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Beatriz Lupín and Elsa M. Rodríguez

Universidad Nacional de Mar del Plata. Argentina. School of Economics and Social Sciences
mblupin@mdp.edu.ar; emrodri@mdp.edu.ar

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Universidad Nacional de Mar del Plata. Argentina. School of Economics and Social Sciences.
Corresponding author: Beatriz Lupín mblupin@mdp.edu.ar; Rodríguez, Elsa M. emrodri@mdp.edu.ar

ABSTRACT

Potato is an important staple food and horticultural crop for Argentina and it is included in almost every meal prepared by households. The annual average *per capita* consumption of potatoes is 40 kg. Despite the rapid rise of supermarkets, small fruit and vegetable shops still dominate horticultural retail in Argentina. The fresh potato quality is a wide and subjective notion that deals with different kinds of attributes e.g., colour, flavor, nutritional contents, added substances during the productive processes and risks perceptions. Commercial channel preferences, knowledge about varieties, and opinions regarding bad quality attributes are important factors affecting fresh potatoes consumers choices. *The aim of this research is to examine how consumers perceive quality characteristics of fresh potatoes and to identify quality attributes and socio-demographics factors affecting channels choices for buying potatoes.*

A representative sample of the population in this city included 500 randomly selected households. The urban households survey was carry out in the city of Mar del Plata, in June 2009 using a questionnaire – based on face to face interviews. The principal place of respondents choosing to purchase fresh potatoes is the fruits and vegetables stores (72 %), followed in importance with much lower percentages by supermarkets / hypermarkets (15 %) and other channels, such as community fairs, wholesaler market, self-production and direct vegetable delivery by producer (12 %). In order to examine the relationship between preferences for certain quality attributes of fresh potato and socio-economic variables of households about their choice of purchase channel, we applied a multinomial logit regression (MNL). According to the econometric results, we can conclude that fruits and vegetables stores are preferred by decision maker buying fresh potatoes with brown skin colour, with knowledge about potato carbohydrate contribution, and having age under 55 years old. Also this channel is chosen, compared with the supermarkets / hypermarkets, by those consumers that consider price as an important factor when buying unpacked fresh potatoes.

Key words: consumer preferences, fresh potatoes, marketing channels, Argentina

I. Introduction

Potato is an important staple food and horticultural crop for Argentina and it is included in almost every meal prepared by households. The annual average per capita consumption of potatoes is 40 kg and previous results indicate that health care, nutritional content and lack of pesticide residues are the main reasons that lead consumers to choose healthy food. Despite the rapid rise of supermarkets in Argentina, from 17 % of the retail sector in 1965 to 70 % in 2000 (Gutman, 2002), small fruit and vegetable shops still dominate horticultural retail in Argentina. As shown by data from the National Household Expenditure Survey (INDEC 1996/1997), 71 % of fresh fruits and vegetables are bought from traditional small stores and 23 % from supermarkets. The reasons that appear to explain this consumers' preference include: a) habit of purchasing daily fresh vegetables, b) perception of better quality and c) personal attention in small shops. Particulary products like red meats, fruits and vegetables and breads are specially valued by Argentines and their attributes of freshness are specially appreciated by consumers in this country.

Supermarkets and large chains are not always associated with lower prices and greater availability of fresh fruits and vegetables compared to small vegetable stores for food-at home consumption. Consumers´ choices are definitely conditioned by the uncertainty they perceive with regard to different qualities offered (Andersen and Philipsen, 1998). Some food quality attributes are related to the product itself (such as taste, texture, nutrition, convenience, food safety, packaging, etc.) and some attributes are related to the production process (such as animal welfare, environmental impact, production organisations, being free from genetically modified organisms)

The content of pesticides and agrochemicals were perceived as very risky for health and also consumers are expecting that size, color, texture and nutritional value might be considered by fresh potatoes suppliers in the domestic market.

The 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., colour, flavor, nutritional facts, added substances during the productive processes and risks perceptions. Commercial channel preferences, knowledge about varieties, and opinions regarding bad quality attributes are important factors affecting consumer´s choices.

The aim of this research is to examine how consumers perceive quality characteristics of fresh potatoes and to identify quality attributes and socio-demographics factors affecting channels choices for buying potatoes. For these purposes socio-economic and demographic variables, potato purchasing habits,

attitudes toward food safety, perceptions of good or poor potato quality, have been analysed, together with price effects on purchasing decisions.

The identification of any potential differences in consumer characteristics and perceptions associated with the selection of a specific store or channel will provide information needed to improve the potato quality offered by a specific outlet or marketing channel.

II. General overview of potato production, marketing and retail outlets in Argentina

The total potato area of Argentina is 77,000 ha with a total production of 1.8 mln mt, resulting in an average yield of 23 t/ha. The main potato production area in Argentina, in terms of total quantity of potatoes produced, is the South East of the province of Buenos Aires. That is the area where the largest farms are located and where yields are the highest (40 t/ha) The crop is considered medium late, with planting in November and harvest in April/May. Two potato production systems are dominating: mechanized production of processing potatoes and semimechanized production of fresh potatoes. The production of processing potatoes is mainly for McCain, PepsiCo and FarmFrites. A limited number of selected farmers has contracts with the large processors, these farmers generally rent large areas of land, often between 100 and 500 ha, production is mechanized but storage capacity is lacking. Fresh potato production is usually performed on a smaller scale. The production costs of fresh potatoes, mainly of Spunta variety, are US$ 6,500 /ha or US$ 0.16 /kg. Potato prices are generally fairly stable through the year because different regions of the country can supply the market all year round with fresh potatoes. Southeast of Buenos Aires Province Potatoes are cultivated in Balcarce, General Alvarado, Lobería, General Pueyrredon, Otamendi and Tandil and on a lesser scale in General Madarriaga, Necochea and Mar Chiquita. Production in this zone is the most important of the country as it contributes to 65 % of total production. Some of the largest potato growers of Argentina are located in this area. Transport and sales costs are lower because suppliers are usually closer to the final destination: the processing plant. Potatoes are bought straight from the farmer by brokers that pick up the potato bags and transport the potatoes to the market to be sold. Since 15 mln of Argentina's 40 mln inhabitants live in the Bs.As. province, out of which 3 mln in the city, the Central Vegetable Market of Bs.As. (Mercado Central de Buenos Aires, MCBA) received 450,000 t of potatoes, in 2005 which makes it the main product for the market. Potatoes are being delivered to MCBA from 7 distinct production regions: Córdoba, General Belgrano,

Mendoza, San Luis, south este of Buenos Aires, Tucumán and Villa Dolores (Cordoba).

The south east of Buenos Aires province is the main provider during the first nine months of the year. During the remaining three months Buenos Aires still provides significant quantities of potatoes. Villa Dolores (Córdoba) is the second important production region, supplying potatoes during eight months and the most important provider in the month of December. Córdoba shows the same pattern but at a lower level. Tucumán is an import supplier during the last four months of the year, being November the most important month. *Per capita* consumption can vary between 30 and 45 kg. Potato can be considered as a product positioned between a staple food and a vegetable. Around 25 % of all potatoes produced in Argentina (2 mln t) is being processed (450,000 t). MCBA receives around 25 % of all fresh potatoes produced in Argentina (400,000 t), another 25 % is being sold through other markets or directly shipped to supermarkets. The remaining 50 % is consumed in the interior. Potato prices can fluctuate quite heavily, as happened during the year 2007, due to severe weather conditions but also to government intervention and Rural Crisis in 2009 due to export taxess (Law Nº 125).

III. Theoretical framework

Consumers Perception and Evaluation of Food Quality

Efforts to understand consumer attitudes, or overall buying behavior and the relative importance of various attributes in purchasing food have been widely explored (Kiesel and Villas Boas, 2007). Numerous specific attributes were found to influence consumer buying behaviour and price sensitivity, such as demographics (age, education, place of residence, income) habits and life style (Govindasamy and Italia, 1998). Experiental eating quality of a product is made up of a composite of attributes whose relative importance varies with the product. The main components are flavor, aroma-texture, color and shape. In the selection and consumption of fresh foods consumers' evaluation of quality plays a major role. The definition of quality is difficult to interpret as it involves various attributes that are closely interrelated with each other but go beyond taste, smell, colour, size, shape, and freshness. Together with visual, smell and aroma components, health related attributes are perceived by consumers as the most significant reasons to buy sustainable food. Related to risk concerns, "pesticide free" is perceived as an important attribute in consumers buying behavior as respondant were willing to pay a premium averaging 15 % above the regular price to buy pesticide free fresh fruits and vegetables (Boccaletti and Nardella, 2000; Onazaka *et al.*, 2006). In the case of unprocessed food, lacking brands, other factors influence the purchase

decision. Consumers use various intrinsic and extrinsic cues to infer food quality (Alfnes, 2004). Beside intrinsic cues such as fat content and appearance, extrinsic cues, such as price, labels or packaging are becoming increasingly important to consumers. Thus, any effort to differentiate products and promote food quality will only be successful if new or advanced quality attributes can be effectively communicated to consumers (von Alvensleben and Scheper, 1997). The assumption of the National Potato Board of United States, was that, if the public were better informed about the nutritional content of potatoes, producers would be able to sell more to consumers and believed that if the public image of the potato could be changed from a high-calorie, relatively non-nutritious food to a relatively low-calorie food with other nutritional benefits, a major barrier to increased potato consumption would be eliminated (Kolasa and Marks, 1994). *Thus, in order to meet consumers' expectations and preferences, it becomes important for producers to know which quality cues and attributes are relevant and accessible to them. And, from a consumers' perspective, certain qualities have to be visible and understandable in order to reduce uncertainty about the product and consumer dissatisfaction (Glitsch, 2000; Grunert et al., 2004). Thus, any effort to differentiate products and promote food quality will only be successful if new or advanced attributes can be communicated to consumers (von Alvensleben and Scheper, 1997).*

IV. Data and summary statistics

In a first stage of this research, a qualitative study was conducted using focus group methodology. It included domestic consumers-individuals who prepare food at home-chefs and restaurants, as well as the other actors involved in international marketing, producers dedicated to the sale or direct distribution of potato, traders and supermarket managers. These interviews were designed to obtain information about their perception and degree of knowledge on consumer profile, the importance assigned to this product in the channels of marketing, sales and distribution strategies in Mar del Plata, Province of Buenos Aires and limitations of the expansion of the domestic market. The most relevant opinions of focus groups participants were that potato is a versatile and tasty food. There is very little knowledge related to varieties of potatoes and high misunderstanding about cooking benefits of different potatoes varieties. Visual or external characteristics are influencing consumers choices, a medium potato is the more appropriate size, and there is a preference to buy washed potatoes. A difference in taste and texture between fresh and processed potatoes was also highlighted.

In a second stage of this research a urban households survey was carry out in the city of Mar del Plata, in June 2009 using a questionnaire -based on face to face interviews-.

A representative sample of the population in this city included 500 randomly selected households. Interviews were conducted with the person responsible for food purchases and meals preparation or cooking in the household. They were interviewed face-to-face, based on a structured questionnaire that was carefully designed and pretested.

The structured questionnaire covered general household characteristics and different consumer perceptions related to quality attributes. Other questions dealt with frequency of purchasing and consuming fresh potatoes and preferred shopping channels. Respondents had to rate and also rank among a list of attributes, with regard to the relative importance assigned to them, such as pesticide or drug residues, health, carbohydrates and dietary fiber content, colour, appearance, softness, smell, freshness, kind variety, size, shape, skin colour, packaging, varieties and price. The second section of the questionnaire was designed to collect prior knowledge concerning integrated pest management (IPM) that have been analyzed in our previous research studies.

Health-associated risks perceptions about pesticide and fertilize use and content in potatoes and vegetables was asked to report having to answer in a 10-point scale. The last section of the questionnaire collected demographic and socio-economic data, such as income, household size, employment status, educational level and age. Particularly, respondents were asked to choose categories of income due to their reluctance to give specific income values and they gave also information about household health insurance. S*oftwares* IBM SPSS Statistics 19 and InfoStat Profesional 2011 were used to process statistically the information.

The socio-economic and demographic sample characterization displayed in Table 1 shows that 79 % of respondents are female. The average sample age is 51 years old, and the highest absolute frequency ranged between 35-59 years old. The average household size is three members per household.

Regarding income, 58 % of respondents have declared a monthly income not higher than US$ 789.47[1]. Concerning educational level, only 16 % of respondents completed High School.

[1] By June 2009, the nominal exchange rate between US$ and Argentinean Peso was 1 to 3.8.

Table 1: Demographic and socio-economic sample characterization

Variables	Categories	Relative Frequencies (%) -500 cases-
Respondent´s **GENDER**	Male	21%
	Female	**79%**
Respondent´s **AGE**	18-34	22%
	35-59	**42%**
	More 59	35%
	Non responses	0.6%
	Average age: 51 years old	51
Respondent´s **EDUCATIONAL LEVEL**	Low	31%
	Medium-low	38%
	Medium-high	14%
	High	**16%**
Respondent´s **OCUPATION**	Employed	**44%**
	Retired	28%
	Unemployed	2%
	Housewife	23%
	Student	3%
Respondent´s household monthly **INCOME**	Up to US$ 394.74	**25%**
	US$ 395-US$ 789.47	**33%**
	US$ 789.74- US$ 1,578.95	16%
	US$ 1,579.21- US$ 2,105.26	3%
	More than US$ 2,105.26	1%
	Non responses	23%

Note: Exchange rate (June 2009): 1 US$ = 3.8 Argentinean Pesos.
Source: Potato Consumption Survey, Mar del Plata Argentina / June 2009.

Households location in different neighborhoods

The sampling covered several neighborhoods achieving geographical representation and socio-economic levels of the City of Mar del Plata. As suggested Hartili *et al.* (2004), it is expected that households from the same neighborhood have similar socio-economic characteristics. The geographical location of total sample (500 households) allowed grouping the neighborhoods in three socio-economic levels: 1 low / medium-low (202 cases, 40 % of the total sample), 2 medium (163 cases, 33 % of the total sample) and 3 medium-high / high (135 cases, 27 % of the sample). They are called "Neighborhood 1", "Neighborhood 2" and " Neighborhood 3" and this classification is based on the consideration of the following variables: formal education and occupation of the Head of Household (HH), gender of meal planner and cooking / preparing household food, if this person is not in the labour market, number of persons in household, monthly income, number of persons earning an income and social health insurance.

It is observed that 10 % of households without completed basic education belongs to Neighb 1, this percentage drops to 1% for Neighb 3. It is worth noting that the HH of Neighb 1 are of greatest relative importance in terms of complete secondary education (54 % vs. 29 % and 24 %) but also those with a lower proportion in terms of completed primary school (26 % vs. 42 % and 46 %) and completed undergraduate studies (6 % vs. 24 % and 29 %).

With respect to the occupation of the HH, 76 % and 69 % of those who work belong to the Neighborhoods 1 and 3, respectively. The unemployed, housewives, retirees / pensioners and students take values of 30 % and 21 % for Neighborhoods 3 and 1. Specifically, the Neighbohood 3 has the highest proportion of retirees / pensioners (22 %). Among the HH in the labor market the Neighborhood 1 captures the highest percentages of those who are independent workers or self employed.

With regard to household size, the largest average amount of household members are in Neighborhood 1 (3.70 members), and although the households located in Neighb 2 and 3, have similar average number of members (about 3) the Neighborhood 3 presents the lowest coefficient of variation (44.43 vs. 49.17 In Neighboord 1 and 54.31 in Neighborhood 2). One or two-person households have the lowest relative frequency in Neighborhood 1 and also 37 % of households with children under 12 years old are mainly present in Neighborhood 1. It was observed that this value drops to 22 % and 24 % in the case of Neighborhoods 2 and 3.

Although the three Neighborhoods have as a predominant working decision maker woman in the labor market, the highest proportion of those who are housewives (37 %) belong to households located in Neighborhoods I, compared with those women in Neighborhoods 2 (19 %) and 3 (20 %).

56 % of households with lowest income reported is located in the Neighborhood 1 (vs. 24 % in Neighb 3) and 18 % of households that belong to higher range of income belong to Neighborhood 3 compared with 3 % in Neighbhood 1.

Although the three types of neighborhood, one or two income contributors are prevailing and the average number of different households in the neighborhood is similar (around 1.80), the neighborhood 3 presents a lower dispersion (coefficient of variability is equal to 0.76 vs. 0.88 and 0.91 in Neighborhoods 1 and 2).

25 % of households located in Neighborhood 1 and only 4 % of households in Neighborhood 3 receive health assistance in a Public hospital while a 19 % of Neighborhood 3 and 10 % of households in Neighborhood 1 and 2 receive health assistance through a private medical care.

The Pearson Chi-square Test rejected the null hypothesis of no association between belonging to a certain type of neighborhood and categorical variables listed, except for the occupation of the HH. Similarly, the Kruskal-Wallis Test indicated the rejection of the null hypothesis that states that the number of members and the number of income contributors to the household do not differ by the type of household neighborhood of residence. The Table 2 presented below shows these figures

Table 2: Households located in different neighborhoods

Variable	Description	Mean / Relative Frecuency		
		Neighb 1	Neighb 2	Neighb 3
Socio-demographic characteristics of Household Head (HH)				
EDUCATION	Formal education HH***:			
	1 = No formal education or incomplete primary education	**10%**	4%	1%
	2 = Completed primary education	**26%**	42%	46%
	3 = Complete middle education	54%	29%	24%
	4 = Technical school or college education	6%	24%	**29%**
	Non responses	3%	1%	1%
OCUPATION	Ocupation HH:			
	1 = Trabaja	**76%**	74%	69%
	2 = Otherwise	**21%**	24.5%	30%
	Non responses	2%	1%	1%
Household characteristics				
SIZE	Number of members in housholds	3.70 (1.82)[a]	3 (1.63)[a]	3.06 **(1.36)[a]**
	Number of members in the household -by range-:			
	1 = One or two persons	**29%**	48%	9%
	2 = Three or four persons	43%	36%	48%
	3 = More than four persons	**28%**	16%	13%
CHILDREN	Children under 12 years old ***:			
	1 =Yes	**37%**	22%	24%
	2 = No	63%	77%	76%
	Non responses	0.5%	1%	0%
GENDER	Meal planner gender**:			
	1 = Female	**85%**	75%	75%
	2 = Male	15%	25%	25%
HOUSEWIFE MEAL PLANNER	Meal planner does not work out of home-***:			
	1 = Yes	**37%**	19%	20%
	2 = No	62%	80%	80%
	Non responses	1%	1%	0%
INCOME	Household monthly income ***:			
	1 = Up US$ 526.32	**56%**	40%	24%
	2 = Between US$ 526.58 and US$ 1,052.63	20%	29%	27%
	3 = More than US$ 1,052.63	3%	12%	**18%**
	Non responses	20%	19%	31%
NUMBERINC	Number of member having an Income	1.84 (0.88)[a] n = 195	1.85 (0.91)[a] n = 158	**1.82 (0.76)[a]** n = 130
	Number of member having an Income -by range-:			
	1 = one or two	78%	82%	**85%**
	2 = more than two	18%	15%	11%
	Non responses	3%	3%	4%
HEALTH INSURANCE	Household Health Insurance***:			
	1 = Social Insurance	62%	81%	75.5%
	2 = Private health insurance	10%	10%	**19%**
	3 = Public attention	**25%**	8.5%	4%
	Non responses	2%	0%	2%

•[a]S.E. •Three asterisks (***) denote statistical significance at he 0.01 level and two asterisks (**) denote statistical significance at the 0.05 level. •Exchange rate (June 2009): 1 US$ = 3.8 Argentinean Pesos.
Source: Potato Consumption Survey, Mar del Plata Argentina / June 2009.

V. Marketing channels and consumers perception about poor quality of fresh potatoes

In the city of Mar del Plata, the grocery stores are evenly distributed in all neighborhoods. According to the latest National Economic Census (2004) there were about two hundred and seventy (270) fruits and vegetables stores. With respect to the supermarkets / hypermarkets, a local chain "Toledo" has forty-two (42) branches, covering all social classes neighbourhoods. The international chain "Carrefour", "Disco" and "VEA" have three to five branch each and are located mainly in middle and medium/high class neighborhoods. The “other stores” category includes approximately five community fairs that are located mainly in lower and medium/low class neighborhoods.

From a list of "negative" quality aspects mentioned to consumers, they had to choose only three of those aspects associated with "poor quality" of fresh potato. The sprouted aspect of fresh potato was highlighted by 71 % of those consumers selecting vegetables stores to buy fresh potatoes. This percentage decreases to 60 % and 67 % for those consumers buying the product in supermarkets / hypermarkets and other channels.

Those households that give priority to supermarkets / hypermarkets to buy fresh potatoes, mentioned the ugly potato flavor as a bad qualiy characteristic (35 % vs. 28 % and 21%), with scratches and bruises (28.5 % vs 22. % and 15.5 %) and with "eyes" (26 % vs. 22 % and 14 %) in external visual appareance.

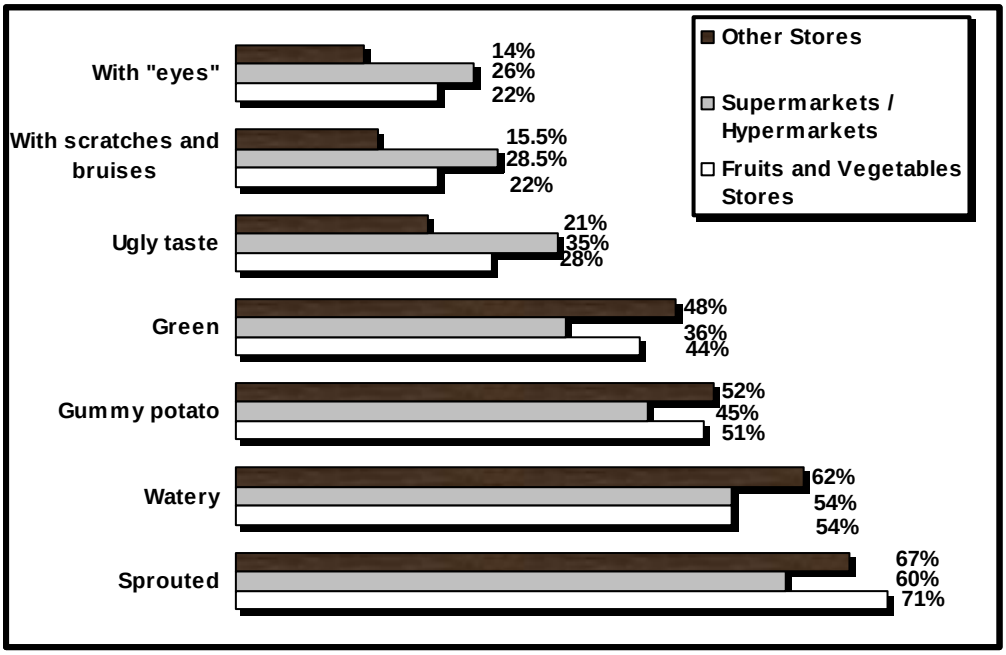
Meanwhile, 62 % of those who buy potatoes primarily in “other channels” mention watery as poor quality of fresh potatoes and 48 % mentioned green potato.

54 % of consumers buying in each of the other two channels mention watery also. And 44 % in the fruits and vegetables stores and the 36 % in the supermarkets / hypermarkets pointed out green.

Finally, with respect to the negative gummy quality, both the fruits and vegetables stores as the other channels have similar values (51 % and 52 %, respectively), and it is lower in the case of supermarkets / hypermarkets (45 %).

Figure 1 shows the relative importance of these negative features above mentioned associated with the concept of "poor quality" of fresh potatoes.

Figure 1: Fresh Potatoes poor quality by marketing channels



Source: Author´s calculation. Potato Consumption Survey, Mar del Plata Argentina / June 2009.

Table 3 presents the consumers preference for fresh potatoes atributtes.

Table 3: Consumer preference for fresh potatoes atributtes by marketing channel

Characteristics	Marketing Channel		
	Fruits and Vegetables Stores	Supermarkets / Hypermarkets	Other Stores
PACKAGING			
Unpacked / Bulk vs. Packed	**85%**	70%	67%
TREATMENT			
Dirt vs. Washed or Brushed	**35%**	25%	28%
Washed vs. Dirt or Brushed	39%	36%	**41%**
Brushed vs. Dirt or Washed	13%	**18%**	9%
MATURITY			
New vs. Old	89%	84%	81%
SKIN COLOUR			
Brown vs. other	**55,5%**	48%	41%
SHAPE			
Oval vs. Round or Elogated	30%	**44%**	27,5%
Round vs. Oval or Elogated	18%	17%	**29%**
Elogated vs. Oval or Round	**22%**	16%	12%
SIZE			
Small vs. Medium or Large	4%	5%	**12%**
Medium vs. Small or Large	66%	**71%**	57%
Large vs. Small or Medium	**24%**	19%	**26%**

Source: Author´s calculation. Potato Consumption Survey, Mar del Plata Argentina / June 2009.

VI. Model Theoretical Framework

VI.1 Random Utility Model

An individual, n, will choose between three discrete alternatives regarding where to buy fresh potatoes. These three alternatives are known as the choice set and consist of:

- Small Fruits and Vegetable Store (j = 1)
- Supermarkets / Hypermarkets (j = 2)
- Other Stores (j = 0)

Individuals are assumed to be rational and the chosen alternative, will presumably maximize the utility U of an individual. So if a person prefers to buy on Small and Vegetable Stores rather than buying on Supermarket/Hipermarket, then $U_{n1} > U_{n2}$.

The utility of the individual can be written in the form: $U_{nj} = V_{nj} + \varepsilon_{nj}$

Where V_{nj} is the deterministic part of utility that can be specified. It includes measurable attributes of the alternative and characteristics of the individual and is specified to be linear in parameters. The error term ε_{nj} represents the stochastic part of utility and includes: a) measurement errors b) unobserved attributes and c) unobserved variations. These sources of variability require the model builder to treat each error term as a random term. It follows that the true utilities are not known and are also treated as random hence the "Random Utility Maximization Model".

VI.2 The Multinomial Logit (MNL) Model

Define the function P_{nj} the probability that individual n chooses alternative j. There are k characteristics attributes of n that are arranged in vector $\beta_j' x_n$, where $x_n = (x_{1n}, x_{2n},....,x_{hn})$ is the set of variables considered and $\beta_j = (\beta_0, \beta_{1j}, \beta_{2j},...\beta_{kj})$ is the set of parameter that represent the impact of changes in x on the probability. So the probability multinomial model is :

$P_{nj} = Pr\ (y_n=j)$ for all $j = 0,....,J$ **[1]**

If the deterministic part of utility is specified to be linear in parameters,

$V_{nj} = \beta_j' x_n$ $[V_{nj}= \beta_0 +\beta_{11} x_{11} +\beta_{21}x_{21}+.....+\beta_{kj}x_{kn}]$

Then the probability function of equation **[1]** is: $P_{nj} = P_j(\beta_j' x_n)$

For the multinomial logit model the probability function can be written as:

$$P_{nj} = P_j(\beta_j' x_n) = Pr(y_n = i) \qquad \frac{e^{\beta j' xn}}{\sum_{j=0}^{J} e^{\beta i' xn}}$$

This formulation of the model -Agresti (2002), Greene (1999), Maddala (1983) and Powers and Xie (1996)-, is unidentified since more than one set of parameter values can generate the same probabilities for the alternatives. To correct this problem and identify the model, set one vector of coefficients to zero. For example assume $\beta'_0 = 0$. Thus the probabilities for the channel options are:

$$Pr(y_n = j) = \frac{e^{\beta j' xn}}{1 + \sum_{j=1}^{J} e^{\beta i' xn}} \qquad Para\ j = 1,\ldots, J \qquad Pr(y_n = 0) = \frac{1}{1 + \sum_{j=1}^{J} e^{\beta i' xn}}$$

When examining the coefficient estimates it is necessary to keep in mind that they are being compared to the base category. The parameters estimates are calculated through an iterative process using Maximum Likelihood. To derive the log-likelihood, define a scalar variable d_{nj} for each individual where the variable will equal 1 if the alternative is chosen and 0 otherwise.

For example if there are three alternatives (0,1 2) and individual 5 chooses alternative 2 , the three scalars are $d_{50} = 0$, $d_{51} = 0$ y $d_{52} = 1$. There are a total of N observations of individual index n = 1,2,...,N . The objective is to find the parameter values that maximize:

$$Ln\ L = \sum_{n=1}^{N} \sum_{j=0}^{J} d_{nj}\, ln\ Pr(y_n = j)$$

The parameters estimates are calculated through an iterative process. It is necessary since P_{nj} is a nonlinear function of all of the β. The Statistical Package for Social Sciences (SPSS) uses the Newton-Raphson iterative method of scoring where initial starting values calculated by ordinary least squares are adjusted until the gradient of the log-likelihood converges to zero. The final sets of coefficients used in convergence are the maximum likelihood estimates. The equation used is:

$$\frac{\partial\, ln\ L}{\partial \beta_j} = \sum_{n=1}^{N} [d_{nj} - P_{nj}]\, x_n = 0 \qquad para\ j = 1, \ldots, J$$

VII. Results and conclusions

The principal place of respondents choosing to purchase fresh potatoes is the fruits and vegetables stores (72 %), followed in importance with much lower percentages by supermarket/ hipermarket (15 %) and other channels, such as community fairs, wholesaler market, self-production and direct vegetable delivery by producer (12 %) (Figure 2).

Despite the low relative importance of this last channel, it shows the highest average amount of fresh potatoes purchased per week (5.44 kg) compared to 3.60 kg bought by households on each of the other two channels. The average price paid per 1 kg of fresh potatoes in the three channels has similar value- (about US$ 0.40-US $ 0.43). The Kruskal-Wallis Test showed non-price marked differences by type of channel. But consumers who prefer different channels to the small fruits and vegetable stores and supermarkets / hypermarkets are less willing to pay more for a differentiated-quality potato, like one obtained from a sustainable production practice. Although 69 % of those households attending other channels do accept to pay a premium price for a differenciated product, the proportion rises to 80 % among those who choose any of the other two channels- fruits and vegetables stores and supermarkets / hypermarkets. In this case, the Chi-Square Test indicated association between willingness to pay a premium for a top quality fresh potatoes and the priority channel.

While the average price of potatoes is almost the same for the shopping channel options, some interesting differences appear by type of neighborhood. Those consumers who live in a neighborhood 1 usually pay US$ 0.40 per kg, and this value amounts to US$ 0.44 and US$ 0.48 in the neighborhoods 2 and 3. In this case the Kruskal-Wallis Test does point out significant differences among neighborhoods. It could suggest that households located in neighborhoods with low socio-eonomics levels attend stores characterized by lower prices, such as community fairs, or also it could be explained by prices differences due to geographic businness location around the City.

In this sense, the relative frequencies show that 17 % of households living in neighborhoods of low / medium-socioeconomic level buy fresh potatoes, mainly in “other channels” while 9 % and 8 % of households living in medium-high / high Neighborhoods buy in the other channels.

While community fairs are prioritized by only 8 % of consumers who live in a neighborhood type 1, this percentage drops to 2 % in the case of medium and high income-medium / high income neighborhood.

In order to examine the joint relationship between preferences for certain quality attributes of fresh potato and socio-economic and demographic of the decision maker

and their families about their choice of purchase channel, we applied a multinomial logit regression (MNL). Prior to the application of this procedure, performed statistical tests mentioned above, Pearson Chi Square, Kruskal-Wallis and Friedman, were applied in order to explore the relationship between different purchasing channels and variables related to product attributes and socio-economic and demographic factors.

Out of the estimated models, the one whose evaluation is reported in this paper adjusted more appropriated the data, both from an economic perspective and from a statistical and econometric perspective (Cacace and Huarte, 1996; Caswell, *et al.*, 2002; Cheng *et al.* , 1991; Cook *et al.*, 2000; Kezis *et al.*, 1988; Nayga, 1996; Reynolds 1990; Yue *et al.*, 2008).

The dependent variable is the preferred purchase channel chosen by the decision maker to buy fresh potatoes. This dependent variable is nominal in nature and it does not imply an ordinal alternative and do not has a hierarchy and therefore a natural progression will not be expected. Each category is mutually exclusive since if one channel is priorized a different one will not be priorized. Finally, according to Rodríguez Donate *et al.* (2009), may be indicated that the consumer's decision to choose a certain channel can be done in two steps: first he or she takes the decision to buy or not in a particular place, and then decides about the frequency of attendance at the same channel. According to the purpose of this research, which is to identify factors influencing the choice of a particular channel, we did not explore the number of times the decision maker chooses or visits the same marketing channel.

With respect to the explanatory variables included in the model estimation, they might be separated according to extrinsic or intrinsic quality attributes of fresh potato. Among the former are the way potatoes are selling -packed or unpacked / bulk fresh potatoes- and if the price is an important variable when deciding to buy fresh potatoes.

In turn, the variables related to the intrinsic attributes are: colour of skin and shape, if the fact that potatoes have "eyes" is associated with poor / bad quality and consumers knowledge about the nutritional content. All of these attributes are signals that can not be altered without modifying the physical characteristics of this product.

With regard to nutrients content, the survey took into account whether the consumer knew the contribution of carbohydrates and dietary fiber, among other nutrients, throught the consumption of potatoes. Previous studies showed a general lack of knowledge related to this aspect (Cacace and Huarte, 1996), therefore the inclusion of these variables in the estimated model attempts to capture the behavior of a more informed consumer.

Due to the analysis carried out by type of neighborhood, a residence place of household was selected as a proxy indicator of household socioeconomic level.

Finally, we considered the age of meal planner or person in household deciding the shopping and preparing food as a demographic variable that could be a best indicator of generationa l trend or preference.

For the MNL regression, only those cases without missing data were included in the estimated model, totaling 297 cases (59 % of the total sample). In this sub-sample, the proportion of each of the shopping channels showed no relevant differences regarding the total sample and the same happens with the explanatory variables considered.

Table 4 presents the variables included in the estimated MNL model.

Table 4: Description of model variables

Dependent Variable	Categories	Relative frecuencies
MARKETING CHANNEL	Channel where the respondent buys mainly fresh potatoes	
	1 = Fruit and Vegetables Stores	73%
	2 = Supermarkets / Hypermarkets	16%
	3 = Other Stores	11%
Categorical Explanatory Variables	**Categories**	**Relative frecuencies**
PACKAGING	Way of purchasing fresh potatoes	
	1 = Unpacked / Bulk	84%
	2 = Packed	16%
PRICE	If the fresh potatoes´s price is important at moment of buying them	
	1 = Yes	35.5%
	2 = No	64.5%
SKIN COLOUR	Favorite colour skin fresh potatoes	
	1= Brown	66%
	2 = Otherwise	44%
SHAPE	Favorite shape of fresh potatoes	
	1 = Oval	46%
	2 = Round	29%
	3 = Elongated	25%
EXTERNAL APPEARANCE	The respondent links bad qualitiy of fresh potatoes if they have “eyes”	
	1= Yes	22%
	2 = No	78%
CARBOHYDRATES	If the respondent knows that the fresh potatoes contain carbohydrates	
	1 = Yes	22%
	2 = No	78%
DIETARY FIBER	If the respondent knows that the fresh potatoes contain dietary fiber	
	1 = Yes	9.5%
	2 = No	90.5%
NEIGHBORHOOD	Household socioeconomic level	
	1 = Low / Medium low	49%
	2 = Medium	30%
	3 = Medium High / High	21%
AGE	Age of meal planner	
	1 = 30 and under	17%
	2 = 31-55 years old	40%
	3 = 56 and older	43%

Source: Author´s calculation. Potato Consumption Survey, Mar del Plata Argentina / June 2009.

The Global Adjustment and Testing goodness of fit of the model and Likelihood Ratio for each of the explanatory variables are statistically significant. The Pseudo-R2 gave consistent values according to those obtained by other authors using cross-section data (Briz and Ward, 2009; Canavari, *et al.*, 2009; Rodríguez Donate *et al.*, 2009, Rossini, 2009; Schupp *et al.*, 1998). Its relevance is considered controversial in the bibliography, therefore they should be taken as illustrative way (Caffey and Kazmierczak.Jr. 1994; Menard, 2000). Finally, the overall predictive power of the model is 75 % and also it is a percentage consistent with those obtained in similar applications (Fertó and Szabó, 2002; Florkowski *et al.*, 1999, Rossini, 2009). (Table 5)

Table 5: Model perfomance evaluation

Model Fitting Information	
Model	**Significance**
Intercept only	
Final	0.000
Goodness-of-Fit	
	Significance
Pearson	0.968
Deviance	1.000
Pseudo R-Square	
Cox and Snell	24%
Negelkerke	31%
McFadden	18%
Likelihood Ratio Tests	
Effect	**Significance**
Intercept	-
PACKAGING	0.007
PRICE	0.039
SKIN COLOUR	0.057
SHAPE	0.037
EXTERNAL APPEARANCE	0.077
CARBOHYDRATE	0.001
DIETARY FIBER	0.001
NEIGHBORHOOD	0.012
AGE	0.031
Model´s predictive power	
Overall porcentge	75%

Source: Author´s calculation. Potato Consumption Survey, Mar del Plata Argentina / June 2009.

It may be noted that the estimated model is suitable and according to statistical test and its predictive power it was successful. The following Table 6 presents the results obtained from the model estimation

Table 6: Estimates of the Multinomial Logit Model

Explanatory Variables	Dependent Variable					
	Fruits and Vegetables Stores vs. Other Stores		Supermarkets / Hypermarkets vs. Other		Fruits and Vegetables Stores vs. Supermarkets / Hypermarkets	
	β	e^{β}	β	e^{β}	β	e^{β}
PACKAGING = 1	1.284*** (0.497)[a]	3.610	0.283 (0.563)[a]		1.001** (0.413)[a]	2.720
PACKAGING = 2	0[b]		0[b]		0[b]	
PRICE = 1	-0.267 (0.445)[a]		-1.203** (0.562)[a]	0.300	0.936** (0.421)[a]	2.551
PRICE = 2	0[b]		0[b]		0[b]	
SKIN COLOUR = 1	0.992** (0.439)[a]	2.698	0.559 (0.520)[a]		0.433 (0.369)[a]	
SKIN COLOUR = 2	0[b]		0[b]		0[b]	
SHAPE = 1	-1.356** (0.646)[a]	0.258	-0.451 (0.742)[a]		-0.905*** (0.463)[a]	0.405
SHAPE = 2	-1.481** (0.659)[a]	0.227	-1.087 (0.782)[a]		-0.394 (0.538)[a]	
SAHPE = 3	0[b]		0[b]		0[b]	
EXTERNAL APPEARANCE =1	0.547 (0.586)[a]		1.271** (0.641)[a]	3.565	-0.724*** (0.390)[a]	0.485
EXTERNAL APPEARANCE = 2	0[b]		0[b]		0[b]	
CARBOHYDRATE = 1	1.835*** (0.552)[a]	6.264	1.430** (0.618)[a]	4.180	0.405 (0.362)[a]	
CARBOHYDRATE = 2	0[b]		0[b]		0[b]	
DIETARY FIBER = 1	-2.176*** (0.649)[a]	0.113	-3.348*** (1.187)[a]	0.03516	1.172 (1.074)[a]	
DIETARY FIBER = 2	0[b]		0[b]		0[b]	
NEIGHBORHOOD = 1	-1.774** (0.728)[a]	0.170	-0.643 (0.864)[a]		-1.130** (0.551)[a]	0.323
NEIGHBORHOOD = 2	-0.890 (0.774)[a]		0.303 (0.915)[a]		-1.193** (0.574)[a]	0.303
NEIGHBORHOOD = 3	0[b]		0[b]		0[b]	
AGE = 1	2.136** (0.872)[a]	8.468	2.166** (0.949)[a]	8.721	-0.029 (0.487)[a]	
AGE = 2	0.922** (0.464)[a]	2.514	0.733 (0.552)[a]	2.081	0.189 (0.392)[a]	
AGE = 3	0[b]		0[b]		0[b]	
Intercept	1.699** (0.862)[a]		0.097 (1.039)[a]		1.602** (0.724)[a]	

•n = 297. •[a]S.E. •[b]This parameter is set to zero because it is redundant. •Three asterisks (***) denote statistical significance at he 0.01 level, two asterisks (**) denote statistical significance at the 0.05 level and an asterisk (*) denotes statistical significance at the 0.1 level.
Source: Author´s calculation. Potato Consumption Survey, Mar del Plata Argentina / June 2009.

The analysis of the variables that were statistically significant is presented below, and as noted by several authors (Babcock *et al.*, 1995, Greene, 1999; Powers and Xie, 1999, among others), interpretation of the parameters estimated in a MNL is more difficult than in a binary choice model.

The signs of the estimated coefficients do not always reveal the direction of the impact of a given variable (Briz and Ward, 2009). Even though some literature review indicates that the calculation of marginal effects can lead to ambiguous interpretations (Powers

and Xie, 1999). Thus, given the exploratory nature of this research, we chose to interpret the odds ratios, and they suggest that:

⇨Those who prioritize the purchase of spare fresh potatoes have 3.6 and 2.7 more chances of buying fresh potatoes in the fruits and vegetables stores than in “other channels” and supermarkets / hypermarkets, related to those consumers who prefer to buy bottled-on bag. (**PACKAGING**)

⇨Consumers giving a relevant incidence to the price of a kilogram of fresh potatoes, compared to those consumers that do not take care about price, have 2½ more chances of acquiring it in fruits and vegetables stores and more than 3 chances of acquiring it in “other channels”, that to buy it in a supermarkets / hypermarkets. (**PRICE**)

⇨Those who prefer a fresh potato with brown skin color or brownish have 2.7 more chances to choose the fruits and vegetables stores or “other channels” related to those prefering another colour of fresh potato peel / skin, for example, yellow or flushed. (**SKINCOLOUR**)

⇨For individuals who choose a fresh potato with elongated shape, those prefering an oval potato have more chances, almost 4 and 2½ more chances of going to “other channels” or supermarkets / hypermarkets than those going to a vegetable store. In turn, consumers who prefer a round-shaped fresh potato has about 4½ more chances to shop somewhere else, and have less chance to buy them in fruits and vegetables stores. (**SHAPE**)

⇨Those that associated poor quality of fresh potatoes with "eyes" have 3 ½ more chances and 2 more chances to go to a hyper / supermarket that to go to “other channels” or to the fruits ande vegetable stores, compared to those who do not make such a bad quality link. (**EXTERNAL APPEARANCE**)

⇨Those who know that the potato provides carbohydrates to the body have 6 more chances and 4 more chances to choose fruits and vegetables stores or supermarkets / hypermarkets that choosing some other channel, in relation to those consumers unfamiliar with such nutritive content (**CARBOHYDRATE**). Meanwhile, respondents who know that the potato contributes to the recommended intake of dietary fiber have 9 and 28 more chances to select “other channels” that to select fruits and vegetables stores or supermarkets / hypermarkets, comparing to those consumers that do not know about such a dietary content (**DIETARY FIBER**).

⇨Households located in the neighborhood 1 have 6 more chances and 3 more chances to shop for fresh potatoes in “other channels” or supermarkets / hypermarkets than in fruits and vegetables stores. Also, households located in the neighborhood type 2 have 3 more chances to go to a supermarkets / hypermarkets than buy them in the

fruits and vegetables stores. Always comparing this marketing channels with respect to households living in the neighborhood type 3. (**NEIGHBORHOOD**).

⇨For younger decision makers or meal planners the fruits and vegetables stores and supermarkets / hypermarkets are more important than “other channels” because these channels have 8 more chances to be choosen that the latter. The middle age -between 31 and 55 years of age- meal planner o decision maker also prioritize the vegetable grocery store, compared to other channels, accounting for 2½ more times the chance to go there. These preferences by age are compared to those responded by older decision makers o meal planner- over 55 years old-. (**AGE**)

According to this econometric results, we can conclude

•Fruits and vegetables stores are preferred by decision maker buying fresh potatoes with brown skin that has knowledge about potato carbohydrate contribution, and having age under 55 years old. Also this channel is prefered, compared with the supermarkets / hypermarkets, by those consumers considering price as an important factor when buying fresh potatoes. And also prefered by those consumers buying unpacked or bushel type of fresh potatoes.

•The supermarkets / hypermarkets are prioritized by the respondent to choose an oval potato instead of round or elongated potato in relation to the fruit and vegetable stores, associeted also to those households located in a low / medium-low or medium neighborhood. Supermarket / hypermarkets is also preferred to "other channels" for those who know that potatoes contain carbohydrates and are the youngest consumers. Finally, the association of poor quality of fresh potatoes related to it to have "eyes" is performed mostly by those who choose the supermarkets / hypermarkets compared to the remaining channel options.

•Finally, “other channels” are chosen by those households considering the price of fresh potatoes as a relevant factor for buying fresh potato in relation to supermarkets / hypermarkets-, who prefers an oval or round shape for fresh potatoes respect to fruits and vegetables stores and who knows that potato contributes to dietary fiber, which implies that it would be a more informed consumer. In this regard, it is clear that a large proportion of respondents could name at least one nutrient in potatoes and, among those who did know some, carbohydrate predominated by their association to the "fat potato" and whose home is located in a neighborhood of low / medium-low, in contrast to the fruits and vegetables stores.

The following Figure shows the prevalence of each explanatory variable-cell-gray painted in the different types of channels considered by this research.

Figure 2: Prevalence of each explanatory variable in the different types of channels

Explanatory Variables	Marketing channel		
	Fruits and Vegetables Stores	Supermarkets / Hypermarkets	Other Stores
PACKAGING Unpacked vs. Packed			
PRICE The price is important vs. the price isn´t important			
SKIN COLOUR Brown vs. other colour			
SHAPE Oval vs. Elongated			
SHAPE Round vs. Elongated			
EXTERNAL APPEARENCE With eyes vs. Without eyes			
CARBOHYDRATES The meal pleanner knows vs. the meal pleanner doesn´t know			
DIETARY FIBER The meal pleanner knows vs. the meal pleanner doesn´t know			
NEIGHBORHOOD Low / Medium Low vs. Medium High / High			
NEIGHBORHOOD Medium vs Medium High / High			
AGE 30 and under vs. 56 and older			
AGE 31-55 years old vs. 56 and older			

Source: Author´s calculation. Potato Consumption Survey, Mar del Plata Argentina / June 2009.

We note that although all respondents expressed a high concern for the content of pesticides and fertilizers on fresh potatoes, qualifying them with an average grade of 8.50 points and 8 points for health risk involves these substances, the variables related to that fear was not statistically significant according to Kruskal-Wallis Test or the estimated MNL model. It is possible explained by the type of survey used in our research and probably other form of inquiry by applying Choice Modelling could give different results.

All actors in this supply chain and retail stores should convey quality attributes to ensure that consumers value their product. These strategies help to raise awareness of

improving or enhancing product quality and financial reward to the effort of research, production and marketing of this commodity in the diet of our population.

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References

Agresti, A. (2002): "An Introduction to categorical data analysis", John Wiley & Sons INC, Canada.

Alfnes, F. (2004): "Stated preferences for imported and hormone-treated beef: an application of the mixed logit model". European Reviewof Agricultural Economics 31:19-37.

Alvensleben, R.v. and **Sheper, U.** (1997): "The decline of the meat image in Germany-Therorical considerations". In Alvensleben, R.v.; Cramon-Taubadel, S.v.; Rohr, A.; Sheper, U. and Schleyerbach, K. (eds.): Problems of meat marketing. Department of Agricultural Economics, CAU Kiel, Kiel:working paper 2, 1-7.

Andersen E.S. and **Philipsen, K.** (1998): "The evolution of credence goods in customer marketes: exchanging ´pigs in pokes´". DRUID Winter Seminar, Middelfart, 8-10 January 1998.

Babcock, B.A.; Chaherli, N.M. and **Lakshminarayan, P.G.** (1995): "Program participation and farm-level adoption of conservation tillage: estimates from a Multinomial Logit Model". Working Paper 95-WP 136, Center for Agricultural and Rural Development, Iowa State University, May 1995.

Boccaletti, S. and **Nardella, M.** (2000): "Consumer´s Willingness-to-Pay for Pesticide-Free Fruit and Vegetable in Italy". International Food and Agribusiness Management Review, 3: 297-310.

Briz, T. and **Ward, R.W.** (2009): "Consumer awareness of organic products in Spain: an application of multinomial logit models". Food Policy, 34: 295-304.

Cacace, J. M. y **Huarte, M.** (1996): "Descubriendo la papa". Instituto Nacional de Tecnología Agropecuaria (INTA), Fundación ArgenInta, Balcarce.

Caffey, R.H. and **Kazmierczak Jr., R.F.** (1994): "Factors influencing technology adoption in a Lousiana aquaculture system". Journal of Agricultural and Applied Economicas, 26(1): 264-274, July 1994.

Canavari, M.; Tisselli, F.; Nayga Jr., R. and Scarpa, R. (2009): "Italian consumer acceptance of nutritionally enhanced GM food". 27th Conference of the International Association of Agricultural Economists (IAAE), Beijing-China, August 2009.

Caswell, J. A.; **Noelke, C. M.** and **Mojduszka, E. M.** (2002): "Unifying two frameworks for analyzing quality and quality assurance for food products". In ´Global trade and consumer demand for quality´; B. Krissoff, M. Bohman & J. A. Caswell (Eds.); Springer-Verlag , New York, LLC.

Cerdá, R.; Faundez, M.; Chandia, A. and **Monroy, M.** (2004): Prospección de mercado de hortalizas bajo producción integrada en cuatro ciudades de la octava región, Chile. Anales del 1º Congreso Regional de Economistas Agrarios – XXXV Reunion Anual de la Asociacion Argentina de Economia Agraria, Mar del Plata, 3 al 5 de noviembre de 2004.

Cheng, H.T.; Kezis, A.S.; Peavey, S.R. and **Smith, D.A.** (1991): "Factors affecting consumers´choices among types of potatoes: a Multinomial Logit Analysis". American Potato Journal, Vol. 68, 87-96.

Cook, K. S.; **Toenesmeyer, U. C.**; **German, C. L.** and **Bacon, R.** (2000): "An analysis of household consumption of fresh potatoes in Delaware". Journal of Food Distribution Research, 103-111, March 2000.

El-Osta, H.S. and **Morehart, M.J.** (1999): "Technology adoption decisions in dairy production and the role of herd expansion". Agricultural and Resource Economics Review, Vol. 28, Issue 1, 84-94, April 1999.

Fernández, **V.J.** (2009): "Individual profiles and wine consumption patterns in Tenerife. A Multinomial Logit Model". Spanish Journal of Agricultural Research, 7(4): 759-769.

Fertó, I. and **Szabó, G.G.** (2002): "The choice of supply channels in Hungarian fruit and vegetable sector". American Agricultural Economics Association, Annual Meeting, Long Beach, California-USA.

Florkowski, W.J.; You, Z. and **Huang, Ch.L.** (1999): "Consumer selection of retail outlets in buying pecans". Journal of Food and Distribution Research, 30: 34-43.

Glitsch, K. (2000): "Consumer perceptions of fresh meat quality: cross-national comparison". British Food Journal, Vol. 102, Nº 3, 177-194.

Govindasamy, R.; **Italia, J.** & **Rabin, J.** (1998): "Consumer Response and Perceptions of Integrated Pest Management Produce". The State University of New Jersey, REUTERS, May 1998.

Greene, W. (1999): "Análisis econométrico". 3$^{era.}$ Ed., Prentice-Hall Iberia S.R.L., España.

Grunert, K.G.; Bredahl, L. and **Brunsø, K.** (2004): "Consumer perceptions of meat quality and implications for product development in the meat Sector-A Review". Meat Science, Vol. 66, 259-277.

Gutman, G.(2002): "Impact of the Rapid Rise of Supermarkets on Dairy Products Systems in Argentina. Development policy Review, 2002, 20 (4) 404-427.

Hartili, S.A.; Ozkan, B. and **Aktas, A.R.** (2004): “Factors affecting fluid milk purchasing sources inTurkey”. Food Quality and Preference, 15: 509-515.

Kezis, A.S.; Smith, D.A.; Peavey, S.R. and **Lloyd, J.A.** (1988): “Testing for differences in consumer acceptance of identically appearing potato varieties”, Journal of Food Distribution Research, September 1988, 54-62.

Kiesel, K. and **Villas-Boas, S.B.** (2007): “Get organic milk? Consumer valuations of milk labels after the implementation of the USDA organica seal”. Journal of Agricultural & Food Industrial Organization, Vol. 5:Iss. 1, Article 4.

Kolasa, K. & **Marks, B.** (1994): “Nutrition public relations: dietary promotion of the potato”. Nutrition Today, January/February, 30-36.

Maddala, G. S. (1983): “Limited-dependent and qualitative variables in Econometrics”. Cambridge University Press, USA.

Menard, S. (2000): “Coefficients of determination for multiple logistic regression analysis”. American Statistical Association, 54 (1): 17-24.

Nayga Jr., R.M. (1996): “Sociodemographic influences consumer concern for food safety: the case of irradiation, antibiotics, hormones and pesticides”. Review of Agricultural Economics, 18(3): 467-475.

Netherlands Ministry of Agriculture, Nature and Food Quality Potato Production in Argentina. The Bureau of the Netherlands Agricultural Council in Buenos Aires, Argentina Buenos Aires. December 2008

Onozaka, Y.; Bunch, D. and **Larson, D.** (2006): “What exactly are they paying for?. Explaining the price premium for organic produce”. Agricultural and Resource Economics Update, Vol. 9, Nº 6, University of California Giannini Foundation, July/August.

Powers, D. A. and **Xie, Y.** (1999): “Statistical methods for categorical data analysis”, Academic Press Inc.

Reynolds, A. (1990): “Analyzing fresh vegetable consumption from household survey data”. Southern Journal of Agricultural Economics, 22: 31-38. December 1990.

Rodríguez Donate, M.C.; **Cáceres Hernández, J.J.**; **Guirao Pérez**, **G.** and **Cano Fernández**, **V.J.** (2009): “Individual profiles and wine consumption patterns in Tenerife. A Multinomial Logit Model”. Spanish Journal of Agricultural Research, 7(4): 759-769.

Rossini, G. (2009): “Importancia de los canales minoristas de compra de carne vacuna en Argentina a finales de los 90”. Revista de Investigación de la Facultad de Ciencias Agrarias, Nº XV.

Schupp, A.; Gillespie, J. and **Reed, D.** (1998): “Consumer choice among alternative red meats”. Journal of Food Distribution Research, Vol. 29, Issue 3, 35-43, November 1998.

Tomocico, G.; Ion, V.; Tudor, C.; Asãnicã, C.; Alécu, E. and **Alecu, I.I.** (2008): “The methodology for analysing the choice of various market channels by the Romanian fresh fruits and vegetables producers”. Lucräri Stiintifice U.S.A.M.V.B., Serie B, Vol. LI, 397-400.

Yue, C.; Grebitus, C.; Burhn, M. and **Jensen, H.H.** (2008): “Potato marketing-factors affecting organic and conventional potato consumption patterns”. 12th Congress of the European Association of Agricultural Economists (EAAE), Ghent-Belgium, August 2008.