FOOD QUALITY VERIFICATION:

WHO DO CONSUMERS TRUST?

Jill E. Hobbs

Brian G. Innes

Adrian D. Uzea

Department of Bioresource Policy, Business & Economics

University of Saskatchewan, Canada

Corresponding author: jill.hobbs@usask.ca

2010

Selected Paper
prepared for presentation at the 1st Joint EAAE/AAEA Seminar

"The Economics of Food, Food Choice and Health"
Freising, Germany, September 15 – 17, 2010

FOOD QUALITY VERIFICATION: WHO DO CONSUMERS TRUST?

ABSTRACT

Food markets are increasingly characterized by an array of quality assurances with respect to credence attributes, many of which relate to agricultural production methods. A variety of organizations are associated with these quality assurance claims, including private, third party and public sector organizations. How do quality verifications from different sources affect consumer food choices? Who do consumers trust for assurances about credence attributes? This paper draws upon two recent studies to explore Canadian consumer attitudes toward environmental quality claims in a bread product and animal welfare quality claims in a pork product, along with attitudes toward quality verification from different sources. Analysis from two discrete choice experiments is presented, with latent class models used to explore heterogeneity in consumer preferences. The key message from both studies is the importance of considering heterogeneity in consumer preferences when examining attitudes toward quality verification. Both studies reveal distinct segments of consumers who have a high level of trust in verification by public sector agencies (government). In general, it was the respondents who exhibited the strongest preferences for the quality attributes who also tended to value public sector verification. Both sets of results also reveal a sub-set of consumers who tend to trust farmers, while both also reveal a clear segment of Canadian consumers who might be considered 'conventional food' consumers, with little interest in these quality attributes. Suggestions for further research are provided.

KEYWORDS:

Choice experiment; animal welfare; environment; quality verification; heterogeneity

JEL CODES:

Q13; Q18; D12

FOOD QUALITY VERIFICATION: WHO DO CONSUMERS TRUST?

1. INTRODUCTION

Food markets are increasingly characterized by an array of quality assurances with respect to credence attributes: organic, 'natural', environmentally-friendly, humane animal treatment, sustainable, etc. Many of these assurances relate to the production methods used on the farm and reflect a growing interest among consumers in how food is produced. In some cases, this is driven by perceptions about a link between food safety and agricultural production practices, while in other cases it reflects primarily ethical preferences.

A variety of organizations are associated with these quality assurance claims, including private, third party and public sector organizations. Many countries have developed national standards for organic production and regulate the use of certified organic claims, while other quality claims are dominated by an assortment of private sector and third party assurances pertaining to 'natural' production methods, humane animal treatment, or sustainable production methods. How do quality verifications from different sources affect consumer food choices? Who do consumers trust for assurances about credence attributes? Drawing upon two recent studies of Canadian consumers, this paper explores consumer attitudes toward credence quality attributes in food choices and the role of quality verification in engendering trust among consumers. The paper allows a comparison of Canadian consumers' responses to farm animal welfare quality claims in a meat product, and environmental quality claims in a bread product.

In many countries the provision of farm animal welfare is a blend of public and private sector initiatives. Most developed countries have regulations related to humane animal treatment, although the scope of the legislative intervention on animal welfare varies between countries. Regulatory frameworks are often supplemented by voluntary codes of practice established by industry associations, private firms, or third parties. In recent years, restaurant chains, food retailers and meat processors in Canada and the US have come under increasing pressure from animal welfare organizations to implement more stringent animal welfare requirements for their suppliers, while governments have faced pressure from some groups to impose more stringent mandatory farm animal welfare standards. This appears to mirror, although lags, developments in other markets such as the European Union.

For other credence quality attributes the growth of private food quality standards has been well documented (see for example, Henson and Reardon, 2005; Fulponi, 2005; Hobbs, 2010), and food retailers and third party certifiers increasingly play a prominent role in assuring

various food quality attributes. Proprietary standards are put in place by individual firms and are unique to the firm, such as those established by food retailers: for example, Tesco's "Nature's Choice" in the UK, or Walmart's "Ethical Standards Program". Private standards can also take the form of voluntary consensus standards established by a coalitions of firms or industry organizations, for example the GLOBALGAP food safety standards established by a coalition of food retailers, or the 'Assured Food Standards' program (also known as the 'red tractor' program), driven by a coalition of agricultural producer groups in the UK (Hobbs, 2010). Despite the obvious growth in the scope and complexity of private food quality standards, it has been argued that there may still be a role for public sector involvement in the market for credence attributes in reducing information asymmetries; for example, Harris and Cole (2003) discuss how governments can aid the market for eco-labelled goods by providing an accurate measurement of environmental friendliness. In the European Union and the United States, government involvement in food quality verification includes the Geographic Indication system and USDA Process Verified program, respectively. In Canada there has been relatively limited public sector involvement in quality assurance of credence attributes beyond the introduction of a mandatory national organic standard in 2006.

The credibility of quality assurances from different sources: public, private (farm organizations, the downstream food industry) or third parties determines how effective these quality signals are in averting market failure due to information asymmetry. Of interest therefore is the extent to which consumers trust quality assurances emanating from different sources, and whether this differs across food products or across credence attributes. For example, Innes (2008) found that about a quarter of respondents in a recent Canadian survey reported having avoided purchasing organic food because they did not believe it was truly organic. Consumer trust in quality assurances, together with trust in *who* verifies those assurances, is a key dimension in understanding the role of credible quality signals in food markets. Further, the markets for many of these credence attributes in food products are characterized by horizontal rather than vertical differentiation. We expect some consumers to be highly motivated to purchase foods with environmental or enhanced animal welfare attributes, whereas other consumers may exhibit only weak preferences for these attributes, or be indifferent. The analysis presented in this paper therefore also explores the heterogeneity inherent in consumer preferences for these attributes.

The next section outlines the research design and data collection methods employed in the two consumer studies, both of which use a discrete choice experiment, and provides some initial insights into consumers' trust in different organizations. The discrete choice experiments,

which enabled a more detailed analysis of how quality verification from different sources affects choices, are discussed in section 3 along with the choice modelling framework, while section 4 presents the results of the latent class analysis. The paper concludes with a discussion of key policy implications.

2. DATA COLLECTION AND INITIAL INSIGHTS

Two nationwide[1] Internet-based consumer surveys were undertaken in Canada in June-July 2008. Both surveys included a discrete choice experiment tailored to the product and credence attributes in question. The discrete choice experiment in the first study (480 respondents) presented respondents with various choices of a bread product characterized by two different credence quality attributes: environmentally sustainable production methods, and pesticide-free production methods, together with different organizations that verify these quality attributes (public sector, private sector, third party), at various price levels. For ease of exposition, hereafter study #1 will be referred to as the 'Environmental' or bread study[2]. The second study (540 respondents) focused on animal welfare, with a discrete choice experiment featuring pork chops with three different animal welfare attributes (housing system, group pens, use of antibiotics), together with different quality verification organizations, at various prices. For ease of exposition, study #2 will be referred to as the 'Animal Welfare' or pork study[3]. In addition to the discrete choice experiments, both studies collected data on a common set of questions pertaining to trust in organizations for information about farming methods. Finally, the surveys collected data on respondents' food purchasing habits and attitudes toward various food production methods – again tailored to the context of the individual study – together with socio-demographic information[4].

Both studies contained a common set of questions exploring respondents' trust in various organizations for accurate information about on-farm production methods: this forms the starting point for our analysis. Drawing upon Frewer et al. (2005), who used a similar set of

[1] As the surveys were undertaken in English only, the samples under-represent the province of Quebec, but were otherwise reasonably representative of English-speaking Canadians. As with many Internet surveys, the samples tended to slightly over-represent higher education groups and under-represent lower income Canadians. Survey respondents were recruited by Leger Marketing from their online panel of Canadian consumers.

[2] For a detailed discussion of study #1, readers are referred to Innes (2008) and Innes and Hobbs (2010).

[3]. For a detailed discussion of study #2, readers are referred to Uzea (2009). Study #2 included a general population sample (540 respondents) and a targeted sample of animal welfare organization members (52 respondents). For the purposes of this paper, only the general population sample results are used.

[4] Copies of the survey instruments are available from the authors upon request or can be found in Innes (2008) and Uzea (2009)

questions to examine the attitude of Dutch consumers to public and private sector quality verification institutions, respondents were asked to what extent they trusted farmers, processors, retailers, third parties, and government to provide accurate information about farming methods in the case of the bread study (or about the welfare of pigs in the case of the animal welfare study). A series of follow-up questions explored the determinants of trust, probing the extent to which these organizational types were perceived to be knowledgeable, transparent and accountable, and would act in the consumers' best interests when providing information about farming methods (the welfare of pigs)[5]. Figure 1 compares the results of the broad "to what extent do you trust" question for both studies. Respondents in both studies declared a higher level of trust in third parties, government and farmers compared to food processors or retailers. Respondents in the bread study gave a marginally higher ranking to third party verification over government, while the opposite is true of the pork study, however, the differences are not statistically significant.

Figure 1: Comparison of Declared Trust in Different Organizations

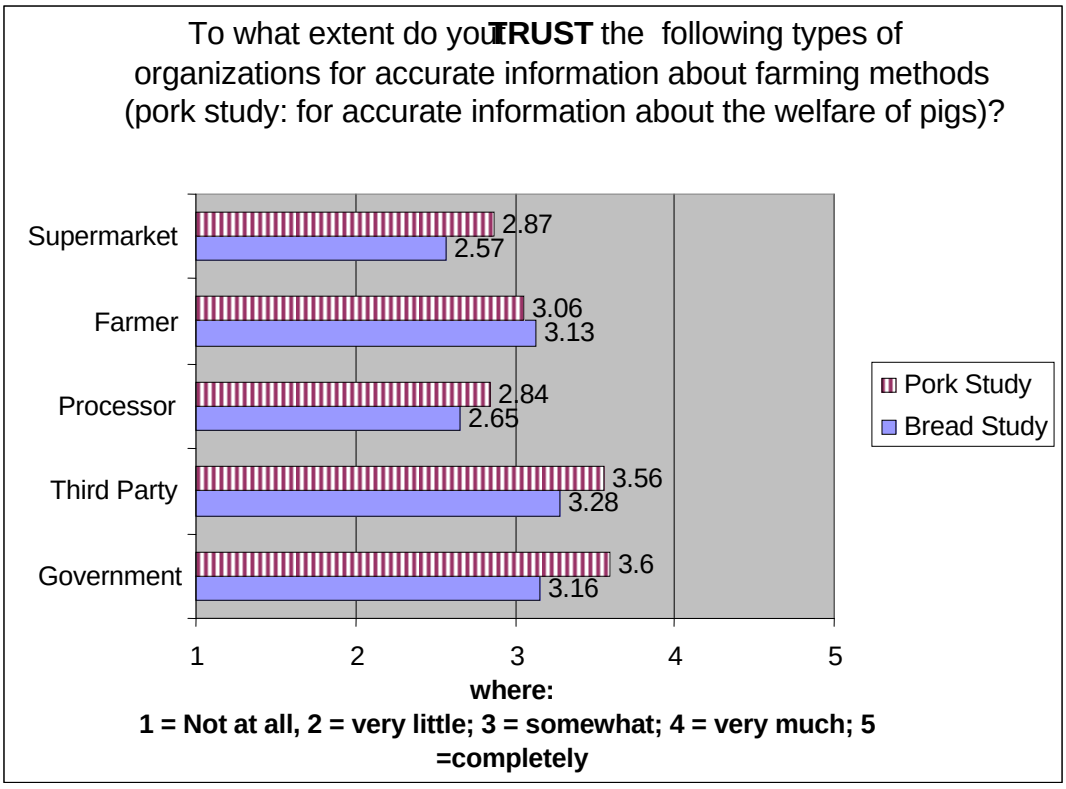

Figure 1 provides a broad overview of 'trust' in public and private sector organizations, and suggests that on average across both studies, respondents tended to declare a higher level of trust in public sector and third party organizations, while trust in private sector actors appears to

[5] Detailed discussions of the responses to these other dimensions of trust can be found in Innes (2008) and Uzea (2009).

be weaker. However, while a broad overview is useful, it can mask heterogeneity in consumer attitudes toward quality verification, and does not capture the extent to which consumers trade-off different types of quality verification when faced with products priced at different levels. The discrete choice experiments provide a more nuanced picture with respect to the trade-offs consumers make when presented with a specific choice situations.

3. CHOICE MODELLING

In the two choice experiments respondents in each survey were asked to imagine that they were planning to purchase a pre-packaged loaf of bread or a package of boneless pork chops, respectively at a supermarket. They were asked to choose one alternative from a choice set where each alternative was described by a set of production method attributes, a verifying organization, and price. Tables 1 and 2 describe the bread and pork product attributes used in the choice experiments, along with the levels for the attributes that varied across the choice sets. Attributes were chosen following extensive review of the literature, and discussion with industry experts. Price levels were chosen to correspond with prices for basic versus speciality bread and pork products in the Canadian retail market.

Table 1 Study 1: Environmental Study (Bread): Attributes and Levels

ATTRIBUTE	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
Verifying Organization	Government	Third Party	Supermarket	Bakery	Farmer
Pesticide-Free Grains	Yes	No			
Environmentally Sustainable Grains	Yes	No			
Price[a]	$1.99/loaf	$2.99/loaf	$3.99/loaf	$4.99/loaf	

[a] All prices are in Canadian dollars. At the time of the survey Cdn$1 = US $0.99 or 0.63 Euros

Table 2: Study 2: Animal Welfare Study (Pork): Attributes and Levels

ATTRIBUTE	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
Verifying Organization	Government	Third Party	Supermarket	Processor	Farmer	None
Pigs' Housing system	Outdoor Housing	Hoop Housing	Conventional Housing			
Gestation Stalls	Use of sow gestation stalls	Use of groups pens for sows				
Sub-Therapeutic Antibiotics	Raised with the use of antibiotics	Raised without the use of antibiotics				
Price[a]	$11.07/Kg	$13.21/Kg	$16.08/Kg	$19.36/Kg		

[a] All prices are in Canadian dollars. At the time of the survey Cdn$1 = US $0.99 or 0.63 Euros

In both surveys the choice experiment used an orthogonal main effect design that was divided into in four blocks of eight questions in each group. Therefore, each respondent completed eight choice tasks; examples of the choice sets used in each survey are presented in Figure 2. Each choice set included a 'no purchase' option (D). The opt-out option increases the realism of the choice task since in a real purchase decision consumers can decide not to purchase a product from those available.

Figure 2: Examples of Choice Sets from Both Studies

Study 1: Bread

Features	**A**	**B**	**C**	**D**
Organization verifying	Supermarket Verified	3rd Party Verified	Bakery Verified	I would not purchase any of these products
Pesticide Free			√	
Environmentally Sustainable	√	√		
Price	$2.99	$4.99	$3.99	
	Option A	Option B	Option C	Option D
I would choose …	⊙	⊙	⊙	⊙

Study 2: Pork Chops

Features	**A**	**B**	**C**	**D**
Pigs' Housing System	Outdoor	Hoop	Conventional	I would not buy any of these products.
Gestation Stalls	Group pens	Gestation stalls	Gestation stalls	
Antibiotics	Not used	Not used	Used	
Organization verifying	Third Party verified	Government verified	None	
Price	$ 19.26/ kg (or $ 8.74/ lb)	$ 13.21/ kg (or $ 5.99/ lb)	$ 11.07/ kg (or $ 5.02/ lb)	
I would choose…	□	□	□	□

For each study choice behaviour is modelled in a random utility maximisation framework, assuming that individual *n* receives utility *U* from selecting alternative *i* in choice situation *t*. Utility is a combination of a systematic component which varies with the product attributes V_{nit} and a stochastic component ε_{nit}, as specified in equation (1) (Louviere *et al*., 2000).

(1) $U_{nit} = V_{nit} + \varepsilon_{nit}$

The systematic component of the utility function is given by:

(2) $V_{nit} = \alpha_n BUYNONE_{nit} + \delta_n' Price_{nit} + \beta_n' x_{nit}$

where α_n represents individual *n*'s utility of not purchasing any bread (pork) products in a choice situation *t*, $BUYNONE_{nit}$ is an alternative specific constant that takes the value 1 for the no purchase alternative (that is, Option D in the two studies) and 0 otherwise, $Price_{nit}$ is price and x_{it} is a vector of non-price quality attributes from the discrete choice experiment. Definitions of the variables used in each study are provided in Tables 3 and 4. The individual *n* chooses the alternative that yields the highest utility from a choice set J= 1,…,*j*.

Following Louviere *et al.* (2000) this can be represented as:

(3) $U_{in} > U_{jn}$ for all $j \neq i$ for all $i \neq j$, in case that alternative *i* is chosen

Substituting (1) into (3) leads to:

(4) $(V_{in} + \varepsilon_{in}) > (V_{jn} + \varepsilon_{jn})$

The probability P_{in} that an individual *n* chooses alternative *i* is:

(5) $P_{in} = \Pr ob(U_{in} > U_{jn}) = \Pr ob(V_{in} + \varepsilon_{in} > V_{jn} + \varepsilon_{jn}) = \Pr ob(\varepsilon_{jn} - \varepsilon_{in} < V_{in} - V_j)$ for all j≠i

Table 3: Study 1: Environmental (Bread) Study Variable descriptions

VARIABLE	DESCRIPTION
Pesticide-Free	Dummy=1 if grains were produced without the use of chemical pesticides
Sustainable	Dummy=1 if grains were produced in an environmentally sustainable way
Government Verified	Effects coded dummy=1 if grains were verified by government to contain at least one of Pesticide-Free or Sustainable
Third Party Verified	Effects coded dummy=1 if grains were verified by a third party to contain at least one of Pesticide-Free or Sustainable
Farmer Verified	Effects coded dummy=1 if grains were verified by the farmer or a farm organization to contain at least one of Pesticide-Free or Sustainable
Supermarket Verified	Effects coded dummy=1 if grains were verified by the supermarket to contain at least one of Pesticide-Free or Sustainable
Bakery Verified	Included in regressions by effects coding the organization attribute. Can be calculated as (-Government Verified)+ (-Farmer Verified) + (-Third Party Verified) + (-Supermarket Verified)

Table 4: Study 2: Animal Welfare (Pork) Study Variable Descriptions

VARIABLE	DESCRIPTION
Outdoor Housing	Effects coded dummy=1 if finishing pigs were kept outdoors.
Hoop Housing	Effects coded dummy=1 if finishing pigs were housed in large tent-like shelters with straw bedding.
Conventional Housing	Included in regression by effects coding the housing attribute. Can be calculated as (-Outdoor)+(-Hoop).
Sows in Groups	Effects coded dummy=1 if the pork chops were sourced from pigs bred at a farm where sows were kept in groups in pens.
Sows in Gestation Stalls	Included in regression by effects coding the "Sows in Groups" level. Can be calculated as (-Sows in Groups).
No Sub-Therapeutic Antibiotics (Therapeutic Antibiotics Only)	Effects coded dummy=1 if the antibiotics were administered only with the approval of a veterinarian and were aimed at treating diseases.
Sub-therapeutic Antibiotics	Included in regression by effects coding the "Therapeutic Antibiotics" level. Can be calculated as (-No S.T. Antibiotics).
Government Verified	Effects coded dummy=1 if pork chops were verified by a federal food agency to contain at least one of Outdoor Housing, Hoop Housing, Sows in Groups, No Antibiotics
Third Party Verified	Effects coded dummy=1 if pork chops were verified by a certifying company or a non-profit organization to contain at least one of Outdoor Housing, Hoop Housing, Sows in Groups, No Antibiotics
Farmer Verified	Effects coded dummy=1 if pork chops were verified by an individual farmer or a farmers' association to contain at least one of Outdoor Housing, Hoop Housing, Sows in Groups, No Antibiotics
Processor Verified	Effects coded dummy=1 if pork chops were verified by a well known meat processor to contain at least one of Outdoor Housing, Hoop Housing, Sows in Groups, No Antibiotics
Supermarket Verified	Effects coded dummy=1 if pork chops were verified by a well known grocery store to contain at least one of Outdoor Housing, Hoop Housing, Sows in Groups, No Antibiotics
Not Verified	Included in regression by effects coding the organization attribute. Can be calculated as (-Farmer Verified)+ (-Processor Verified)+ (-Supermarket Verified) +(-Government Verified)+ (-Third Party Verified)

In both studies, initial estimations were made using the multinomial logit model (MNL) and are reported elsewhere (see Innes, 2008 and Uzea, 2009). For the purposes of this paper, only the Latent Class Model (LCM) results are reported; the LCM model allows heterogeneity within the sample to be captured by specifying homogenous groups of consumers with similar latent characteristics (e.g. see Nilsson *et al*., 2006). It constitutes a generalization of the MNL in the sense that homogeneity within groups and heterogeneity between groups is assumed. The LCM model estimates individual class specific β_f for F different classes within the sample. The

indirect utility function V_{nif} of an individual n belonging to class f choosing alternative i is defined as (Uzea et al., 2010):

(6) $V_{nif} = \alpha_{nif} + \delta_f^{'} P_{ni} + \beta_f^{'} x_{nit}$

The choice probability of an individual n choosing alternative i conditional on membership in class f is:

(7) $P_{ni/f} = \sum_{f=1}^{F} s_f \frac{\exp(v_{n,i,f})}{\sum_{j=1}^{C} \exp(v_{n,j,f})}$ Where s_f is the class probability $0<s<1$ so that $s'1 = \sum_{m=1}^{M} s_m = 1$

where $P_{ni|f}$ is a joint product of the probability of individual n falling into a latent group f and the probability of alternative i will be chosen from a choice set given the individual is in group f. The number of classes, F, was specified using the Bayesian Information Criterion (BIC) following the procedure outlined in Boxall and Adamowicz (2002). Finally, willingness-to-pay (WTP) estimates are useful as a means to evaluate consumer preferences for the attributes. The willingness-to-pay estimates are the ratios of the marginal utility of attributes over the marginal utility of money: $-\beta_m/\ \beta_p$ – where m=1….,6 (bread) [m=1,..,9 (pork)] are conditional marginal utilities estimated at the mean of the population for the attribute of interest and β_p is the parameter for price (Louviere *et al*,. 2000). Of particular interest for the purpose of this study is the *relative* size of the WTP estimate for quality verifications from different sources.

4. RESULTS

Tables 5 and 6 present the willingness to pay estimates for the bread (environmental) and pork (animal welfare) studies respectively. In both cases, five classes of respondents emerged; the classes have been named for ease of exposition. Average class probabilities indicate the probability of respondents falling into a particular class. Of interest for the purpose of this analysis is the *relative* difference in WTP estimates across the classes within each sample. The WTP estimates reveal some interesting patterns and provide an indicator of both the strength of consumer preferences and the diversity of attitudes toward the source of quality verification for these credence attributes.

Table 5 Study 1 (Bread): Latent Class Model WTP estimates ($ per loaf) (n=480)[a]

Variable	**Class 1** *Concerned Shopper*	**Class 2** *Independent Verification Seeker*	**Class 3** *Label Believer*	**Class 4** *Defer to Farmer*	**Class 5** *Not Interested*
Pesticide-Free	**10.26**[**b]	**3.13**[*]	**2.27**[**]	**0.40**[**]	**-0.18**[**]
Environmentally Sustainable	**6.34**[**]	**2.42**[***]	**1.45**[**]	**0.28**[**]	0.07
Government	**5.13**[**]	**4.30**[*]	**0.06**[**]	**-0.39**[**]	0.08
Farmer Verified	0.85	**-1.05**[**]	**-0.34****	**1.22**[**]	**0.40****
Third Party Verified	**-3.80**[**]	**3.34**[**]	**0.18**[**]	**-0.48**[**]	**-0.12**[**]
Supermarket Verified	**-3.55**[**]	**-4.27**[***]	**0.22**[**]	**-0.68**[**]	0.04
Bakery Verified	1.37	-2.32	-0.12	0.34	-0.40
Average Class Probabilities	0.220	0.120	0.352	0.123	0.186

Notes:

a. Model fit: Log-Likelihood -3415 Adjusted Pseudo-R^2 0.358. For details of the underlying parameter estimates see Innes and Hobbs (2010)

b. ** indicates significance at the 5 percent level

Table 6: Study 2: (Pork Chops): Latent Class Model WTP estimates ($/kg) (n=541)[a]

Variable	**Class 1** *Conventional Pork Consumers*	**Class 2** *Avoid Purchasing*	**Class 3** *Verification Matters*	**Class 4** *Trust Farmers*	**Class 5** *Activists*
Outdoor Housing	0.13	-0.03	**3.40****	-0.67	**4.77****
Hoop Housing	0.17	-15.55	**2.05****	0.18	**1.92****
Conventional Housing	-0.30	15.58	**-5.46****	0.49	**-6.68****
Sows in Groups	**0.27**[b]**	-2.92	**3.48****	**2.60****	**4.40****
Sows in Gestation Stalls	**-0.27****	2.92	**-3.48****	**-2.60****	**-4.40****
No Sub-Therapeutic Antibiotics	0.18	0.62	**-10.89****	**4.04****	**7.65****
Use of Sub-Therapeutic Antibiotics	-0.18	-0.62	**10.89****	**-4.04****	**-7.65****
Farmer Verified	0.03	16.70	**-13.57****	**3.86****	-0.02
Processor Verified	**0.59****	9.93	**8.35****	**-1.24***	-0.19
Supermarket Verified	0.03	28.06	-1.91	**-4.21****	**4.83****
Government Verified	**0.97****	-81.22	**22.87****	**8.75****	**3.27****
Third Party Verified	-0.40	-23.88	**8.13****	**1.61****	0.56
No Verification	**-1.23****	50.40	**-23.88****	**-8.76****	**-8.46****
Average Class Probabilities	0.222	0.029	0.256	0.206	0.287

Notes:
a. Model fit: Log-Likelihood -3559.564; Adjusted Pseudo-R^2 0.219. For details of the underlying parameter estimates see Uzea et al (2010)
b. **, * indicates significance at the 5 percent and 10 percent levels respectively

Both studies reveal a subset of consumers with strong preferences for quality verifications related to on-farm production methods, together with similar patterns of attitudes toward the source of these verifications. Of particular note is that in both studies, public sector (government) quality verification is valued highly by distinct segments (classes 1 and 2 in the bread/environmental study, classes 3, 4, and to some extent 5, in the pork/animal welfare study). With the exception of the *defer to farmer* group in the bread study, who exhibited a small

negative WTP for government verification, in general consumers in both studies appeared to be either supportive of or indifferent towards government as a verifier of these on-farm production attributes. In contrast, attitudes toward the other verification sources were far more mixed. Third party verification was viewed positively by the *independent verification seeker* class in the bread study, with a marginally positive valuation by the *label believer* class (as indicated by very small positive WTP). Similarly, in the pork/animal welfare study, the *verification matters* and *trust farmers* groups had positive views of third party verification, while the other three classes were indifferent. However, it is clear from the bread study in particular that third party verification did not resonate with all consumers: the *concerned shoppers* viewed this source of quality verification negatively, as did (very marginally), the *not interested* class. In both studies, the description of 'third party' was kept carefully neutral (described as a certifying company or non-profit organization) but clearly, *third party* is a broad category and it may well be that attitudes toward specific third parties will differ.

Reactions to the various private sector verification sources were also mixed, while some respondents (e.g. the *defer to farmer* class) in the bread study evidently preferred farmer-based verification, this was not true of the *independent verification seeker* class, who discounted verification from this source. Similarly in the pork study, a distinct segment of respondents (class 4) trusted farmers (as well as government), while the *verification matters* class reacted negatively to farmer-based verification. Turning to the opposite end of the supply chain, both the *concerned shopper* and *independent verification seeker* classes in the bread study reacted negatively to supermarket verification, while the *trust farmers* class in the pork study had a similar negative reaction. Nevertheless, some respondents evidently did trust supermarkets, as revealed by the positive valuation from class 5 (*activists)* in the pork study, and marginally so by the *label believer* class in the bread study. A potential limitation of both studies is that 'supermarkets' were defined as a category whereas it is plausible that consumers could have higher levels of trust in a specific retailer. The role of brand/company identity in establishing credible quality verifications is a topic for further research.

As with the attitudes toward the source of verification, considerable heterogeneity is evident in the relative importance of the quality attributes themselves. The bread study features a class of highly motivated consumers, the *concerned shopper* class with extremely high WTP estimates which are indicative of strongly held preferences, while the *independent verification* seeker and *label believer* classes also viewed these attributes positively but are likely not as motivated as class 1 consumers. Again, of interest here as an indicator of strength of preferences is the relative size of the WTP estimates, rather than their absolute values. The remaining two

classes, representing about 30 percent of respondents, were not particularly interested in these quality attributes, as indicated by WTP estimates that are either very small or not statistically significant. Similarly, in the pork study, the *activists* and the *verification matter*s classes responded positively to the welfare-enhanced production attributes (outdoor housing, hoop housing, sows in groups), while the *trust farmer*s group valued only some of these attributes, and the *conventional pork consumers* and *avoid purchasing* classes (together representing approximately 25% of respondents) evidently did not place a great deal of value in these attributes.

5. IMPLICATIONS AND CONCLUSIONS

This paper has provided an opportunity to compare the results of two Canadian consumer studies that were conducted at approximately the same time but focused on different food products. We would expect some differences to exist given that one study focused on animal welfare attributes in a meat product, while the other study examined environmental attributes in a bread product, and given slight differences in the design of the choice experiments. There may also be human health perceptions that affected consumers' valuation of these attributes, for example bread produced with 'pesticide-free' grains, or pork produced without the use of antibiotics. The commonalities among the studies, however, provide some interesting points of comparison.

The key message from both studies is the importance of considering heterogeneity in consumer preferences when examining attitudes toward quality verification. The overview questions about trust revealed that 'government' tends to be trusted for accurate information about on-farm production methods relative to other (private sector) sources, and this was confirmed in initial model runs using multinomial logit and random parameters models (not reported here). The latent class model results, however, demonstrate the heterogeneity in attitudes: indeed government is highly trusted by several segments of respondents in both studies, while others tend to be somewhat indifferent toward this source of verification. In general though (and particularly in the bread/environmental study), it is those consumers who exhibit the strongest preferences for the quality attributes who tend to value public sector verification relatively highly. Both sets of results also reveal a sub-set of consumers who tend to trust farmers, while both also reveal a very clear segment of respondents who might be considered 'conventional food' consumers: they exhibit relatively low WTP for these quality attributes and, consistent with this response, therefore also toward verification of these attributes.

It is evident that some respondents have very strong preferences for the credence attributes examined in these two studies (as indicated by the relative size of the WTP estimates); clearly the stated choice experiment is a hypothetical choice situation and there always remains the question of whether consumes would make the same choices in a 'real' purchase situation. In this regard it is the *relative* size of these WTP estimates across the latent classes that is of most interest. In both studies distinct sub-sets of respondents exhibited strong preferences that indicate a highly motivated group of consumers likely to be both very interested in products with these attributes, and possibly therefore also in lobbying for policies to encourage these types of production systems (e.g., through stricter animal welfare or environmental regulations)[6]. On the other hand, the results also show that a sizeable segment of other consumers do not share these views, tend to be more price sensitive and therefore would be less likely to benefit from policies that restricted agricultural production systems; the public good aspects of animal welfare and environmental protection notwithstanding.

This paper provides a starting point for analysing the common themes that emerge in attitudes towards quality verification across different studies, and possible extensions to this work include pooling the data for the source of verification together with exploring interaction effects among the quality and verification attributes. Finally, it is clear that there are many roles for public, private and third party organizations in establishing and enforcing quality verification systems, and indeed collaborative public-private partnerships may be an effective means of delivering credible quality assurances. An exploration of the relative roles of different organizations in standard setting, accreditation, certification and monitoring, etc. was beyond the scope of the present analysis but is a fruitful topic for further research.

ACKNOWLEDGEMENTS:

Funding from the Consumer and Market Demand Network, the Canadian Wheat Board, and the Social Sciences and Humanities Research Council (SSHRC) is gratefully acknowledged.

[6] Indeed, in the animal welfare study, an analysis of several latent factors explaining class membership found that the degree of involvement in nine 'activism' related activities was significant in explaining class membership (Uzea et al., 2010)

REFERENCES

Boxall, P. and W. Adamowicz (2002). Understanding Heterogeneous Preference in Random Utility Models: a Latent Class Approach. *Environmental and Resource Economics.* 23: 421-446.

Frewer, L., A. Kole, S. Van de Kroon and C. De Lauwere. (2005). Consumer attitudes towards the development of animal-friendly husbandry systems. *Journal of Agricultural and Environmental Ethics* 18: 345–67.

Fulponi, L. (2005). Private Voluntary Standards in the Food System: The Perspective of Major Food Retailers in OECD Countries. *Food Policy*, 31:1-13.

Harris, J. and A. Cole (2003). *The Role for Government in Eco-Labelling – On the Scenes or Behind the Scenes?* Paper prepared for the conference "The Future of Eco-Labelling in Australia" Canberra, Australia Oct. 9-10, 2003. Accessed August 3, 2010 at http://www.geca.org.au/conference/Conference%20Proceedings/1_4_EnsuringCredibility/1_Jane%20Harris_DPIVIC.pdf

Henson, S. and T. Reardon (2005). Private Agri-Food Standards: Implications for Food Policy and the Agri-Food System. *Food Policy* 30(3):241-253.

Hobbs, J.E. (2010). Public and Private Standards for Food Safety and Quality: International Trade Implications. *The Estey Centre Journal of International Law and Trade Policy* 11(1): 136-152. Available at: http://www.esteyjournal.com/

Innes, B.G. (2008). *Assuring Production-derived Quality in Canadian Food Markets.* Unpublished M.Sc. Thesis, University of Saskatchewan, Saskatoon, Canada. Available at: http://library2.usask.ca/theses/available/etd-01022009-193201/

Innes, B.G. and J.E. Hobbs (2010). Does it Matter Who Verifies Production-Derived Quality? *Canadian Journal of Agricultural Economics* (forthcoming)

Louviere, J., D. Hensher and J. Swait (2000)**.** *Stated Choice Methods.* Cambridge: University Press.

Nilsson, T., Foster, K and Lusk, J.L. (2006). Marketing Opportunities for Certified Pork Chops. *Canadian Journal of Agricultural Economics* 54 (4): 567-583.

Uzea, A.D. (2009). *Canadian Consumer Valuation of Farm Animal Welfare and Quality Verification: The Case of Pork.* Unpublished M.Sc. Thesis, University of Saskatchewan, Saskatoon, Canada. Available at: http://library2.usask.ca/theses/available/etd-06082009-185952/

Uzea, A.D., J.E. Hobbs and J. Zhang. (2010). *Activists and Animal Welfare. Quality Verifications in the Pork Sector*. Working paper. Department of Bioresource Policy, Business & Economics, University of Saskatchewan