



Consumers' assessment of labelled and packaged fresh potato: Evidence from Experimental Auctions

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Abstract

Worldwide, the potato is the third more important crop, coming after wheat and rice. In Argentina, it is the horticultural product with the highest consumption in fresh state, but Argentine consumers know little to nothing about potatoes attributes.

The objective of this research is to identify the attributes that influence the assessment that consumers make of a potato with differentiated quality. Due to this, a Vickrey Second Price Experimental Auction took place in April 2017. The experiment involved 155 participants, who were students and employees of the School of Economic and Social Sciences of the National University of Mar del Plata. A Multiple Correspondence Analysis was applied based on the data of the bids and the survey carried out at the Auction.

The main results showed that the participants, after receiving information about the culinary aptitude of the differentiated potato and its production method – its lower content of agrochemicals –, were willing to pay a higher price for the product. Additionally, participants opted for a higher price of potato when it was presented in a labelled package. Likewise, an identify group of participants were shown to be willing to pay more for this differentiated food.

Article info

Type:

Article

Submitted:

18/05/2020

Accepted:

25/11/2020

JEL codes:

D12, Q13

Key words:

Subak

Food produced
with less use
agrochemical
Attributes,
differentiated
quality
Experimental
Economics

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Introduction

The potato is an important source of carbohydrates, proteins, vitamins and minerals. In Argentina, it is the horticultural product with the highest consumption in fresh state; the average consumption reaching almost 60 kg/per capita/for year. This figure is above the normal consumption of many countries. Potato production is carried out in many regions of the country at different times of the year, therefore providing year-long supplies. As in other countries, fresh potato is commercialized particularly in the domestic market; a weak selling point is the lack of consumer knowledge regarding the qualities of this vegetable. Although the potato is a staple food, it is found in the diet of all socio-economic levels, in Argentina. Despite the widespread potato consumption, little is commonly known about its varieties and characteristics (Napolitano *et al.*, 2011; Cacace y Huarte, 1996). Consumers associate variety with skin colour, pulp texture, harvest care and origin (Lupín *et al.*, 2010). This misinformation promotes the availability of only one potato variety for fresh consumption (Spunta). This variety is the more popular among national producers due to its high-yielding ability, even though its quality is not the best.

The south-east region of the Buenos Aires province is an area of fertile lands with a mild climate and constitutes one of the main potato producing areas of Argentina. In this region, 30,000 ha of potatoes are produced. The production in this region is for fresh consumption and industrial processing. Potato production is highly dependant on imported inputs, and therefore it is characterized by high costs, relative to other crops. Low product price mean, that in some cases, costs are not covered in full (Huarte *et al.*, 2011). This situation creates the necessity to explore new productive alternatives, allowing for costs reduction and possible higher prices. New products can become feasible if it conforms to consumers demands, regarding quality information and safety controls (Rodríguez, 2018).

Rodríguez *et al.* (2015) carried out a survey based on 402 potato consumers who lived in various neighbourhoods of Mar del Plata city (Argentina) all of them belonging to different social-economic levels. This survey showed that the majority of consumers surveyed chose a potato with low agro-chemical content and good culinary aptitudes. These results promoted this investigation and raised the following research questions: would consumers pay a higher price for a low agro-chemical content potato? Would their decision be influenced by more or less information about the potato features? How does tagging and packaging affect the potato's value? Consumers' demographic and socio-economic characteristics influence choice?

The aim of this research is to identify the attributes that affect consumer assessment make of a potato with differentiated quality. Hypotheses proposed are:

H1) Information provided, packaging and labelling contribute to the price that consumers are willing to pay for a differentiated potato.

H2) People who are willing to pay an additional price for a differentiated potato have common characteristics in reference to quality perceptions and the information that they prioritize.

This research uses data from an Experimental Auction (EA). EA is a method of preference assessment, carried out in a laboratory environment, whose implementation has increased in recent years, mainly in studies on products related to the Agricultural Economy (Lusk & Shogren, 2007). But EA studies have not been carried out in Argentina. So, through this investigation we hope to achieve two aims: first, to make known to the public the aspects of an EA, but also to put forward to potato producers the qualities that consumers look for.

This article is organized in the following manner. Section 1 describes the conceptual framework on which this research is based. Section 2 details the materials and methods used, emphasizing the EA design. Section 3 presents results and Section 4, the discussion. Concluding remarks are provided in Section 5 and finally, limitations and future research are exposed in Section 6.

1. Theoretical framework

The conceptual back-up of this investigation is “Quality perceived - quality attributes”. Issanchou (1996), believes that product quality is found in the belief of just that. Bearing this in mind, the quality concept can be seen as relevant when studying consumer choice and preferences. Economic status is connected to personal preferences. Steenkamp (1990), pointed out that quality judgement in reference to food is based on perception, needs and objectives.

In order for consumers to evaluate product quality, information must be gotten by signs; these can be put into categories and integrated in such a way as to generate an expectation of purchase or not.

Following this line Caswell (2002) proposed an analysis breakdown involving 3 different dimensions:

1. Depending on whether they modify, alter or not the physical characteristics of the product: intrinsic attributes or extrinsic indicators and cues. Potato variety and its content of agrochemicals are intrinsic attributes. Instead, label and packaging are extrinsic indicators and signs.
2. According to the environmental information: search, experience and credibility. When the nature of the product quality information is searchable, the buyer can judge the quality of the product by evaluating it before purchase. On the other hand, if the nature of the information is from personal experience, the buyer has to use the product to assess its

quality. Finally, if the nature of the information is credibility, the buyer cannot judge the quality of the product even after purchase and use. In this case, the variety and content of agrochemicals can be classified as belief attributes but the label and packaging as search attributes.

3. According to the ranking that consumers have with respect to an attribute: vertical differentiation and horizontal differentiation. The first one occurs when consumers have the same ranking with respect to an attribute, while the second if consumers have different classifications. Agrochemical content is an example of vertical differentiation because consumers, in general, have a tendency to lean towards safe and innocuous food. For its part, variety, label and packaging are examples of horizontal differentiation because consumers' choices can vary according to their preferences.

In reference to the afore-mentioned, the Experimental Auction method allows us to perceive consumer evaluation by way of an integral analysis of the product in question and determine certain attributes.

2. Materials and Methods

An EA was developed, during the month of April 2017. EA is a method of preference assessment, carried out in a laboratory environment, whose implementation has increased in recent years, mainly in studies on products related to the Agricultural Economy (Lusk & Shogren, 2007). There are different types of EA-BDM, Random n^{th} price auction, Second Price- but particularly in this study, Vickrey Second Price EA was developed (Vickrey, 1961).

In Vickrey Second Price EA the utility expected by the participant is maximized when his bid is equal to the valuation he makes of the product. Bids are simultaneous and individual but should not be known by the rest of the participants. The one who issues the highest bid wins the auction but has to pay the second highest price to access the product. Among its main advantages, it is possible to mention that it has theoretical robustness, it is revealing of the demand and it is relatively easier to apply than other auctions. Its main disadvantage is that it does not work well for bidders that are located in the lowest tail of the supply distribution (their value is not close to the second highest price) (Alfnes, 2007; Lusk *et al.*, 2004; Shogren *et al.*, 2001).

EA was carried out selecting students and staff from the Economics and Social Sciences School at Universidad Nacional de Mar del Plata, in Mar del Plata, Argentina (Nalley *et al.*, 2004). The sample included 155 participants. A representative sample of FCEyS population was selected by gender and age (Zhang & Vickers, 2014; Martínez-Carrasco *et al.*, 2012). Additionally, it is

possible to indicate that participants reside in neighborhoods of Mar del Plata city with different socioeconomic levels (Restrepo-Bentancurt *et al.*, 2016).

Participant recruitment carried out at the University is a common practice implemented in similar studies. It allows us to save time and money (the experiment goes on at people's work or study place, therefore the participants cost are lower). Furthermore, methodology comprehension is easier (Nalley *et al.*, 2004; Kajale & Becker, 2014; Zhang & Vickers, 2014; Strzok & Huffman, 2015). This study group is certainly not representative of the general population in terms of demographics; this study does not set out to make productions about potato marketing for the entire city (Nalley *et al.*, 2006).

Volunteers were invited to participate in market study, not knowing what the methodology would be nor about the product to be evaluated (Lusk & Shogren, 2007). Nine groups were formed. The groups were called on different days and times with the objective of recruiting people from the three different faculty shifts. Multiple experimental auction groups maximize independent observations.

Another advantage of multiple auction groups is that it can reduce the risk of interrupting the experiment in case that one of the participants decides to leave during the experiment; in this case, it would be possible discard only the auction group affected by the participant's defection (Canavari *et al.*, 2019).

The EA was carried out in the month of April, according to potato produce in the south-east of Buenos Aires. The produce on auction were two fresh varieties of potato: Spunta and Frital INTA. Spunta was produced by the conventional way and Frital INTA, with a lesser use of agro-chemicals, for this particular study. It must be clarified that both varieties can be produced by either of the afore mentioned methods (conventional or reduced agro-chemicals). Six rounds were done in each group during the experiment, betting simultaneously on both varieties.

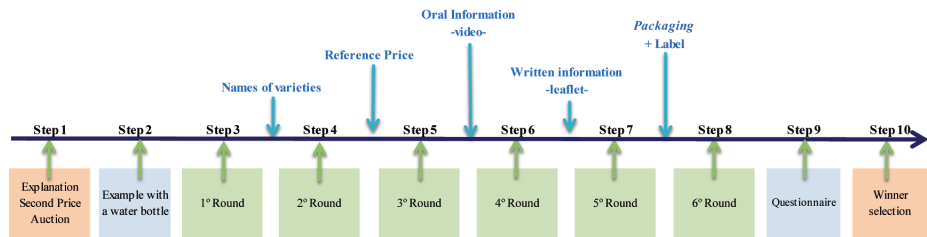
Protocol was set up with the guidelines for the moderator. This ensured replicating the call for participants and the development of the auction with each group (Fox *et al.*, 1995). At the beginning of each session, participants were identified with a letter to maintain anonymity (Depositario *et al.*, 2009). Then, the moderator explained the methodology and invited participants to go on a pilot round with a bottle of water. Next, 50 argentine pesos were given to each participant (50 argentine pesos were equivalent to 3.22 American dollars), a pen and cards to register their bids. The moderator highlighted the importance of betting the real price that they would pay for the auctioned product. Sessions are always moderated by the same person (the first author of this paper), accompanied by an assistant who registered the bids in a computer.

This experiment was carried out in a developing country. Canavari *et al.* (2019) said that these kind of countries possess particular characteristics, like bartering. This isn't the case of Argentina where bartering isn't common. But a characteristic that Argentina has as developing country is that has to work with a slim university budget; this do not allowed do the EA with computers in laboratories so bets were done with pens and cards.

Participants received different stimuli as the rounds progressed: presentation of both types of potatoes without identification of the varieties name – just named A and B – (Nalley *et al.*, 2004) and without packaging and labelling; reference price information – the average price of 1 Kg of Spunta because it is the variety more available at the local market – (Gil & Soler, 2006); information about Frital INTA properties, provided by a specialized INTA technician, using oral guides, video and leaflets (Gil y Soler, 2006); finally, Spunta was displayed as in previous rounds and Frital was presented with packaging and labelling.

One of the six rounds was randomly selected and the participant who had bet the highest price was identified. In order to take the product, this participant had to pay the second highest price bet on that round. After that, participants had to answer a survey consisting of two sections: the first one referred to potato consumption, and the second part related to demographic and socioeconomic characteristics (Vecchio *et al.*, 2016; Zhang & Vickers, 2014; Gil & Soler, 2006).

Figure 1 - Steps of Experimental Auction



Source: Author's calculation, Experimental Auction – April 2017 (Rodríguez *et al.*, 2018).

The data obtained was analysed using descriptive statistics and Multiple Correspondence Analysis (MCA) (Johnson & Wichern, 2007), by InfoStat[®] software (Balzarini *et al.*, 2017).

3. Results

Analysis of the prices bet in the Experimental Auction

Bids were higher for Frital INTA potato than for Spunta potato, showing a notable distance from each other after participants were informed about the reference' price. The highest average bid for Frital INTA coincides with the lowest average bid for Spunta (1.61 US\$/kg and \$ 0.77 US\$/kg respectively)¹, registered in the last round, after the presentation of the Frital INTA with packaging and labelling. It was also observed that as the rounds progress, the percentage of participants who bet more on Frital increased (from 58.71% in Round 1 to 96.77% in Round 6).

Furthermore, when comparing each round with Round 1, it is possible to indicate that the proportion of participants that increase their bids increases as rounds follow each other – from 38.71% Round 2 with respect to Round 1 to 74.84% Round 6 with respect to Round 1 – (Table 1). Hypothesis 1 is verified.

Table 1 - Proportion of participants who increase, decrease or maintain bids on Frital in view of the variation in information regarding Round 1 – total sample, 155 cases

Bid variation	Round 2 - Round 1	Round 3 - Round 1	Round 4 - Round 1	Round 5 - Round 1	Round 6 - Round 1
Increases	38.71%	40.00%	63.23%	65.16%	74.84%
It keeps	49.03%	21.94%	12.26%	10.32%	7.74%
Decreases	12.26%	38.06%	24.52%	24.52%	17.42%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

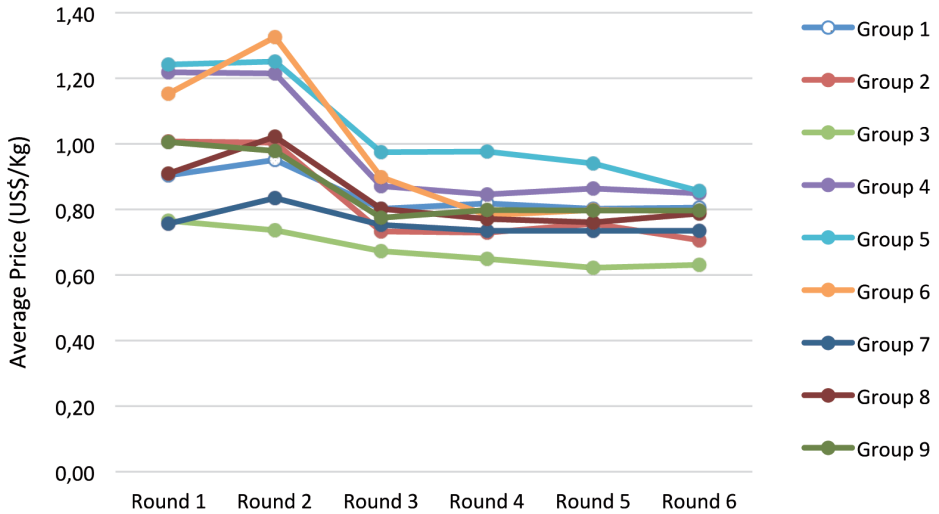
Source: Author's calculation (Experimental Auction – April 2017).

In reference to the variability of bids, it decreases as the participants receive information on the quality differentiating attributes, being higher for the Frital than for the Spunta.

Then, in Figure 2 and in Figure 3 it can be seen that, in all groups, there was a similar behavior with respect to the decrease that occurs in medium bids with reference to the Spunta variety; and the increase in the prices of the variety Frital INTA. This happened as the participants received information about Frital INTA variety. The adjustment in bids for both varieties in Round 3 is also noticeable, in which participants are notified about the reference price.

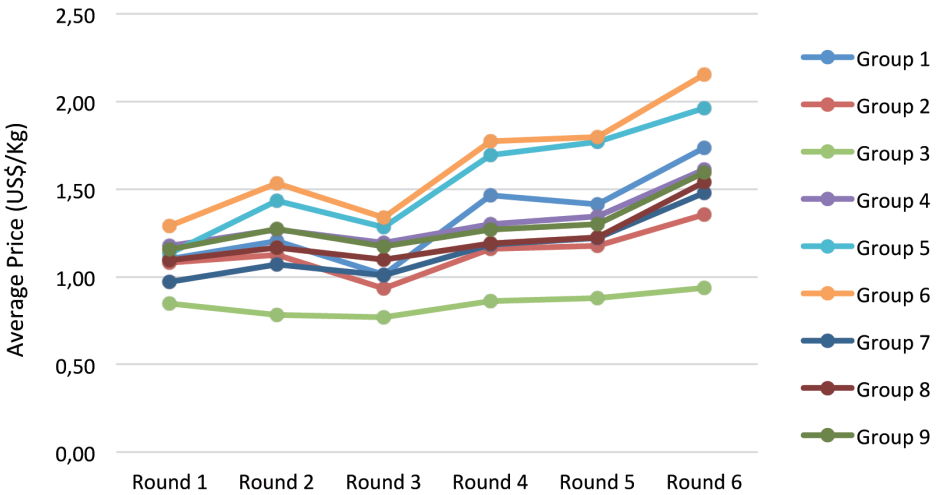
1. April 2017, nominal exchange rate between US\$ and Argentinean Peso was 1 to 15.50.

Figure 2 - Bidding evolutions in subsequent EA Rounds – Average Prices for Spunta variety – total sample, 155 cases



Source: Author’s calculation (Experimental Auction – April 2017).

Figure 3 - Bidding evolutions in subsequent EA Rounds – Average Prices for Frital INTA variety – total sample, 155 cases



Source: Author’s calculation (Experimental Auction – April 2017).

Analysis of participants' preferences

In order to explore the perceptions and choices of the participants, with the data provided by the EA and the survey, a MCA was applied using InfoStat® Software.

After analyzing various configurations that involve different variables, it was decided to select the most appropriate configuration according to the objectives of this investigation, the economic foundation and the statistical methodology applied. Therefore, Table 2 details the variables that make up this configuration:

Table 2 - Variables used in Multiple Correspondence Analysis

Variables	Definition	Categories
WTP	The participant is willing to pay more for a potato produced with lower agrochemical content.	1 = Yes 2 = Another case
SEX	Participant's sex.	1 = Female 2 = Male
PLAC	Participant prefers that a potato label contains a print that guarantees a lower content of agrochemicals.	1 = Yes 2 = Another case
LNC	Participant prefers that a potato label contains information about the nutritional content of the potato.	1 = Yes 2 = Another case
IIT	Participant prefers to be informed about the potato by means of internet and/or television.	1 = Yes 2 = Another case
VPLAC	Participant prefers to eat vegetables produced with lesser agrochemical content.	1 = Higher preference 2 = Another case
CONT	Participant considers that there must be an entity that controls the quality of the food and that it must be state-run.	1 = More agree 2 = Another case
BHD	Participant considers that eating potato is foremost in having a balanced and healthy diet.	1 = Higher importance 2 = Another case

Source: Author's calculation (Experimental Auction – April 2017).

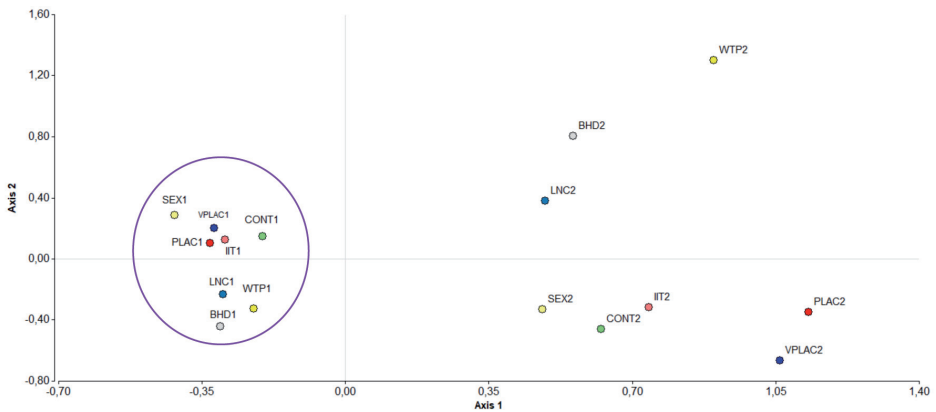
The survey that complements and completes the Auction includes questions that underline categorical variables. Such is the case of the variables SEX, PLAC, LNC and IIT. But, also questions that reflect numerical variables, such

as VPLAC, CONT and BHD. These variables arise from the statements that the participants had to rate according to their degree of satisfaction with a scale ranging from 1 – nothing – to 10 – totally agree –. In order to transform them into categorical variables, the category “1” was assigned to the grades between 8 and 10 points, category “2” to the rest.

Regarding the WTP variable, it was found, taking into consideration two issues. As described in similar EA, such is the case of Roosen *et al.* (1998), in the survey, participants were asked to indicate whether they were willing to pay more for a potato with a lower content of agrochemicals. For all those participants who answered “Yes”, it was verified if in Round 5 of the EA – after receiving oral and written information – they had opted more for the Frital INTA variety than for the Spunta variety. Then, category “1” of the WTP variable represents the desire to pay more and to have bet more on the variety of potatoes produced with less use of agrochemicals (Frital INTA).

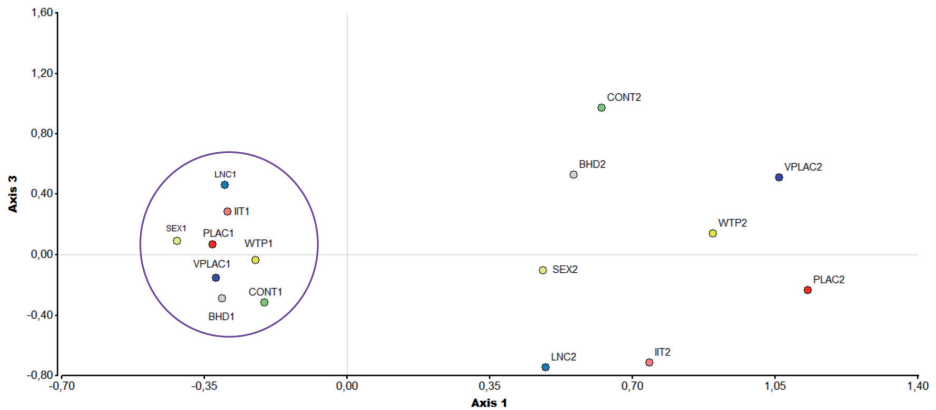
The corresponding biplots allow us to observe the separation of the participants who are willing to pay more for a potato produced with a lower content of agrochemicals (WTP1) than those who are not (WTP2)². The accumulated inertia in the first three axes was 51.64%.

Figure 4.1 - Participants' characterization – MCA –, axis 1 and axis 2



2. The WTP variable was constructed considering the desire to pay more (data that arises from the survey) and to have bet more on the INTA Frital potato variety produced with less use of agrochemicals (data that arises from the EA). Then, category 1 of the variable brings together both issues.

Figure 4.2 - Participants' characterization – MCA –, axis 1 and axis 3



An association pattern is distinguished between those who are willing to pay and the “female” sex (SEX1); the preference for a seal that guarantees the lowest content of agrochemicals (PLAC1) and information on nutritional composition (LNC1) on labels. A predilection was also seen regarding potato information gotten through the Internet and/or television (IIT1); the consumption of vegetables produced with less environmental impact (VPLAC1) and the opinion that there should be a state agency that controls the quality of food (CONT1); and that eating potatoes is relevant to following a balanced diet (BHD1). Hypothesis 2 is verified.

Eighty percent of the participants in the sample (124 cases) are willing to pay more for Frital INTA potato produced with a lower content of agrochemicals. Out of these 124 cases, 54.03% (67 cases) are women; 81.54% (101 cases) believe that potato labels must include a stamp that certifies the lowest content of agrochemicals and 65.32% (81 cases) information about their nutritional value. 72.58% (90 cases) choose the Internet and/or television as sources of information about the potato; 77.42% (96 cases) prefer vegetables produced with low environmental impact; 75.81% (94 cases) are in favor of the setting up of a state agency that controls the quality of food and 71.77% (89 cases) believe that potatoes are important for a balanced and healthy diet.

4. Discussion

This research paper addresses four research questions regarding the implementation of an Experimental Auction. Firstly, we obtained WTP

estimates on two varieties of potato and some basic information. We investigated further so as to see if additional product information influences the WTP, and if tagging and packaging could affect value. In addition to this socio-economic characteristics were analyzed, along with attitudes and purchase behavior.

Regarding our first question results showed that bids were higher for Frital INTA – produced with a low agrochemical use- than for Spunta variety – produced conventionally – from the beginning of the EA where the only information that consumers had was visual and tactile appreciation of the potatoes. There are many studies in which more than one product is compared, that is, researchers are usually interested in comparing bets for a conventional good with a similar good but that has at least one differentiated attribute (Lusk y Shogren, 2007; Martínez-Carrasco *et al.*, 2006; Thorne *et al.*, 2014; Nalley *et al.*, 2004).

Our second research question showed us that when additional product information was available, bids modified. In the third round of bidding, when price references were known, a considerable change was seen in bidding. This result goes along with our expectations because participants possessed a current market price of Spunta. A behavior similar to that found by Gil y Soler (2006). Other authors, instead of price information being made available during the auction, preferred to make it available before the beginning of the EA (Martínez-Carrasco *et al.*, 2012; Thorne *et al.*, 2014). Likewise, rounds four and five, where in participants receive oral and written information in the Frital INTA potato's method of production, bets varied significantly. Results showed a bid rise of 63.23% in Round 4 and a rise of 65.16% in Round 5, compared to Round 1. Similar results were shown by Martínez-Carrasco *et al.* (2012) in a tomato study in Spain. The way in which the EA had been designed, didn't allow us to determine the best way of communication. Gil and Soler (2006) carried out a a study on organic olive oil and came to the conclusion that oral information is more efficient than written. Other auctions offered positive, negative and both information to participants and analyzed the effect on every consumer (Lacy & Huffman 2016; Kajale y Becker, 2014; Colson, 2009).

Regarding our third research question, we think it is of the utmost importance that consumers know about the attributes of a differentiated product at the moment of purchase. Grunert (2011) believed that sustainability alongside other food qualities (for instance, less chemical content) had to be communicated to consumers, because it cannot be observed or tested by consumers. So, food stuffs produced in a more sustainable manner, should carry this information via labelling. In the final auction round INTA Frital potato was shown in a new packaging with the afore-mentioned labelling and bidding was seen to rise considerably compared to that of Spunta. Drichoutis

(2009) asked if consumers really gave much importance to labelling, keeping in mind the higher costs this brings to the companies. This particular paper does not estimate packaging and labelling costs but we do think it is necessary to do so, so as to inform producers of the viability of a value-added product. Lastly, Lacy y Huffman (2016) found from a study carried out in the USA that consumers will pay more when it comes to food safety. It was seen that a higher price was paid because safety is associated with information.

Our fourth question was answered, by way of a questionnaire participants completed during the auction. Information was sought about participants' socioeconomic situations, demographics and preferences at the moment of purchase. Nayga Jr. (1996) found that gender, age and education influenced the buyer's trust (with or without agro-chemicals) and that these factors must be kept in mind when implementing information programmes. Our study showed that women were more agreeable to paying a higher price, coinciding with Govindasamy e Italia (1997) y Buzby y Skees (1994). Neither age nor family size came into the question differing what found Loureiro & Hine (2001) y Villano *et al.* (2016). Coinciding with Lacy y Huffman (2016), our analysis didn't show an influence of education or income regarding WTP. Quite different to what was found by Boccaletti y Moro (2000) on studying WTP in foodstuffs in Italy. People that perceive their diets as a lifestyle are more concerned about finding out product information regarding nutrition and health characteristics on labelling, as an example, chemical free (Drichoutis *et al.*, 2006). The importance a consumer gives to certain quality attributes influences labelling, an important factor at the moment of purchase. It can't be doubted that people who follow a healthy diet and lifestyle, will look for nutrition information in the labelling (Nayga Jr., 2000). Similar results were found in that in our analysis, consumers who were willing to pay more were those who believed that potatoes are a valuable contribution to a healthy diet and that labelling must give information about product nutrition.

5. Concluding Remarks

Given to the present day trend of "new consumers", researchers on this topic find themselves constantly updating methodology regarding products perception and the willingness to pay for quality. This research betters the information available to everybody concerned in the agro-alimentation field and those responsible for promoting better political policies regarding production and food sales. The purpose of this investigation was to identify the main attributes that coincide with potatoes of various qualities. For that, a Vickrey Second Price EA was developed so as to analyze prices that participants would pay for the auctioned product. The experiment was

backed up with a questionnaire, therefore obtaining further information about the participants' potato knowledge, more their individual social-economic situations and buying habits. Lastly, on compiling all the above-mentioned data, a MCA was set up, which showed a particular group of participants who were willing to pay a superior price for differential potatoes.

The results obtained can be analyzed from three different perspectives:

A. Consumer's view. At the beginning of the auction, it was evident that participants could only evaluate the potato visually and by touch, and that bets placed for a differential potato were higher, in general, than those for a classic potato. Moreover, as the participants received more information, both verbally and by leaflets, information in reference to culinary aptitudes and production methods, values were seen to change.

The Frital INTA variety rose in price, whereas the Spunta dropped. This price difference between both varieties broadened even more during the last round of the auction in which Frital INTA was presented with a particular tagged packaging. So, it was shown that consumers preferred differential potato, for its variety and production, and its novelty packaging. H1 was proved.

Finally, the MCA carried out allowed the identification of a group of participants with common characteristics willing to pay an additional value for the differentiated potato. H3 was proved.

From the data collected from the participants survey, it can be seen that the potato is an important element in a healthy, balanced diet. More so it was noted the necessity of a government entity to control food quality. Participants also added that they prefer a label that indicates low agro-chemical use and nutritional content. It was noted that consumers value the intrinsic information found on the potato label. This coincides with a higher price being paid for the Frital variety, packaged and labelled, at the EA.

B. Production perspectives. This analysis gives producers information on what consumers value when buying. Even though it is expected that producers will not make any changes regarding production methods or varieties produced in the near future, the possibility of access to participants views in this investigation may promote change in the following campaigns.

Regarding potato variety, it would be apt for producers to gradually incorporate other potato varieties; alternatives to Spunta. In this way, producers could offer a wider range of potato with diverse culinary characteristics. Also, it is evident that consumers like to be informed about the produce; producers must label the potato grown in an eco-friendly environment, so that at the moment of purchase consumers know what they are buying.

C. Academic views. The contribution made by this research focuses on the implementation of the EA for the collection of primary data. Although over

the last years this method has been applied internationally for food study, Argentina presents little or no evidence of such a method. This experimental method allows us to try some theories out regarding auctioning as a way to monitor participants behaviour regarding payment for a differential foodstuff.

6. Limitations and future research

Finally, we find it necessary to comment on the limitations of this investigation, for future possible studies.

The results cannot be extended to the population residing in the City of Mar del Plata, because the sample is representative of the Economics and Social Sciences School at Universidad Nacional de Mar del Plata instead of the city. Consequently, the study should be replicated with a representative sample at the local level. Also, the study should increase the number of cases. In this way, results could be specified by estimating econometric models.

Nonetheless, EA design implemented prevents determining if the bids made by participants in each round, contemplate only the stimulus received in that round or they reflect the accumulation of stimuli received in the previous rounds. The previous idea impeded the individual assessment of the attributes of potatoes in question. This could be corrected with an experiment that combines different treatments to be applied in different groups – for example, a group that do not receive information (*status quo*) vs. others that receive various stimuli –. Likewise, it would be convenient to test the experience with other potato varieties produced in the Southeast of Buenos Aires province (for example, Innovator, Kennebec, Daisy) or with a single variety but produced in a conventional way and with a lower content of agrochemicals or organic.

Also, it would be ideally convenient to calculate the cost of potatoes marketing with packaging and labelling in order to know the additional necessary price that the producer would have to obtain for a differentiated potato, and compare it with the consumers' willingness to pay.

However, the contribution made focuses on the implementation of the EA for the collection of primary data since, in Argentina, there is little evidence of the application of this method. In addition, the results indicate the relevance of making consumers aware of the attributes of a differentiated potato and identifying it correctly with a label that allows it to be distinguished. This being a guide for those Sector agents interested in improving product quality and reorienting their strategies for commercialization.

References

- Alfnes, F. (2007). Willingness to pay versus expected consumption value in Vickrey Auctions for new experience goods. *American Journal of Agricultural Economics*, 89(4), 921-931, doi: 10.1111/j.1467-8276.2007.01028.x.
- Balzarini, M.G., González, L., Tablada, M., Casanoves, F., Di Rienzo, J.A. & Robledo, C.W. (2017). *Manual del Usuario InfoStat*. Córdoba-Argentina: Brujas.
- Boccaletti, S. & Moro, M. (2000). Consumer willingness to pay for gm food products in Italy. *AgBioForum.*, 3(4), 259-267.
- Buzby, J.C. & Skees, J.R. 1994. Consumers Want reduced Exposure to Pesticides on Food. *Food Review*, 17(2), 19-26.
- Cacace, J.M. & Huarte, M. (1996). *Descubriendo la papa*. Balcarce-Argentina: Fundación ArgenInta, INTA.
- Canavari, M., Drichoutis, A.C., Lusk, J.L. & Nayga Jr., R.M. (2019). How to run an experimental auction: a review of recent advances. *European Review of Agricultural Economics*, 1-61, doi: 10.1093/erae/jbz038.
- Caswell, J.A. (2000). Analyzing quality and quality assurance (including labeling) for GMOs. *AgBioForum*, 3(4), 225-230. -- <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.876.965&rep=rep1&type=pdf>.
- Colson, G. (2009). *Improving nutrient content through genetic modification: evidence from experimental auctions on consumer acceptance and willingness to pay for intragenic foods*. Tesis Doctor of Philosophy. Iowa State University, Ames, Iowa, 168p.
- Depositario, D.P., Nayga, R.M. Jr., Wu, X. & Laude, T.P. (2009). Should students be used as subjects in experimental auctions?. *Economics Letters*, 102, 122-124, doi: 10.1016/j.econlet.2008.11.018.
- Drichoutis, A.C., Lazaridis, P. & Nayga, R.M. (Jr.) (2006). Consumers' use of nutritional labels: A review of research studies and issues. *Academy of Marketing Science Review*, 9, 93-118.
- Drichoutis, A.C., Lazaridis, P. & Nayga, R.M. (Jr.) (2009). On consumers's valuation of nutrition information. *Bulletin of Economic Research*, 61(3), 223-247.
- Fox, J.A., Shogren, J.F., Hayes, D.J. & Kliebnstei, J.B. (1995). Experimental Auctions to measure willingness to pay for food safety. In: Caswel, J.A., *Valuing Food Safety and Nutrition*. Boulder, Colorado: Westview Press.
- Gil, J.M. & Soler, F. (2006). Knowledge and willingness to pay for organic food in Spain: evidence from Experimental Auctions. *Food Economics - Acta Agriculturae Scandinavica*, Section C, 3(3-4), 109-124, doi: 10.1080/16507540601127656.
- Govindasamy, R. & Italia, J. (1997). *Consumer response to integrated pest management and organic agriculture: an econometric analysis*. State University of New Jersey - Rutgers Working Paper. P Series 36727.
- Grunert, K.G. (2011). Sustainability in the food sector: a consumer behaviour perspective. *International Journal Food System Dynamics*, 2(3), 207-218, doi: 10.18461/ijfsd.v2i3.232.
- Huarte, M., Huarte D., Lucca, F., Carmona, D., Mairosser, A. & Viglianchino, L. (2011). *Protocolo para la producción integrada de papa consumo en el sudeste de la Provincia de Buenos Aires*. Balcarce-Argentina: EEA-INTA.

- Issanchou, S. (1996). Consumer expectations and perceptions of meat and meat products quality. *Meat Science*, 43(S), 5-19, doi: 10.1016/0309-1740(96)00051-4.
- Johnson, R.A. & Wichern, D.W. (2007). *Applied Multivariate Statistical Analysis*. USA: Prentice-Hall.
- Kajale, D.B. & Becker, T.C. (2014). Effects of information in young consumers' willingness to pay for genetically modified food: Experimental Auction Analysis. *Ecology of Food and Nutrition*, 53, 292-311, doi: 10.1080/03670244.2013.824433.
- Lacy, K. & Huffman, W.E. (2016). Consumer demand for potato products and willingness-to-pay for low-acrylamide, sulfite-free fresh potatoes and dices: evidence from lab auctions. *Journal of Agricultural and Resource Economics*, 41(1), 116-137, doi: 10.1007/s12230-017-9577-1.
- Loureiro, M.L. & Hine, S. (2001). *Discovering niche markets: a comparison of consumer willingness to pay for a local (Colorado-grown), organic, and GMO-free product*. American Agricultural Economics Association Meetings, 24p.
- Lupín, B., Rodríguez, E.M.M. & Lacaze, V. (2010). *Aspectos valorados en el consumo de un alimento funcional: El potencial de la papa fresca obtenida bajo el sistema de producción integrada*. 41º Reunión Anual de la Asociación Argentina de Economía Agraria, Argentina, october 2010.
- Lusk, J.L., Feldkamp, T. & Schroeder, T.C. (2004). Experimental Auction Procedure: impact on valuation of quality differentiated goods. *American Journal Agricultural Economics*, 86(2), 389-405, doi: 10.1111/j.0092-5853.2004.00586.x.
- Lusk, J.L. & Shogren, J.F. (2007). *Experimental Auctions. methods and applications in economic and marketing research*. UK: Cambridge University Press.
- Martinez-Carrasco Martinez, L., Vidal, F., Poole, N. (2006). Evaluación de preferencias hacia las mandarinas en el mercado británico. Aplicación de las Subastas Vickrey. *Economía Agraria y Recursos Naturales*, 6(11), 157-175, doi: 10.22004/ag.econ.8004.
- Martinez-Carrasco Martinez, L., Brugarolas Molla Bauza, M., Martinez Poveda, A., Espinosa Ferrer, D. & Fresquet, E. (2012). Disposición a pagar por tomates mejorados genéticamente. Aplicación de una subasta experimental. *Revista Española de Estudios Agrosociales y Pesqueros*, 233, 101-128.
- Nalley, L., Hudson, D. & Parkhurst, G. (2004). *The impacts of taste, location of origin, and health information on market demand for sweet potatoes*. Department of Agricultural Economics-Mississippi State University. Research Report 2004-001.
- Nalley, L., Hudson, D. & Parkhurst, G. (2006). Consistency of Consumer Valuation Under Different Information Sets: An Experimental Auction with Sweet Potatoes. *Journal of Food Distribution Research*, 37(3), 1-12.
- 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.
- Nayga Jr., R.M. (2000). Nutrition knowledge, gender, and food label use. *The Journal of Consumer Affairs*, 34(1), 97-112.
- Napolitano, G., Senesi, S., Dulce, E., Inchausti, M. & Tagliacozzo, R. (2011). *Estudio de calidad y competitividad del agronegocio de la papa*. Informe Final.

- Alimentos Argentinos, Ministerio de Agroindustria-Presidencia de la Nación. -- http://www.alimentosargentinos.gob.ar/contenido/procal/estudios/06_AgrNegPapa/AgronegocioPapa_2011_Dic.pdf.
- Restrepo-Betancurt, L.F., Rodríguez-Espinosa, H. & Valencia, D. (2016). Caracterización del consumo de pescado y mariscos en población universitaria de la ciudad de Medellín-Colombia. *Rev. Universidad y Salud*, 18(2), 257-265. doi: 10.22267/rus.161802.36.
- Rodríguez, E.M.M., Lupín, B. & González, J. (2015). *Willingness to pay for a differentiated potato applying a choice modelling experiment by socioeconomic levels of Argentinean consumers*. 29 International Conference of Agricultural Economists, Milan [ITA], August 8-14, 2015. -- <http://nulan.mdp.edu.ar/2301/>.
- Rodríguez, J. (2018). *Valoración de los atributos de una papa diferenciada: aplicación del Método Subasta Experimental* (Master's Thesis). FCA-UNMDP, Mar del Plata-Argentina.
- Rodríguez, J., Rodríguez, E.M. & Lupín, B. (2018). *A Consumers' valuation of Frital INTA: An empirical Research that applies the Experimental Auction Method*. 10th World Potato Congress-XXVIII Congreso de la Asociación Latinoamericana de la Papa (ALAP 2018). Cuzco-Perú. -- <http://nulan.mdp.edu.ar/2904/1/rodriguez-et-al-2018.pdf>.
- Roosen, J., Fox, J.A., Hennessy, D.A. & Schreiber, A. (1998). Consumers' valuation of insecticide use restrictions: an application to apples. *Journal of Agricultural and Resource Economics*, 23(2), 367-384.
- Shogren, J.F., Margolias, M., Koo, C. & List, J.A. (2001). A Random nth-Price Auction. *Journal of Economic Behavior & Organization*, 46, 409-421, doi: 10.1016/s0167-2681(01)00165-2.
- Steenkamp, J.B. (1990). Conceptual model of the quality perception process. *Journal of Business Research*, 21(4), 309-333.
- Strzok, J.L. & Huffman, W. E. (2015). Willingness to Pay for Organic Food Products and Organic Purity: Experimental Evidence. *AgBioForum*, 18(3), 345-353, doi: 10.31274/etd-180810-1292.
- Thorne, F., Loughran, D., Fox, S., Mullins, E. & Wallace, M. (2014). *Consumer willingness to pay for genetically modified potatoes in Ireland: an experimental auction approach*. 88th Annual Conference of the Agricultural Economics Society, AgroParisTech, Paris, France. Abril 2014. En CD.
- Vecchio, R., Van Loo, E.J. & Annunziata, A. (2016). Consumers' willingness to pay for conventional, organic and functional yogurt: evidence from Experimental Auctions. *International Journal of Consumer Studies*, 40, 368-378, doi: 10.1111/ijcs.12264.
- Vickrey, W. (1961). Counter speculation, auctions, and competitive sealed tenders. *Journal of Finance*, 16(1), 8-37, doi: 10.1111/j.1540-6261.1961.tb02789.x.
- Villano, R., Chang, H., Kewa, J. & Irving, D. 2016. Factors affecting consumers' willingness to pay for good quality sweetpotato in Papúa New Guinea. *Australasian Agribusiness Review*, 24(3).
- Zhang, K.M. & Vickers, Z. (2014). The order of tasting and information presentation in an experimental auction matters. *Journal of Food Quality and Preference*, 36, 12-19, doi: 10.1016/j.foodqual.2014.02.008.

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