Jun. 2010, Volume 4, No.3 (Serial No.28)
Journal of Agricultural Science and Technology, ISSN 1939-1250, USA

Risk Perceptions and Willingness to Pay for Organic Fresh Chicken in Argentina

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Received: October 03, 2009 / Accepted: December 08, 2009 / Published: June 15, 2010.

Abstract: 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 for promoting organic chicken production and consumption in Argentina. A binomial logit model was estimated using data from a consumer survey conducted in Buenos Aires City, Argentina. Willingness to pay is explained by the consumption of organic products, health risk perceptions, concerns about production processes and also regulation issues, and label reading. The WTP calculation reveals a mean value of 21.4%/kg and a median value of 19%/kg. These results indicate that organic chicken is positively valued by consumers. In fact, it provides the nutritional and product origin information that buyers require and they consider it a safer option than conventional chicken.

Key words: Risk perceptions, hormone-free chicken, willingness to pay.

1. Introduction

An increase in consumer 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.

In the past few 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 [1]. Consequently, it has started to be incorporated as an additional variable in food demand functions [2].

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

Based on the Lancaster approach (1966), which affirms that consumers derive utility from a good's attributes, a model has been presented that estimates consumers' willingness to pay, that could be defined as the monetary difference between a consumer's surplus before and after adding or improving a food product attribute [3].

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 are increasing consumers' concerns. Moreover, some production process attributes cannot be readily verified by them and, consequently, the health effects associated with chicken consumption are difficult or impossible to determine once it has been eaten.

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As consumers' awareness and concerns about risk increase, risk calculations are likely to be central to an individual's life. It was emphasized that it is extremely important to distinguish the scientific knowledge about health, safety, or other characteristics of food products from consumers' subjective assessment [2]. Consumers' beliefs will finally determine their behavior, and consequently, their willingness to pay for a specific product.

In the Argentinean domestic market many consumers are willing to pay higher prices for healthy products, e.g. organic ones, because their consumption reduces the perceived health risks [4].

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 for promoting organic chicken production and consumption.

2. Argentinean Chicken Production and Consumption: An Overview

Increasing access by the Argentinean population to conventional chicken meat has been noted since the 1990s, mainly due to lower retail prices which are explained by the reduction in industrial costs, the supply chain integration, and the opening up to foreign markets.

At the same time, chicken consumption has further increased due to the development of semi-ready or prepared products to satisfy changes in consumer habits. A variety of examples can be found on Argentinean store shelves, e.g., refrigerated or frozen whole chicken, chicken pieces (breasts, legs, thighs and wings), boneless chicken, and breaded pieces (*"milanesas"*, snacks). The annual national consumption of conventional poultry meat in the last three years was around 29 kg/per person.

Production of conventional chicken meat is mainly conducted in confinement. As has been shown in many cases, the balanced feed may have additional components, such 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 rate, but they do not improve the quality of the meat.

In addition to some European research documents [5, 6] and due to the common knowledge about the production practices referred to above, Argentineans and also Brazilians are tending towards alternative chicken varieties they conceive as "healthier", "tastier" and "free of harmful chemical substances" [7, 8].

The Argentinean conventional poultry production and processing stages are concentrated in the province of Entre Rios, accounting nationally for 43% of all factory farms and 57% of the slaughter plants.

Argentina is acknowledged by the World Organization for Animal Health (OIE) as a country free from Newcastle Disease following vaccination and free from Avian Influenza.

The production of organic chicken is also mainly located in the province of Entre Rios. This activity has been developed following the organic standards and regulations laid down by the European Union (EEC 2092/91, 1804/99, and 834/2007)[1] which are verified by certification bodies.

3. 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 consumer's lifestyle [9]. Despite the notorious ambiguity of the socio-demographic profile, these consumers show a purposeful attitude towards a balanced lifestyle, eating healthy food and reducing the agriculture impact on the environment [10].

A pilot experiment with groups of organic consumers and non-organic consumers carried out in a city of Argentina found that the sensory attribute mentioned most often in connection with organic chicken was the flavor [7]. Organic chicken was

[1] Available online at http://www.senasa.gov.ar.

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

The relationship between income level and WTP is well documented in studies carried out in developed countries. A greater degree of confidence in food supply was confirmed in higher income levels [11]. Some studies have found direct associations between income and WTP regarding risk reduction derived from consuming healthier and safer food products [12].

With regard to educational level, some researchers have 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 [13].

Several researches have focused on the obstacles hindering organic food demand expansion. Higher prices and product shortages in supermarkets should be mentioned in the first place; together with the level of food quality information to which consumers have access [14]. The price premiums observed for whole fresh chicken in the Argentinean domestic market range between 10 percent and 33 percent, with an average price of 25 percent. In European Union countries the average price premiums are above 100 percent [15].

4. Data and Methodology

4.1 Survey Design and Data Collection

The semi-structured questionnaire that was applied contains both closed-and open-ended questions divided into three sections. In the first part, questions referred to organic, natural and fresh food consumption and reasons for buying these products. The second part solicited consumers' opinions regarding eating habits and risk perceptions, trust in brands, food labels, product origin and stores, opinions about food control and the functioning of regulatory bodies, preferences regarding private or public regulation systems and personal beliefs about differences between organic and conventional foods. The last part gathered socio-economic data. Among other things, respondents had to indicate into which range the monthly household income fell.

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 packaged materials and offerings that can be found, the fresh whole chicken presented on plastic trays was selected to compare organic and conventional chicken.

The organic price premium was calculated as the percentage by which the price of organic fresh chicken is above the price of conventional fresh chicken and expressed in percent per kilogram (%/kg) [16]. 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,[2] Argentina, in April 2005. A convenience sample, in which the probability of being selected is unknown, was chosen due to the difficulty to spot individuals who usually shop for organic foods [17]. This kind of sample could be used to obtain model-based inferences [18].

In total, 301 surveys were completed by trained interviewers who intercepted respondents in the largest supermarket chains and also in an important specialist organic store. The sample was based on age and gender local distribution, according to the latest National Population Census in Argentina [19], for respondents aged 18 or above with a medium-high socio-economic level.[3]

For the purposes of this study, a sub-sample was sel-

[2] Buenos Aires, the capital city of Argentina, is the most densely populated city and is also where most commercial activity is concentrated.

[3] As defined by the Argentinean Marketing Association (AAM), available online at http://www.aam-ar.com.

ected consisting of 227 completed questionnaires and which accounted for 75 percent of the total sample.

4.2 Sample Characterization

The socio-economic sample characterization displayed in Table 1 shows that 68 percent of the respondents were female, as expected, since grocery shopping is mostly a female activity [20, 21].

Considering that the average sample age was 44, Table 1 shows that the highest absolute frequency ranged between 35 and 49 years old, and 60 years old or more (26 percent and 25 percent of the total sample, respectively).

As can be seen in Table 2, 41 percent of the total sample stated that their monthly household income was US$500 or less per month, while the remaining 59 percent declared it was above US $500.

Regarding educational level, 19 percent of the respondents had not completed high school, and more than a half had gone into further education, even though they had not graduated. Twenty-nine percent held a university or postgraduate degree.

4.3 Methodology for WTP Calculation

Among the different methodological alternatives used to assess consumers' WTP, the Contingent Valuation (CV) approach was chosen. CV tends to quantify the value consumers assign to products by posing 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 developed a theoretical formulation of CV experiments with a binary format, which allows for obtaining Hicksian compensating welfare measures from discrete response data by applying a methodology which explicitly recognizes the utility-maximizing choice underlying the individuals' responses [22]. 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

Table 1 Sample representativeness according to gender and age (18-87 years old).

Respondent's characteristics	Categories	Relative frequencies	
		Sample *	Census **
Gender	Female	68%	56%
	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%

* n=301 cases| ** N=2,174,017 inhabitants.
Source: Consumer survey, Buenos Aires City, Argentina-April, 2005, National Population Census (INDEC/2001).

Table 2 Income and education characterization: Sample and Census results.

Characteristics	Categories	Relative frequencies
Respondents' Education	High school not completed	19%
	University not completed	50%
	University graduate or postgraduate	29%
	Non responses	2%
Respondent's monthly household income *	US$500	41%
	US$501-US$1,300	50%
	>US$1,300	9%

(1) For the cases who declared income levels (n=284)
Exchange rate in 2005: 1 US$=3 Argentinean pesos
Source: Consumer survey, Buenos Aires City, Argentina-April, 2005.

individual random utility function. In particular, in the case of such central tendency measures generated by the logit model, he sustains that it can be analytically shown that the point estimate 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 to risks and quality attributes perceptions of i respondent.

Equation 1 was estimated by maximum likelihood. Table 3 lists the selected variables.

Focusing on Bishop & Heberlein studies [23], Hanemann argued against a truncated integration for the case where WTP is constrained to be non-negative and proposed that the following expression [2] would correctly measure the WTP [24]. This expression, according to variable definitions in Eq. (1), corresponds to the WTP, calculated as the area below the estimated logit function.

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

5. Results

5.1 Binomial Logit Model Estimation

The preliminary estimated model was proposed as follows:

Logit (WTP)=$\alpha+\beta_1$ CONSUMPTION+β_2 LABELS+ β_3 REGULATION+β_4 PROCESSING+β_5 ADVERTISING+ β_6 AVAILABLE+β_7 HORMONERISK+ β_8 EDUCATION+β_9 INCOME+ β_{10} RISK+β_{11} PRICEPREM

Where, according to Eq. (1):

CONSUMPTION, LABELS, REGULATION, PROCESSING, ADVERTISING, AVAILABLE, HORMONERISK, EDUCATION and INCOME are the categorical explanatory variables -X_i, i=1, …, 9.

RISK and PRICEPREM are the quantitative explanatory variables -X_i, i=10, 11.

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 βi are the coefficients –i=1,…, 11.

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

Table 4 shows the results from the maximum-likelihood estimation of the estimated logit model:

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 perceived scarcity of this product in the market (AVAILABLE). Moreover, the belief that there should be a food-quality regulation system (REGULATION) ranks as the third significative explanatory factor, followed by the intention to buy organic products if they were advertised more (ADVERTISING).

On the other hand, the high degree of confidence in the information contained in chicken labeling (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 percent 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. In addition, 49 percent of those who are not willing to pay the market price premium also believe the same. Despite this relevant level of hormone-risk perception, there are no statistically significant differences at the model stage estimation. Therefore, the hormone-risk perception variable (HORMONERISK) was not finally included in the WTP model.

The model performance results are displayed in Table 5. 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 such as Cox &

Table 3 Description of model's variables.

Variable	Description	Categories	Mean
WTP	If the respondent is willing to pay a price premium for organic fresh chicken	1=Yes, 0=Otherwise	0.68
Consumption	If organic products are usually consumed in the respondent's household	1=Yes, 0=Otherwise	0.38
Labels	If chicken quality information obtained by label reading provides a high degree of confidence	1=Yes, 0=Otherwise	0.36
Regulation	If the respondent believes that there should be a food-quality regulation system	1=Yes, 0=Otherwise	0.88
Processing	If the respondent considers that the higher degree of processing, the higher the distrust in food quality	1=Yes, 0=Otherwise	0.61
Advertising	If the respondent is willing to buy organic products if they were more widely advertised	1=Yes, 0=Otherwise	0.30
Available	If the respondent would be willing to buy organic products if they were available in the market	1=Yes, 0=Otherwise	0.55
Hormonerisk	If the respondent perceives that he / she faces significant risks linked with hormone content when eating conventional chicken	1=Yes, 0=Otherwise	0.54
Education	Highest educational level attained by the respondent	1=University or Postgraduate0=Otherwise	0.29
Income	Respondent's monthly household income	1=Equal to or above US$5000=Otherwise	0.59
Risk	If the respondent perceives significant risks when eating conventional food		3.78
Priceprem	Organic fresh chicken price premium over conventional fresh chicken price		24.61

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

Table 4 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, Argentina-April, 2005.

Snell's R^2 and Nagelkerke's R^2 could be calculated but they have to be considered in an indicative way [25-27]. The corresponding values obtained in this study indicate that more than 30 percent of the variation is explained by the variables included in the estimated model.

Diagnostic tests commonly are characterized by their true positive (sensitivity) and true negative (specificity) classification rates, which rely on a single decision threshold to classify a test result as positive.

A more complete description of test accuracy is given by the Receiver Operating Characteristic (ROC) curve, which is presented in Fig. 1. It is a graph of the false positive and true positive rates obtained as the decision threshold is varied, and it visually depicts the performance and performance trade-off of a classification model.

The diagonal line from the bottom left-hand corner to the top right-hand corner denotes random classifier performance. A classification model mapped onto this

Table 5 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, Argentina, April 2005.

line produces as many false positive responses as it produces true positive responses. Because of this, the concave shape connecting the points (0, 0) and (1, 1) that is shown in Fig. 1-according to the estimated logit model-indicates a reasonable classifier. These results are consistent with the value for the Concordance Index (0.85) and the model overall predictive power (82%), presented in Table 5.

To conclude, 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.

Fig. 2 presents the histogram of predicted probabilities, also called "class plot" or the "plot of observed groups and predicted probabilities". It is an alternative way of assessing correct and incorrect predictions under logistic regression. The X axis is the predicted probability from 0.0 to 1.0 of the dependent being classified "1".

As can be seen, Fig. 2 shows an approximate U-shape, which indicates that the predictions are well differentiated. By contrast, a normal distribution would indicate that many predictions are close to the cut-point, which is not as good a model fit. In Fig. 2, the 1s to the left are false predictions for respondents who are willing to pay an extra price premium for organic chicken (13 cases). The 0s to the right are false predictions for respondents who are not willing to pay (28 cases).

5.2 WTP Calculation

Table 6 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.

As could be seen in Table 6, with average prices of 2.43 US$/kg for organic chicken and 1.95 US$/kg for conventional chicken, the average organic price premium is 24.61%/kg and the median price premium is 25%/kg.

The results yielded after logit estimation and welfare measures calculation reveal a mean WTP of 21.39%/kg (US$ 0.42 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 (US$ 0.37 extra). These results are graphically represented in Fig. 3.

As shown in Fig. 3, both the mean and the median WTP values are below the market values prevailing at the sampled stores by as much as 3.22 percent and 5.96 percent, respectively.

It is important to note that the proportion of respondents sourced from a specialized organic store is 21 percent 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.

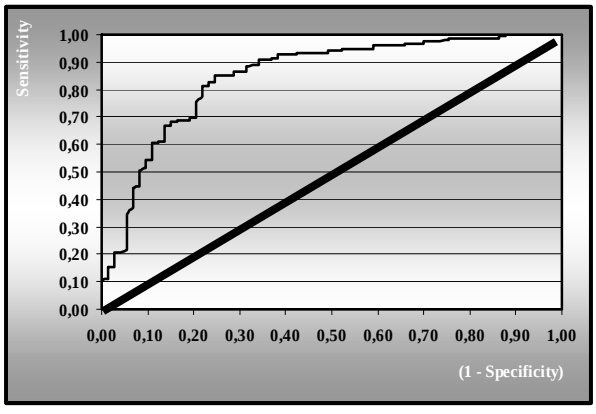

Fig. 1 The ROC Curve.

Source: Author's calculation. Consumption Survey, Buenos Aires City, Argentina, April 2005.

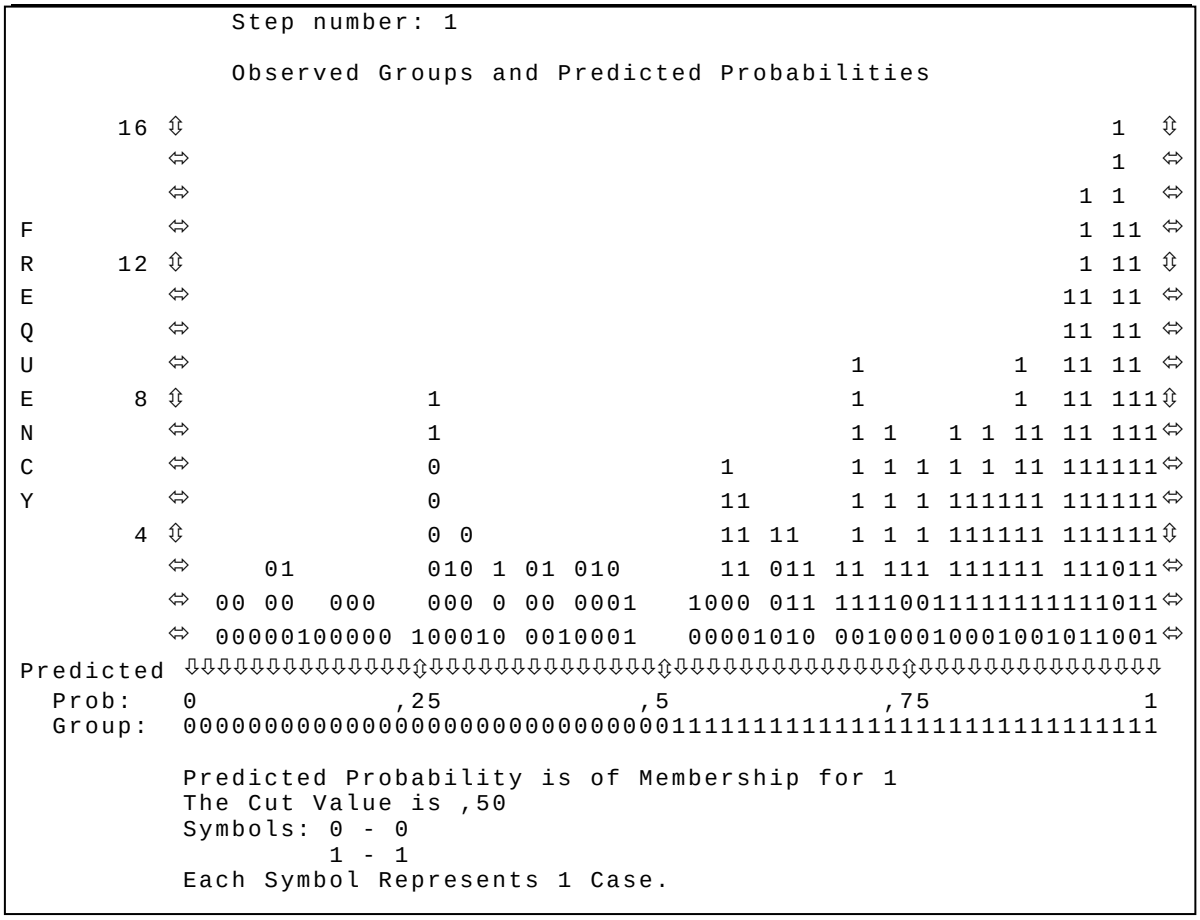

Fig. 2 The Histogram of predicted probabilities.

Source: Author's calculation. Consumption Survey, Buenos Aires City, Argentina-April, 2005.

Table 6 Willingness-to-pay calculation.

Market data	
Average Price for Organic Chicken	2.43 US$/kg
Average Price for Conventional Chicken	1.95 US$/kg
Average Price premium (1)	24.61 %/kg
Median Price premium (1)	25 %/kg
WTP results	
Mean WTP	21.39 %/kg
Median WTP	19.04 %/kg
(1) Calculated as indicated in Section 4.1	

n=227|Exchange rate (2005): 1US$=3 Argentinean pesos.
Source: Author's calculation. Consumer Survey, Buenos Aires City, Argentina, April 2005.

Due to this, it should be useful to test the WTP format by applying alternative approaches.

6. 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 risk perceptions, production processes and regulation concerns and label reading. Argentinean consumers seem to be worried about food production processes and the food regulatory and control systems performance.

The medium-high socio-economic level of the convenience sample could explain why income and education were not statistically significant in the estimated model. Moreover, in Argentina these kinds of surveys present some difficulties when trying to elicit from consumers a declaration of income.

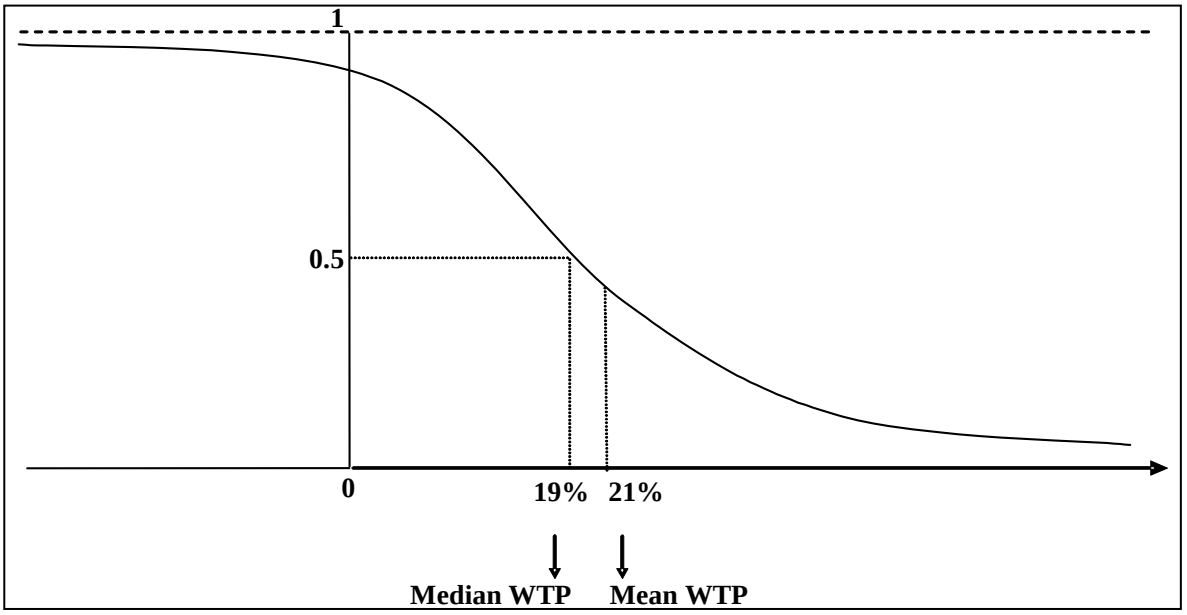

Fig. 3 WTP results.

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

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

This study was carried out with data collected four years ago, when an erratic supply of organic chicken was noted, at least in the main supermarket chains in Buenos Aires city. Nowadays, organic chicken is not sold anywhere because of 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 with regard to organic domestic consumption expansion in Argentina.

For agribusiness and marketers these insights open up positioning potentials. They are also relevant to strategic marketing communication where it concerns promoting organic chicken production in Argentina.

Acknowledgments

These investigations were supported by the Universidad Nacional de Mar del Plata, Argentina.

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