sandwich were CND $0.65 (13% premium), $0.65 (13% premium), $0.35 (7.0% premium), and $1.05 (21% premium) for Sandwiches 1, 2, 3, and 4, respectively (Figure 4).

The most striking aspect of the results for average bids is their similarity in terms of ordering and also relative magnitudes in both countries. This suggests a very close correlation exists between consumers' WTP in both countries. All of the upgradeable characteristics exhibited positive average bids by participants. Extra assurances about food safety are the most highly valued characteristic in both countries followed by assurances about the humane treatment of animals and finally traceability. The results suggest that traceability may best be “bundled” with characteristics that can be verified using traceability (e.g., animal welfare and extra food safety) rather than as a characteristic of its own.

However, a closer examination of the distribution of average bids in the two countries indicates that some important differences may exist between Canadian and American participants. For beef, approximately 5% of Canadian participants had average bids for traceability that exceeded the value of the base sandwich by 40% or more (Figure 2). Also, about 10% of Canadian participants would have paid a 40% premium or more for humane animal treatment assurances or extra food safety assurances (Figure 2). Virtually no US

\[1\]The reader should regard the auction bids as qualitative information since they are obtained under experimental conditions, i.e., one should not conclude that average bids necessarily represent what average consumers would be willing to pay at retail for the various characteristics.
participants were willing to pay more than a 40% premium for traceability, animal welfare, or extra food safety assurances for beef (Figure 1). Between 30% and 40% of participants in both countries would have paid in excess of a 40% premium for a roast beef sandwich with the three combined characteristics, but a few Canadians had a substantially higher WTP than the Americans with the highest WTP for the combined characteristics in roast beef (Figures 1 and 2).

For ham, only about 10% of Canadian participants would pay a premium of more than 40% above the value of the baseline sandwich for assurances about animal welfare, food safety, or traceability (Figure 4). However, approximately one quarter of the US participants indicated they were willing to pay a premium of 40% or more for extra assurances for these three characteristics (Figure 2).

Taken as a whole, the cdfs suggest a larger market (on a percentage basis) for extra assurances for traceability, animal welfare, and food safety for beef in Canada than in the US, but a larger market for these assurances (on a percentage basis) for ham in the US than in Canada. An examination of average bids for ham given by the different demographic groups may help to explain this. Average ham bids for the combined characteristics (Sandwich 4) given by the US students, faculty, classified staff, and professional staff were USD $0.14, $0.34, $2.49, and $1.80, respectively. Average ham bids for Sandwich 4 given by the Canadian students, faculty, classified staff, and professional staff were CND $0.36, $1.71, $0.70, and $1.71, respectively. This indicates that a wider range in average ham bids exists in the US data than in the Canadian data resulting from seemingly, unusually high bids by the classified staff participants in the US auction experiments. The reasons for higher bids being made by the US classified employees group are not completely clear, but the results strongly suggest that demographic differences matter in both the US and Canadian markets.
Participants were also asked in a questionnaire following the auction experiment to rate how highly they valued extra assurances about food safety, traceability, and assurances about the processes used to produce meat products (e.g., humane animal treatment). In both countries, added assurances about food safety, traceability, and assurances about processes used to produce meat were more highly valued for beef than for ham. This likely reflects widely publicized food recalls and other problems in recent years, such as BSE, that have been associated with beef and not with ham. However, Canadian participants placed more value on traceability and assurances about processes used to produce red-meat products than did American participants. This may reflect more awareness about these issues in Canada than in the US. This would be reasonable considering that Canada has implemented mandatory traceability to the plant level for cattle and swine while the US does not have any mandatory traceability system.

Conclusions

The results presented here indicate that many, but not all, Canadian and American consumers would be willing to pay for TTA characteristics in red-meat products. Average bids for assurances about humane animal treatment, food safety, and traceability were all positive for both countries. Traceability, while receiving positive average bids, was the least valued of the three individual characteristics considered (e.g., animal welfare, food safety, and traceability). This suggests that traceability should be bundled with other characteristics that can be verified with traceability when food products are marketed with these characteristics.

Results for both countries are very similar in how preferences for the characteristics are ordered, and they are also similar in comparing many of the relative magnitude of average bids for the different characteristics (see Figures 1-4). Demographic characteristics appear to play an important role regarding WTP for TTA characteristics, especially for ham. Consequently, one
would expect different niche markets to be important for firms developing meat products with TTA characteristics.
References


Figure 1: USA Beef
Bid CDF's
(unit of observation=average % bid from rounds 6-10)

- treatment mean bid=16% premium
- Safety mean bid=20% premium
- Traceability mean bid=7% premium
- All Attributes mean bid=35% premium

Figure 2: Canada Beef
Bid CDF's
(unit of observation=average % bid from rounds 6-10)

- treatment mean bid=19% premium
- Safety mean bid=18% premium
- Traceability mean bid=9% premium
- All Attributes mean bid=37% premium
Figure 3: USA Pork
Bid CDF's
(unit of observation=average % bid from rounds 6-10)

- treatment mean bid=20% premium
- Safety mean bid=23% premium
- Traceability mean bid=18% premium
- All Attributes mean bid=43% premium

Figure 4: Canada Pork
Bid CDF's
(unit of observation=average % bid from rounds 6-10)

- treatment mean bid=13% premium
- Safety mean bid=13% premium
- Traceability mean bid=7% premium
- All Attributes mean bid=21% premium