

Risks Perceptions and Willingness-to-Pay for Organic Fresh Chicken in Argentina

Lacaze, Victoria; Rodríguez, Elsa; Lupín, Beatriz

Faculty of Economic and Social Sciences, Universidad Nacional de Mar del Plata, Argentina

mvlacaze@mdp.edu.ar; emrodri@mdp.edu.ar; mblupin@mdp.edu.ar

*Contributed Paper prepared for presentation at the International Association of
Agricultural Economists Conference, Beijing, China, August 16-22, 2009*

Copyright 2009 by Lacaze, V., Rodríguez, E., and Lupín B. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Risks Perceptions and Willingness-to-Pay for Organic Fresh Chicken in Argentina

Lacaze, V.¹; Rodríguez, E.² and Lupín, B.³

Faculty of Economic and Social Sciences, Universidad Nacional de Mar del Plata, Argentina

¹ Research Scholar in Agricultural Economics - mvlacaze@mdp.edu.ar

² Professor of Agricultural Economics - emrodri@mdp.edu.ar

³ Researcher in Agricultural Economics - mblupin@mdp.edu.ar

Abstract

In developed countries, a series of food scares and the overuse of antibiotics in animals have increased consumers' concerns about chicken meat quality since the last decades.

In Argentina, consumers are clearly becoming oriented to alternative chicken varieties they conceive as "healthier", "tastier" and "free of harmful chemical substances".

This paper aims to calculate Argentinean consumers' willingness-to-pay (WTP) for organic fresh chicken in the domestic market by applying the Contingent Valuation approach and with a view to providing some useful insights to promote organic chicken production and consumption. A binomial logit model was estimated with data from a consumer survey conducted in Buenos Aires City, Argentina.

Willingness-to-pay is explained by the consumption of organic products, health risks perceptions, production processes and regulation concerns and labels reading. WTP calculation reveals a mean value of 21.4%/kg and a median of 19%/kg. Even though both measures are below than the average price premium prevailing at the sampled stores (24.6%/kg), they are indicating that organic chicken is positively valued. In fact, it is provided with the nutritional and product origin information that consumers require and considered for them as a safer option than conventional chicken.

Keywords

Risks perceptions, hormone-free chicken, willingness-to-pay

JEL Codes: D12, C25

Risks Perceptions and Willingness-to-Pay for Organic Fresh Chicken in Argentina

I. Introduction

Increase in consumers' concern about food quality and safety is driven by, among other factors, new scientific discoveries, new food technology and new information about linkages between diet and health.

Throughout these last years, organic agriculture has undergone a remarkable expansion due, among other things, to the greater interest shown by consumers aware of food safety issues involving real or perceived quality risks.

The concept of quality has become crucial in the new approaches of Demand Theory. Consequently, it started to be incorporated as an additional variable in food demand functions (Antle, 1999).

Quality is a wide and subjective notion that deals with different kinds of attributes which could either be verified by consumers or not, before or after purchasing food e. g. sensory and safety attributes, nutritional facts, convenience, origin and production applied processes. Consumers' choices are definitely conditioned by the uncertainty they perceive with regard to different qualities offered.

Based on Lancaster approach (1966), who affirms that consumers derive utility from goods' attributes, Halbrendt et al. (1995) present a model that estimates consumers' willingness-to-pay. It could be defined as the monetary difference between consumer's surplus before and after adding or improving a food product attribute.

Chicken meat has become a popular food for most people in developed countries because it is considered to be a healthy option and can be adapted to a wide variety of dishes. But a series of food scares and the overuse of antibiotics in animals, increase consumers' concerns. Besides, some production process attributes cannot be readily verified for them and,

consequently, the health effects associated with chicken consumption are difficult or impossible to determine once it has been eaten.

As consumers' awareness and concerns of risk increase, risk calculations are likely to be central to an individual's life. Antle (1999) emphasizes that it is of extremely importance to distinguish the scientific knowledge about health, safety, or other characteristics of food products from consumers' subjective assessment. Consumers' beliefs will finally determine their behaviour, and consequently, their willingness-to-pay for acquiring a specific product.

In the Argentinean domestic market many consumers are willing to pay higher prices for healthy products, e.g. organics, because its consumption reduces their perceived health risks (Rodriguez et al., 2006).

This paper aims to calculate Argentinean consumers' willingness-to-pay (WTP) for organic fresh chicken in the domestic market, with a view to providing some useful insights to promote organic chicken production and consumption.

II. An overview of Argentinean chicken production and consumption

A growing access of the Argentinean population to conventional chicken meat has been verified since the 90 decade, mainly due to retail price reduction which is explained by the industrial costs reduction, the supply chain integration, and the incidence of the foreign market opening.

At the same time, chicken consumption has been further increased due to the development of semi-ready or prepared products which preferences satisfy changes in the consumers' habits.

A variety of presentations can be found on the Argentinean stores shelves, e.g. refrigerated or frozen whole chicken, in pieces (breasts, legs, thighs and wings), boneless chicken, and breaded pieces ("*milanesas*", snacks). The annual national consumption of conventional poultry meat in 2007 was 28 kg/per person.

The production of conventional chicken meat is mainly conducted in confinement. The balanced feed could have additional components, as it is verified in many cases, as fat and growth promoters (e.g., hormones). The use of medicines has been increasingly criticized because the only reason for using growth-promoting antibiotics is to reduce the slaughter time and the mortality index, however they do not improve the quality of the meat.

As well as Neufeld (2002) and Goldberg & Roosen (2005) documented for Europeans and due to the popular knowledge about the production practices referred above, Argentineans and also Brazilians are clearly becoming oriented to alternative chicken varieties they conceive as “healthier”, “tastier” and “free of harmful chemical substances” (Rodríguez & Lacaze, 2004; Farina & de Almeida, 2003).

The Argentinean conventional poultry production and processing stages are concentrated in the province of Entre Rios, which account for 43% of the national production farms and 57% of the slaughtering plants. The production of organic chicken is also mainly located in this province.

Argentina is acknowledged by the Epizooties World Organization (OIE) as free country from the Newcastle Disease with vaccination and from Avian Influenza.

III. Theoretical framework

Most studies conducted in developed markets for organic agriculture have tried to establish connections between the WTP for these products and a particular consumers’ lifestyle (Hartman & New Hope, 1997). Despite the notorious ambiguity of the socio-demographic profile, these consumers show a purposeful attitude towards a balanced life, eating healthy food and reducing agriculture impact on the environment (Thompson, 1998).

A pilot experiment with panels of organic consumers and non-organic consumers carried out in a city of Argentina (Rodríguez & Lacaze, 2004) found that the sensory attribute mostly mentioned for organic chicken was the flavour. Organic chicken was considered of higher

quality compared to conventional one due to **hormone-free attribute**. When provided with information about organic chicken attributes, panellists declared that they were willing to pay an average premium price of 40 percent per kilogram to obtain a guarantee hormone-free chicken.

The relationship between income level and WTP is well documented in developed countries studies. A greater degree of confidence in food supply was verified in higher income levels (Buzby et al., 1995). Some studies have found direct associations between income and WTP regarding risk reduction derived from consuming healthier and safer food products (Blend & van Ravenswaay, 1998).

With regard to educational level, Govindasamy and Italia (1999) concluded, on the one hand, that the lower the educational level, the higher the risk perception and, on the other, that the higher the educational level, the greater the confidence in production standards.

Several researches have focused on the obstacles hindering organic food demand expansion. Higher prices and products shortage supply in supermarkets should be mentioned in the first place; together with the level of food quality information consumers have access to (Richman & Dimitri, 2000). The price premiums observed for whole fresh chicken in the Argentinean domestic market range between 10% and 33%, with an average of 25%. In the European Union countries the average price premiums is above 100% (Hamm et al., 2002).

IV. Data and methodology

a. Survey design and data collection

The semi-structured questionnaire contained both close- and open-ended questions displayed in three sections. In the first one, questions referred to organic, natural and fresh food consumption and reasons for buying these products. The second collected consumers' opinions concerning eating habits and risks perceptions, trust in brands, food labels, product origin and stores, opinions about food control and regulatory bodies functioning, preferences

regarding private or public regulation systems and personal beliefs about differences between organic and conventional foods. The last section collected socio-economic data. Among other things, respondents had to indicate the range in which the household monthly income falls.

Store availability was a crucial factor in the selection of the product to which the methodology for consumers' WTP calculation was applied. Despite the variety of package materials and presentations that can be found, the fresh whole chicken presented in plastic trays was selected for the comparative purpose between organic and conventional chicken.

The organic price premium was calculated as the percentage by which the price of organic chicken is above the price of conventional fresh chicken (Lohr, 2001) and expressed in percent per kilogram (%/kg). The premiums were calculated from the observed prices of both organic and conventional products that were collected at the stores where the survey took place.

This consumer survey was conducted in Buenos Aires City,¹ Argentina, in April 2005. A convenience sample, in which the probability of being selected is unknown (Chow, 2002), was chosen due to the difficulty to spot individuals who used to shop for organic foods. This kind of samples could be used to obtain model-based inferences (Brewer, 1999).

301 surveys were completed by trained interviewers who intercepted respondents in the largest supermarket chains and also in an important specialized organic store. The sample was based on age and gender local distribution, pursuant to the last National Population Census in Argentina (2001), for respondents aged 18 or above with a medium-high socio-economic level.²

¹ Buenos Aires, the capital city of Argentina, is the most densely populated city and also concentrates most trading activity.

² As defined by the Argentinean Marketing Association (AAM). It is available at <http://www.aam-ar.com>

Table 1: Sample Representativeness according to gender, age (18-87 years old), income and education

Respondent's characteristics	Categories	Relative frequencies		Respondent's household monthly income	Relative frequencies ^(*)	
		Sample ⁽¹⁾	Census ⁽²⁾		Sample ⁽³⁾	EPH ⁽⁴⁾
Gender	Female	68%	56%	≤ US\$ 500	41%	54%
	Male	32%	44%			
Age (in years)	18-24	15%	14%			
	25-34	19%	20%			
	35-49	26%	24%			
	50-59	15%	15%			
	60-87	25%	27%			
Education	Unfinished high school	19%	41%	> US\$ 1,300	9%	11%
	Unfinished university	50%	46%			
	University or Postgraduate	29%	13%			
	Non responses	2%	-			

^(*) Calculated considering the cases who declared income levels | Exchange rate (2005): 1 US\$ = 3 Argentinean pesos

⁽¹⁾ n = 301 cases | ⁽²⁾ N = 2,174,017 inh.

⁽³⁾ n = 284 households

⁽⁴⁾ Households Permanent Survey, n = 1,114,996 inh.

⁽⁵⁾ N = 2,307,117 inh. aged 15 or above

Source: Consumer survey, Buenos Aires City/2005; Population Census (INDEC/2001) and Households Permanent Survey (EPH, 2nd Trimester, 2005).

For the purpose of this study, it was selected a sample that consists of 227 completed questionnaires, representing 75% of the total sample.

b. Methodology for WTP calculation

Among the different methodological alternatives to assess consumers WTP, the Contingent Valuation (CV) approach was chosen. CV tends to quantify the value consumers assign to products by facing a hypothetical purchasing situation in which they have to answer how much money they would be willing to pay for a given product, or if they would be willing to pay a certain price premium.

Hanemann (1984) developed a theoretical formulation of CV experiments with binary format, which allows obtaining Hicksian compensating welfare measures from discrete response data by applying a methodology which explicitly recognizes the utility-maximizing choice underlying the individuals' responses. He postulates that the mean and the median of the true compensating surplus are shown to be invariant with respect to an arbitrary monotonic

transformation of the individual random utility function. Especially in the case of such central tendency measures generated by the logit model, he upholds it can be analytically shown that the estimate point of the mean is far more sensitive than the median.

A first stage when the parameters were estimated was followed by a second stage of calculation, when estimated parameters were combined to calculate the WTP for organic fresh chicken. A binomial logit model with the following specification has been chosen:

$$WTP_{ij} = \alpha + \beta_1 P_{jk} + \beta_2 Y_i + \beta_3 Z_i + F(\psi) \quad [1]$$

Where:

- WTP_{ij} Whether i respondent is willing to pay a price premium for the j selected food product or not; j = Fresh Chicken;
- P_{jk} Organic price premiums charged for the j selected product at the k sampled stores; k = 1 Coto; k = 2 Disco; k = 3 Jumbo; k = 4 Norte; k = 5 Wal Mart; k = 6 La Esquina de las Flores;
- Y_i Household income level of i respondent;
- Z_i Highest educational level of i respondent;
- ψ_i Variables related with risks and quality attributes perceptions of i respondent.

Equation [1] was estimated by Maximum likelihood by using the Statistical Package for Social Sciences (SPSS version 11, 2001). Table 2 below lists the selected variables.

Focusing on Bishop & Haberlein studies, Hanemann (1989) argued against a truncated integration for the case where WTP is constrained to be non-negative and propounded that the following expression [2] would correctly measure the WTP. This expression, according to variables definitions in [1], corresponds to the WTP, calculated as the area below the estimated logit function.

$$C = \frac{1}{\beta_1} \ln \{1 + \exp [\alpha + \beta_2 Y_i + \beta_3 Z_i + F(\psi)]\} \quad [2]$$

Table 2: Description of model's variables

Dependent Variable		Categories
WTP	If the respondent is willing to pay a price premium for organic fresh chicken	1 = Yes, 0 = Otherwise
Categorical Explanatory Variables		Categories
CONSUMPTION	If organics are usually consumed in the respondent's household	1 = Yes, 0 = Otherwise
LABELS	If chicken quality information obtained by labels reading provides a high degree of confidence	1 = Yes, 0 = Otherwise
REGULATION	If the respondent believes that there should exist a food quality regulation system	1 = Yes, 0 = Otherwise
PROCESSING	If the respondent considers that the higher degree of processing, the higher the distrust in food quality	1 = Yes, 0 = Otherwise
ADVERTISING	If the respondent is willing to buy organics in case they were more widely advertised	1 = Yes, 0 = Otherwise
AVAILABLE	If the respondent would be willing to buy organics if they were available in the market	1 = Yes, 0 = Otherwise
EDUCATION	Highest educational level reached by the respondent	1 = University or Postgraduate 0 = Otherwise
INCOME	Monthly respondent's household income	1 = Equal or above US\$ 500 0 = Otherwise
Quantitative Explanatory Variables		
RISK	If the respondent perceives that he/she faces significant risks when eating conventional food	
PRICEPREM	Organic fresh chicken price premium over conventional fresh chicken price	

V. Results

a. Binomial logit model estimation

The preliminary estimated model was proposed as follows:

$$\text{Logit}(\pi) = \alpha + \beta_1 \text{ CONSUMPTION} + \beta_2 \text{ LABELS} + \beta_3 \text{ REGULATION} + \beta_4 \text{ PROCESSING} + \beta_5 \text{ ADVERTISING} + \beta_6 \text{ AVAILABLE} + \beta_7 \text{ RISK} + \beta_8 \text{ PRICEPREM} + \beta_9 \text{ EDUCATION} + \beta_{10} \text{ INCOME}$$

Where, according to expression [1]:

CONSUMPTION, LABELS, REGULATION, PROCESSING, ADVERTISING, AVAILABLE, EDUCATION and INCOME are the categorical explanatory variables $-X_i, i = 1, \dots, 8-$.

RISK and PRICEPREM are the quantitative explanatory variables $-X_i, i = 1, 2-$.

π is the probability of success for the dependent variable WTP, which is 1 if the respondent is willing to pay a price premium for organic fresh chicken.

α is the intercept and β_i are the coefficients $-i = 1, \dots, 10-$

After running the Model, both the respondent’s educational level and the household monthly income were not statistically significant as explanatory variables. Therefore, they were disregarded when estimating the final model.

Table 3 below displays the results from the maximum-likelihood estimation of the estimated logit model:

Table 3: Results from the estimated logit model

Variables	β	S.E.	Wald	e^β
CONSUMPTION	1.989 (***)	0.428	21.566	7.311
LABELS	0.790 (**)	0.397	3.955	2.203
REGULATION	1.498 (***)	0.560	7.149	4.474
PROCESSING	0.615 (*)	0.357	2.966	1.850
ADVERTISING	1.277 (**)	0.502	6.465	3.587
AVAILABLE	1.521 (***)	0.405	14.133	4.579
RISK	0.135 (**)	0.063	4.519	1.144
PRICEPREM	0.110 (***)	0.030	12.948	1.116
Intercept	-2.211 (***)	0.815	7.362	0.110

n = 227 | Cut-off = 0.50 | *** 1%, ** 5%, *10% significance levels
 Source: Author’s calculation. Consumer Survey, Buenos Aires City / April 2005.

By analyzing the odds-ratios, it could be affirmed that willingness-to-pay (WTP) for organic fresh chicken is largely explained by the consumption of organic products (CONSUMPTION) and the scarce perceived availability of this product in the market (AVAILABLE). Besides, the belief that there should be a food quality regulation system (REGULATION) ranks as the third significative explanatory factor, which is followed by the intention to buy organics if they were more advertised (ADVERTISING).

On the other hand, the high degree of confidence in the information contained in chicken’s labels (LABELS), the distrust in food quality related to the degree of processing of food products (PROCESSING) and the risk perceptions when eating conventional food (RISKS) play a minor, though significant, role in WTP explanation.

It should be mentioned that 56% of the respondents, who are willing to pay the prevailing price premium at the store, where they were surveyed, believe that the degree of health risks associated with hormone content in fresh chicken is high. Besides, 49 % of those who are not willing to pay the market price premium also believe the same. Despite this relevant level of

hormone-risk perception, these figures show no statistically significant differences and this was the reason why the hormone-risk perception variable was not finally included in the WTP estimation model.

The model performance results are depicted in Table 4 below. Pearson’s Chi-Square Statistic and Hosmer & Lemeshow Test indicate that it fits adequately.

Since the Pearson’s R^2 should not be used in binary logistic regressions, alternative forms as Cox & Snell’s R^2 and Nagelkerke’s R^2 could be calculated but they have to be considered in an indicative way (Agresti, 2002; Menard, 2000; Ryan, 1997). The corresponding values obtained in this study indicate that more than 30% of the variation is explained by the variables included in the estimated model.

The model overall predicted power is 82%. It could also be evaluated by the Receiver Operating Characteristics (ROC) Curve and the Concordance Index, which show that the classification of those respondents, who are willing to pay the price premium, and those who are not willing to do so, as well as the predictions, are satisfactory. The Concordance Index yields a value of 0.85 for the estimated model, indicating that predictions are better than random guessing.

Table 4: Model performance evaluation

Omnibus test of Model coefficients		p-value
Chi-square		0.000
Hosmer& Lemeshow		0.112
Model’s predictive power		
Concordance index	Area	p-value
	0.85 > 0.50	0.000
Overall percentage		82 %
Model Summary		
Cox & Snell R^2		0.32
Nagelkerke R^2		0.44

Source: Author’s calculation. Consumer Survey, Buenos Aires City / April 2005.

b. WTP calculation

Table 5 below displays the results of WTP calculation, i.e. the additional premium respondents are willing to pay for organic chicken over the price of the conventional product.

Table 5: Willingness-to-pay calculation

Market data		
Average Price for Organic Chicken	2.43 U\$\$/kg	
Average Price for Conventional Chicken	1.95 U\$\$/kg	
Average Price premium (1)	24.61 %/kg	
WTP results		
	%/kg	U\$\$/kg
Mean WTP	21.39	0.42
Median WTP	19.04	0.37

Notes: n = 227 | Exchange rate (2005): 1U\$\$ = 3 Argentinean pesos

(1) Calculated as indicated in Section IV.a

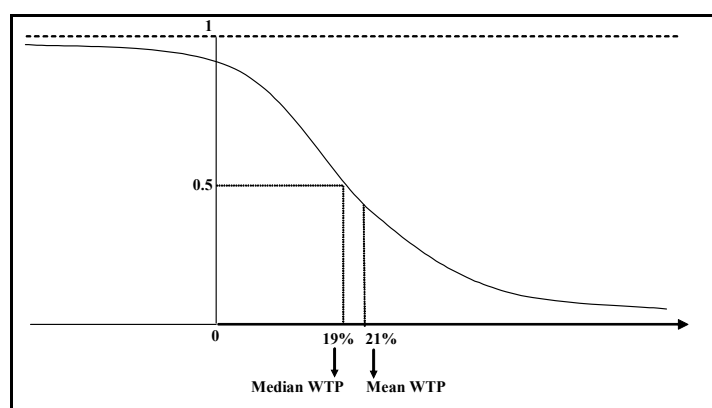
Source: Author's calculation. Consumer Survey, Buenos Aires City / April 2005.

As it could be seen in Table 5, with averages prices of 2.43 U\$\$/kg for organic chicken and 1.95 U\$\$/kg for conventional chicken, the average organic price premium is 24.61%/kg.

The results yielded after logit estimation and welfare measures calculation reveal a mean WTP of 21.39%/kg (0.42 U\$\$ extra above the price of a kilogram of conventional chicken for buying a kilogram of organic chicken) and a median WTP of 19.04%/kg (0.37 U\$\$ extra).

These results are graphically represented in Figure 1 below:

Figure 1: WTP results



Source: Author's calculation. Consumer Survey, Buenos Aires City / April 2005.

Both the mean and the median WTP values are below than the average price premium prevailing at the sampled stores in as much as 3.22% and 5.57%, respectively.

It is important to notice that the proportion of respondents sourced from a specialized organic store is 21% of the sample. They are clearly bound to buy organic food and pay a premium, so they could possibly be introducing a bias in WTP results.

The difference between observed prices and stated WTP may be caused by the hypothetical survey itself. Due to this, it should be useful to test the WTP format by applying alternative approaches.

VI. Final Remarks

The results of WTP estimates indicate that organic chicken is positively valued in Argentina, since consumers are willing to pay price premiums to acquire this product of better quality. WTP is explained by the consumption of organic products, health risks perceptions, production processes and regulation concerns and labels reading. Argentinean consumers seem to be worried about food production process and the food regulatory and control systems performance.

The medium-high socio-economic level of the convenience sample could be explaining why income and education were not statistically significant in the estimated model. Besides, in Argentina this kind of surveys shows some difficulties when trying to elicit from consumers their income declaration.

Consumers who are willing to pay an extra premium for purchase organic chicken consider it as a safer option instead of buying conventional chicken. They are less price-sensitive and more concerned with specific quality attributes. In contrast of conventional chicken, differentiated chickens e.g. organic and free-range are provided with more nutritional and product origin information and differ from conventional chicken in feeding, breeding and/or another productive features.

This study has been carried out with data collected nearly four years ago, when an erratic supply of organic chicken was verified, at least in the most important supermarket chains in Buenos Aires city. Nowadays, organic chicken is not being sold anywhere, because of some difficulties resulting from the production process.

A general scarcity of organic food in the domestic market, together with the price premiums consumers have to pay for them could be identified as the most difficult obstacles to overcome when it comes to organic domestic consumption expansion in Argentina.

For agribusiness and marketers these insights open up positioning potentials. At the same time, they are relevant for strategic marketing communication purposes, in case of promoting organic chicken production in Argentina.

VII. References

- Antle, J. (1999). The New Economics of Agriculture. *American Journal of Agricultural Economics*, 81(5): 993-1010.
- Lancaster, K. (1966). A new approach to consumer theory. *Journal of Political Economy*, LXXIV (2): 132-157.
- Halbrendt, C.; Sterling, L.; Snider, S. & Santoro, G. (1995). Contingent valuation of consumers' willingness to purchase pork with lower saturated fat. In: J. Caswell (Ed.) Valuing food safety and nutrition. Chap.15, pp. 319-339.
- Rodríguez, E.; Lupín, B. & Lacaze, V. (2006). Consumers' perceptions about food quality attributes and their incidence in Argentinean organic choices.
http://agecon.lib.umn.edu/cgi-bin/pdf_view.pl?paperid=22222&ftype=.pdf
- Neufeld, L. (2002). Consumer preferences for organic/free range chicken. AgMRC.
<http://www.agmrc.org>
- Goldberg, I. & Roosen, J. (2005). Measuring consumer willingness to pay for a health risk reduction of *salmonellosis* and *campylobacteriosis*. 11th Congress of the EAAE.
<http://ageconsearch.umn.edu/bitstream/24512/1/cp05go01.pdf>
- Rodríguez, E. & Lacaze, V. (2004). Consumer's preferences for organic food in Argentina: A sensory evaluation. First World Congress on Organic Food.
http://www.foodsafe.msu.edu/events/congress_organics1/tech_abstracts.htm
- Farina, T. & de Almeida, S. (2003) Consumer Perception on Alternative Poultry. *International Food and Agribusiness Management Review*, 2 (5).
- Hartman & New Hope. (1997). The evolving organic marketplace. Industry Series Report.
- Thompson, G. (1998). Consumer demand for organic produce. *American Journal of Agricultural Economics*, 80(5): 113-118.

- Buzby, J.; Ready, R. & Skees, J. (1995). Contingent valuation in food policy analysis: A case study of pesticide-residue risk reduction. *Journal of Agricultural and Applied Economics*, 27(2): 613-625.
- Blend, J. & van Ravenswaay, E. (1998). Consumer demand for eco-labelled apples: Survey Methods and descriptive results. Staff Paper 98-20, Michigan St. University.
- Govindasamy, R. & Italia, J. (1999). Predicting willingness-to-pay a premium for organically grown fresh produce. *Journal of Food Distribution Research*, 30: 44-53.
- Richman, N. & Dimitri, C. (2000). Organic Foods: Niche market venture into mainstream. *Agricultural Outlook*, 11-14.
- Hamm, U.; Gronefeld, F. & Halpin, D. (2002) Analysis of the European market for organic food. http://www.irs.aber.ac.uk/omiard/publications-pdf/OMIaRD_MarketReport2002Summary.pdf
- Lohr, L. (2001). Factors affecting international demand and trade in organic food products. Economic Research Service/USDA/WRS-01-1.
- Chow, S. (2002). Issues in statistical inference. *History and Philosophy of Psychology Bulletin*, 14(1): 30-41.
- Brewer, K. (1999). Design-based or prediction-based inference? Stratified random vs. stratified balanced sampling. *International Statistical Review*, 67: 35-47.
- Hanemann, W. (1984). Welfare evaluations in contingent valuation experiments with discrete responses. *American Journal of Agricultural Economics*, 66(3): 332-341.
- (1989). Welfare evaluations in contingent valuation experiments with discrete response data: Reply. *American Journal of Agricultural Economics*, 71(4): 1057-1061.
- Agresti, A. (2002). An introduction to categorical data analysis. John Wiley & Sons INC, Canada.
- Menard, S. (2000). Coefficients of determination for multiple logistic regression analysis. *American Statistical Association*, 54(1): 17-24.
- Ryan, T. (1997). Modern regression methods. John Willey & Sons INC, Canada.