

The development of Short Food Supply Chain for locally produced Honey: Understanding consumers' opinions and willingness to pay in Argentina

Kallas Z.¹; Alba M.F.¹; Casellas K.²; Berges M.³; De Greef G.⁴; Gil, J.M.¹

¹ Center for Agro-food Economy and Development (CREDA-UPC-IRTA), Castelldefels, Barcelona, Spain. zein.kallas@upc.edu; martin.federico@upc.edu, chema.gil@upc.edu

² Instituto de Economía – Instituto Nacional de Tecnología Agropecuaria. Buenos Aires, Argentina; casellas.karina@inta.gob.ar

³ Facultad de Ciencias Económicas y Sociales –Universidad Nacional de Mar del Plata; Mar del Plata, Argentina; vicedecano@eco.mdp.edu.ar

⁴ Centro de Investigación de Agroindustria-Instituto Nacional de Tecnología Agropecuaria. Hurlingham, Argentina; degreef.gustavo@inta.gob.ar

Abstract

Background

The development of the Short Food Supply Chain (SFSC) is one of the issues of the current agri-food systems. Consumers are reconnecting the food they eat with the farming process and are increasingly asking for fresh, seasonal and traceable food products from known producer source. In this study, we analysed consumers' opinions towards the SFSC and Willingness to Pay (WTP) for local honeys in Mar del Plata, Argentina before and after a hedonic evaluation test.

Design

In an incentive compatible approach, using real purchasing scenarios, two Non-Hypothetical Discrete Choice Experiments (NH-DCE) were applied, accounting for the impact of the SFSC understanding and hedonic evaluation on consumers' WTP.

Finding

Results showed that consumers' WTP a premium for local honey products is conditioned to specific quality cues and the global sensory acceptance. Consumers with high level of agreement with the social and environmental roles of the SFSC were more quality demanding and exhibited higher WTP towards the locally produced honeys.

The development of local market by re-connecting producers and consumers, allowing for in-site tasting, has a strong implication for the structure of the honey added-value chain due to the potential role that may play in satisfying consumers' preference and needs.

Originality

We measured consumers' opinions towards the Short Food Supply Chain (SFSC) and analyse their impact on consumer willingness to pay for honey product by including real purchasing scenarios and hedonic evaluation test, to reduce the hypothetical bias of the traditional surveys. Questionnaires were completed in a controlled laboratory environment for with real product and real money.

Keywords: Short Food Supply Chains; Local Honey; Willingness to Pay; Non-Hypothetical Discrete Choice Experiment; Hedonic Evaluation; Argentina.

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Highlights

- Consumers' opinion and WTP towards Short Food Supply Chain of honey was assessed
- Non-hypothetical Discrete Choice experiment and hedonic evaluation were carried out
- The Consumers' WTP a premium for local honey is conditioned to other quality cues
- Consumers' hedonic evaluation played a major role than opinions in affecting the WTP
- The need in Argentina to develop local markets for small-scale produced honeys

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1. Introduction

Understanding consumers' preferences for agri-food products is a complex and multidimensional analysis. It is related to the analysis of the extrinsic (brand, price, origin, claims...), intrinsic (fat content, ingredient, flavours...) and credence or ethical (animal welfare, carbon footprint...) quality cues. However, the origin cue remains one of the important drivers of food choice (Thøgersen *et al.*, 2017) playing three potential role; a) It can be a preference indicator of the products proximity from the production to consumption place (Feldmann and Hamm, 2015; Ridley *et al.*, 2015), b) It can be a proxy of the perceived quality of the product, specifically for those associated with certain geographical areas (Van der Lans *et al.*, 2001) or c) a descriptor of consumers' ethnocentrism, particularly when related to the national, cultural and local history (Bryła, 2015).

Food origin and consumption pattern are tightly related to the development of the Short Food Supply Chain (SFSC) which become one of the main issues of the current agri-food systems (Guptill and Wilkins, 2002) and one of the widely explored topic (Marsden *et al.*, 2000; Renting *et al.*, 2003). The SFSCs are legal instrument of a sustainable agriculture and rural development policy through the reduction of transport cost, the mitigation of carbon footprint, the implementation of periurban agriculture (Aubry and Kebir, 2013) and the promotion of local food products (Canfora, 2016). These alternative and adaptive marketing strategies and channels contribute to the promotion of fresher products at markets place with optimum level of natural ripening and thus, with an improved organoleptic experience associated to a higher perceived sensory quality (Giampietri *et al.*, 2015). The SFSCs are based on a direct relationship between producers and consumers including a reduced number of commercial agents and intermediaries. They may involve activities where farmers sell off-farm their products in the neighbouring farmers' markets, shops owned by farmers, food festivals and fairs or through one single trade intermediary such in cooperative shops, specialist shops and supermarkets (Kneafsey *et al.*, 2013), highlighting the sustainability dimension of the locally produced products (Schäufele and Hamm, 2017) . They may also ensure fair profit margins and higher prices for farmers (Balogh *et al.*, 2016; Berti and Mulligan, 2016) and improved quality products for consumers (D'amico *et al.*, 2014).

The SFSC involves “*face-to face*” interactions between producers and consumers and sharing information about the products attributes, origin and process (Renting *et al.*, 2003; De-Magistris *et al.*, 2014, Giampietri *et al.*, 2015). This interaction includes “*spatially proximates*” where the product is produced and sold in the same region as local (Sims, 2009;

Hu *et al.*, 2012) or “*partially extended*” where the product can be directly sold to consumers but outside the local region. In these cases, the SFSC require that the distribution circuit implies the presence as a maximum of a single intermediary (Kneafsey *et al.*, 2013; Craviotti *et al.*, 2015). The SFSCs have economic, environmental, social, food quality and ethical dimensions that may impact the consumption patterns, consumers’ preferences and food production. In this context, it is relevant to analyse the driven-definition and understanding of what the SFSC means to consumers and to update knowledge regarding the importance of these adaptive commercial channels as determinant factor when purchasing food products. Furthermore, it is also important to assess how the consumers’ hedonic evaluation (i.e sensory experience) is related to their willingness to pay (WTP) towards the SFSC. The honey product in Mar de Plata (Argentina) was taken as a case study.

In this context, several studies have analysed the consumers’ preferences toward honey products. Cosmina *et al.* (2016) analysed, using the choice experiment, the Italian consumers’ preference toward honey. They identified the origin, the price, the organic production, the landscape, the level of crystallization as the main driving factors to purchase honey. Wu *et al.* (2014) analysed consumers’ choice for honey using the experimental auction and focusing on the local attribute. Yeow *et al.* (2013) analysed the consumers’ purchase intention and verified that the price, the brand, the health claims are relevant determinant factor to consume honey. Roman *et al.* (2013) studied the factors influencing consumer behaviour relating to the purchase of honey. They highlight the importance of the honey type and flower variety, price and convenience packaging. Sanzo *et al.* (2001) showed the importance of the perceived quality associated to commercial brands in determining the honey choice. Literature showed that consumers are not willing to compromise the sensory cues by other credence attributes such as health claims (Realini *et al.*, 2014) or ethical cues such as animal welfare (Kallas *et al.*, 2016). Therefore, it is worthy to understand how consumers’ opinion towards the SFSC is related to their WTP for local attribute and how the hedonic evaluation may impact the preference pattern.

The main objective of this paper is to analyse the WTP for local honey products obtained from SFSC and to analyse how the hedonic evaluation for such a product play a relevant role in the identification of the final preferences. We also seek to assess consumers’ opinion towards the SFCS and how these opinions contribute to the formation of final consumers’ preferences. We followed a methodological approach that jointly estimates the consumers’ WTP with the hedonic evaluation. Two Non-Hypothetical Discrete Choice Experiment (NH-DCE) before and after a hedonic evaluation test, were used. In Hybrid-Random Parameters Logit (RPL) models, the consumers’ opinions towards the SFSC were

introduced into the utility function to shed light on how preferences are affected by opinions towards local attribute.

2. Material and Method

2.1. Consumers' panel

Data was collected on a sample of 210 consumers selected from Mar de Plata (MDP) in Argentina. Participants were consumers over 18 years of age who regularly purchase honey and having purchased and consumed honey at least one time in the last three months. Data were obtained from face to face questionnaires completed in a controlled environment in sensory laboratory. A quota sampling procedure was used to guarantee a representative sample in terms of gender and age. It is worth mentioning that women (70.8%) were overrepresented than men (29.2%) as they are more frequently responsible for food shopping. Consumers were recruited and economically compensated with \$100¹ to participate in an experiment that lasts about one hour. The experiment was approved by the ethical committee of the involved institutions (*Instituto Nacional de Tecnología Agropecuaria, Facultad de Ciencias Económicas y Sociales –Universidad Nacional de Mar del Plata and Centro de Investigación de Agroindustria-Instituto Nacional de Tecnología Agropecuaria*) in accordance to the ethical norms for using human subjects and protecting personal information according to Declaration of Helsinki. Before conducting the experiment, the participants signed a consent form and received an explanation of the experiment which was read to them aloud and projected using power point. Table 1 summarize the main socio-demographic variables of the sample components.

2.2. Experiment performance

Our research relied on an adapted form of the expectancy-disconfirmation model (Oliver, 1980) in which consumers' preferences and hedonic evaluation are jointly estimated (Guerrero *et al.*, 2012). The experiment was carried out in five main steps:

- i. First, a short questionnaire collected consumers' consumption behaviour towards honey and their opinions towards the SFSC. The socioeconomic variables were also obtained.
- ii. Second, participants were asked to participate in a non-hypothetical purchasing scenario (NH-DCE) to purchase their preferred honey product.
- iii. Third, a hedonic evaluation test was carried out. Participants tasted six honeys were the same products posted on the purchase situation in the second step.

¹ \$= Argentine Pesos (ARS); 100\$ (ARS)=6,24USD

- iv. Fourth, consumers were informed about which type of honey they tasted. Then, the same purchase exercise (NH-DCE) was repeated. Consumers were explicitly asked to take into consideration their liking experience.
- v. Fifth, a real purchasing scenario was created to exchange real product and real money. Consumers who accepted to participate were forced to purchase their preferred product from a randomly selected choice set from steps two or four.

2.3. Consumers' Opinions towards the Short Food Supply Chain

Consumers' opinions towards the SFSC were assessed by asking participants to evaluate their agreement levels with different statements extracted and adapted from literature regarding the SFSC in a 9-points Likert type scale that ranges from "disagree very strongly", to "agree very strongly". Following the potential role of the SFSC and their impact on the economic, environmental, social and food quality, we identified the following statements:

- 1) The Short Food Supply Chains assures me that I'll purchase a fresh product (Roininen *et al.*, 2006; Mundler and Laughrea, 2016; Augère-Granier 2016).
- 2) The Short Food Supply Chains assures me that I'll purchase a quality product (Roininen *et al.*, 2006; Galli *et al.*, 2015).
- 3) The Short Food Supply Chains assures me the traceability of the product (Mai *et al.* 2010; Roth *et al.*, 2008, Augère-Granier 2016; Giampietri *et al.*, 2016).
- 4) The Short Food Supply Chains assures me that I'll pay a fair price (Santini *et al.*, 2013; Migliore *et al.*, 2015, De Fazio *et al.*, 2016).
- 5) The Short Food Supply Chains assures me that it is beneficial for the environment (Giampietri *et al.*, 2015; Giampietri *et al.*, 2016; Migliore *et al.*, 2015, De Fazio *et al.*, 2016; Mundler and Laughrea, 2016).
- 6) The Short Food Supply Chains assures me that I'll contribute to the development of the territory and the local economy (Roininen *et al.*, 2006; Giampietri *et al.*, 2015; Migliore *et al.*, 2015; Giampietri *et al.*, 2016; De Fazio *et al.*, 2016; Mundler and Laughrea, 2016).

Consumers' opinions towards the SFSC were estimated by creating an indicator that sums the statements' scores after carrying out an Exploratory (EFA) and Confirmatory Factorial Analysis (CFA).

2.4. The hedonic test

Consumers' acceptance was measured by evaluating their liking in blind conditions using a 9-points hedonic scale from "I extremely dislike" to "I extremely like". Consumers evaluated the colour, consistency, the odour, the flavour and the global acceptance in the

same line of the evaluation of honey sensory studies (Arrabal and Ciappini, 2000; Piana *et al.*, 2004). The honey samples were prepared in an approximate amount of 5 g and placed in transparent plastic cups of 110 cm³ capacity. Consumers were also provided with a white plastic spoon. They were also told to drink water between each tasting. The hedonic evaluation was carried out in a laboratory with individual tasting booths. The hedonic evaluation was carried out on three consecutive days. Ten sensory sessions were conducted with approximately 20-22 consumers per session.

2.5. The Non-Hypothetical Discrete Choice Experiments

2.5.1. The design of the purchase situations

Several researches identified the main quality attributes of honey products. Some cues are not related to nutritional value nor microbiological or chemical contamination, but only to consumer preferences (Gallez, 2006). These preferences pattern are tightly related to the colour where there are markets that only prefer very clear honey with soft aromas, while others prefer dark one (amber) with aromatic and more intense flavour. Within the normal ranges for honey, colour and consistency are the main quality criteria that are not covered by food regulation as such, but have great commercial importance (Gallez, 2006). Murphy *et al.* (2000) identified texture, colour, origin, price and packaging as the most important attributes that differentiate the honey products at market place (Sanzo *et al.*, 2001; Ványi *et al.*, 2011; Arango and Restrepo, 2013; Roman *et al.*, 2013). Tacking into account the interest of our study, we selected the following attributes and levels: Origin (Local that is directly obtained from farmers in Mar de Plata, other origin), consistency (liquid and solid), colour (light and dark) and price for 500 grams/Jar which is the most habitual format (\$35, \$40, \$45, \$50, \$55, \$60).

In the design of the purchase situations, we ensured that all the honey products to be included in the purchasing scenarios are realistic and can be produced in the studied region, since they should be offered to consumers in the last step of the experiment. Thus, one restriction was included because the local level of the origin attribute (i.e. directly from farmers in Mar del Plata) cannot be jointly available with the dark level of the colour attribute, because such combination is not available at market level since all honeys from Mar de Plata are light honeys. From all possible combinations (excluding the price attribute), only six possible honey products are available for the created shopping scenario at the end of the experiment in the laboratory conditions. Table 2 shows the six products identified.

Accounting for the abovementioned restriction, six choice sets were obtained by means of a D-efficient scenario-specific product design using Ngene software (Choice Metrics,

2016) in the same line of the design proposed in Lusk and Schroeder (2004) and Malone and Lusk (2017). Accordingly, all choice sets contained the same six products with only varying the price attribute and the “do not purchase any” (i.e. none of them) alternative. The final design used in the Non-Hypothetical Discrete Choice Experiments is presented in Table 3.

2.5.2. Theoretical and modelling approaches of the Discrete Choice Experiment

The DCE aims to identify the individual’s indirect utility function associated with a product when making a choice decision. Several products with varying attributes’ levels are presented to respondents in an array of choice sets. The respondent is asked to select his preferred product and thus revealing his preference for certain characteristic. Subsequently, the willingness to pay for the products and its attributes can be indirectly estimated. We used a non-hypothetical approach to ensure the “incentive compatibility” of the experiment (Harrison, 2007, Loomis, 2014) similarly to the research carried out in Olesen *et al.* (2010). It induces respondents to be committed with their answers by creating real and tangible consequence of their actions by asking respondents to purchase the product they selected and to pay its posted price such as a real market place (Kallas *et al.*, 2016).

The DCE rely on Lancaster’s Theory of Value and the Random Utility Theory. The probability that an individual n chooses a product i rather than the product j within choice sets t can be identified by the multinomial logit, MNL (McFadden, 1974). However, this model imposes homogeneity in preferences. Thus, the Random Parameter logit model (RPL) was introduced to cope with this restriction. The RPL extend the MNL by allowing random coefficients on attributes, where the utility to person n from choosing alternative j in choice set t is given by:

$$U_{njt} = (\beta_j + \eta_n)x_{njt} + \varepsilon_{njt} \quad n = 1, \dots, N \quad j = 1, \dots, J \quad t = 1, \dots, T \quad (1)$$

where U_{jn} is the utility of alternative j to subject n , x_{njt} represents the observed attributes of product j , β is a vector of mean attribute utilities (utility weights), η_n is the vector of person n specific deviations from the mean value of the β and ε_{jn} is the random term. In this study, we used the RPL model specification and considered the honey products as generic labelled products. Thus, the utility of each honey product itself is a function of an Alternative Specific Constant (ASC) and its price (Lusk and Schroeder, 2004):

$$U_{njt} = \beta_j + \eta_n + \alpha_j P_{ij} + \varepsilon_{njt} \quad n = 1, \dots, N \quad j = 1, \dots, J \quad t = 1, \dots, T \quad (3)$$

Where j represents the six honey products identified in each choice set, P_{ij} is the price of product j for consumers n , β_j are coefficients representing the Alternative Specific

Constants for each of honey alternatives and α_j are the coefficients representing the effect of the j th honey price on the utility of the j th honey product.

The Hybrid-RPL model was estimated by including the SFSC indicator variable into the utility function in similar way to the specification done in Kallas *et al.*, (2012) using two dummy variables to estimate both the preferences for consumers with high and low agreement level towards the role of the SFSC (i.e. high and low value of the indicator).

The willingness to pay (WTP) for a honey alternative j is calculated as the negative ratio of the ASC coefficient to the price coefficient (Lusk and Schroeder, 2004). The confidence interval of the WTP are estimated using the Krinsky and Robb procedure. The marginal WTP of any honey product j versus any other honey product i is simply obtained by subtracting both WTP values (Lusk and Schroeder, 2004). We used the NLOGIT 6.0 software and 1000 random draw to estimate the coefficients², the WTP and their confidence intervals. The coefficients obtained from the RPL before and after the hedonic evaluation test cannot be directly compared because of the specific scale parameter (Swait and Louviere, 1993) that belongs to each data set (i.e. obtained from each choice experiment condition). Therefore, only the WTP can be compared because the scale parameter is cancelled out. To test for the significance of the WTP differences, we used the 1,000 marginal WTP from the Krinsky and Robb procedure to perform the combinatorial test suggested by Poe *et al.* (2005).

3. Results and discussions

To better understand the relevance of consumers' opinions for the SFSC and liking experience on the WTP for local honey, we first report the results of consumers' understanding of the SFSC and the hedonic evaluation test.

3.1. Consumers' Opinions towards Short Food Supply Chain

Results are presented in Figure 1. The items were abbreviated (in bold) for a comprehensive representation.

1. The Short Food Supply Chains assures me that I'll purchase a **fresh product**.
2. The Short Food Supply Chains assures me that I'll purchase a **quality product**,
3. The Short Food Supply Chains assures me the **traceability** of the product,
4. The Short Food Supply Chains assures me that I'll pay a **fair price**,
5. The Short Food Supply Chains assures me that it is beneficial for the **environment**

² The execution time was about 4 hours for each RPL model before and after the hedonic evaluation.

6. The Short Food Supply Chains assures me that I'll contribute to the development of the territory and the **local economy**.

Results showed high positive agreement levels with the statements regarding the SFSC with average values above the scale mid-point. The contribution to fresher products at market place was the most important element, followed by local economy, traceability and fair prices. The product quality and benefit to environment were the least important items.

Results of the Exploratory Factorial Analysis (EFA), using SPSS 22 software, showed (Table 4) that all items are associated to one latent factor. The Cronbach' Alpha showed high internal validity (0.833) with a 54.4% of the total explained variance. A Confirmatory Factorial Analysis (CFA), using Amos 22.0 software, was carried out to ensure that each variable (i.e. the statement) clearly fit and belong to the previously identified latent factor that summarizes consumers' opinions towards the SFSC. Compared to the EFA, in the CFA the research can assign the observable variables to a specific latent factor and test for the best model fit. Results showed, that the statement "The Short Food Supply Chains assures me that I'll contribute to the development of the territory and the local economy", who received the lowest load (0.417) in the EFA, was a non-significant variable in contributing to this latent construct. Thus, a second CFA was carried out by dropping this statement out as can be seen in Figure 2. One of the most important model fit measure in the CFA is the Chi-square/df (CMIN/df) whose value was less than 5. The comparative fit index CFI was higher than 0.80 and the RMSEA index (reasonable error of approximation) was lower than 0.1 (Browne and Cudeck, 1993). All measure fits were accomplished showing the adequacy of the statements proposed to represent consumers' opinions towards the SFSC. Thus, a unique indicator that summarizes consumers' opinions towards the SFSC was calculated by summing up all the statements. This indicator may range from a minimum of 5 to a maximum of 45.

The SFSC indicator was related (ANOVA and Tukey statistics) to the main socio-economic variables of respondents. Results (Table 5) showed that female exhibited higher agreement level with the role of the SFSC than male. Similarly, retired respondents gave higher evaluation than students. Respondent with ages above 65 evaluate more positively the SFSC than respondents with ages between 18 and 31. Finally, unipersonal household exhibited higher agreement level with the role of the SFSC than respondents with more than 3 members by household.

3.2. Hedonic evaluation test

Results of the hedonic evaluation test of the six honeys are presented in Table 6. Comparing the overall acceptability of the six types of honey, results showed significant

differences. The local honeys with light colour and liquid or solid consistency had the highest global acceptability scores (6.88 and 6.62) than the remaining type of honeys. These results confirm the perceived quality of local products which was higher than the other honey types. All the sensory attributes (colour, consistency, odour, and flavour) of the local honeys received the highest evaluation. In particular, light honey with solid consistency. Results also highlight the low acceptance level of the dark honeys whatever the consistency is (4.58 and 5.66), showing a clear acceptance for honeys with light colour. Results of the other honey types confirmed this outcome. The non-local light honeys were relatively highly accepted whatever the consistency is (6.18 and 6.24) compared to other non-local honeys. The low acceptance of dark honeys relies on the lowest score of their flavour compared to the other honeys which is related to the flower type. Consumers in Mar de Plata are not familiar with dark honeys and therefore these honeys received the lowest liking scores.

3.3. Consumers Willingness to pay with the SFSC opinions and hedonic evaluation

Results of the two estimated Hybrid-RPL models are shown in Table 7. The goodness of fit assessed through the McFadden's pseudo- R^2 (0.41 and 0.46) is highly acceptable. Before the hedonic evaluation, the locally produced honey with light colour and solid consistency was more preferred by consumers who exhibited high level of agreement with the role of the SFSC than consumers who exhibited low agreement level. While the majority of the non-locally produced honeys received higher WTP from consumers with low agreement level with the SFSC, only significant difference was found for the honey with light colour and liquid consistency. However, after the hedonic evaluation, more significant difference appeared regarding the WTP of the non-locally produced honeys, in particular the honey with dark colour and liquid consistency. Results showed that the hedonic evaluation accentuated the WTP differences for the non-locally honeys.

Focusing on the differences of the expected WTP (i.e. before the hedonic evaluation) between both SFSC groups of consumers, results showed that consumers with high agreement level of the SFSC exhibited higher expected WTP (63.06\$/500g) for the local honey 1 and lower expected WTP (4.18\$/500g) for the non-local honey 4 compared to their consumers' counterpart whose WTP was 44.68\$/500g and 29.53\$/500g respectively. This preference pattern was similar for the experienced WTP (i.e. after the hedonic evaluation) with an additional significant difference for the non-local honey 6 where consumers with the higher agreement level towards the SFSC exhibited lower WTP (15.07\$/500g) compared to the other group of consumers (21.75\$/500g). These results showed that the consumers' opinions towards the SFSC can play, in part, a relevant role in defining the WTP for the honey products.

However, two remarkable changes can be also extracted after tasting the honey products. Firstly, the WTP for the non-local honey 4 (Light, Liquid & Other origin) of consumers with high level of agreement towards the SFSC increased from a non-significant 4.18\$/500g to a significant 25.56\$/500g, while the WTP of consumers with low level of agreement towards the SFSC remained invariable (29.53\$/500g to 30.96\$/500g). Secondly, the WTP for the non-local honey 6 (Dark, Liquid & Other origin) of consumers with high agreement level towards the SFSC remained similar with non-significant values (13.59\$/500g and 15.07\$/500g), while the WTP of consumers with low level of agreement towards the SFSC increased from a statistically non-significant value (24.68\$/500g) to a significant 21.75\$/500g.

To better understand the previous changes in preferences, the hedonic evaluation results (Table 8) of both groups of consumers can shed light on this outcome. Results suggested that the opinions towards the SFSC had a minor role in affecting the WTP compared to the sensory experience. The non-local honey that received the lowest global acceptability score (Honey 5: Dark, Solid and Other origin) received a non-significant experienced WTP for both type of consumers groups showing the importance of the sensory experience in identifying consumers WTP compared to consumers' opinions. In this same line, when the global acceptability of a non-local honey was relatively high, consumers with high agreement level towards the SFSC showed a significant increase in their WTP, highlighting the superiority of the sensory experience in affecting their preference compared to their opinions.

Results in Table 8 also showed non-significant differences between consumers with low and high level of agreement of the SFSC for the global acceptability of the majority of honey types with the exception of the local honey 1 (Light, Solid and Local). Therefore, the changes occurred for the WTP after the hedonic evaluation presented before in Table 8, suggest that consumers with high agreement level towards the SFSC are more demanding and exigent regarding the perceived quality of the honey product. In other words, the WTP increase after the hedonic evaluation for such consumers was only remarkable if the honey received relatively high global acceptability even if it is not locally produced, highlighting the key role of the sensory experience in the purchase decision.

4. Discussion

Results showed high level of preference of the consumers towards local honey obtained from the short food supply chains. This finding is similar to those obtained by Wu *et al.* (2015), who used experimental auctions and found that consumers in United States demonstrate greater demand and willingness to pay a premium for locally produced honey,

in particular when information is provided to them. Murphy *et al.* (2000) who used conjoint approach showed that in Ireland the greatest market segment of honey is formed by consumers that are the least price sensitive and with the most important attribute being small-scale producer source. A large majority of studies that focused on the analysis of consumers' preferences for local attribute in food preference showed a willingness to pay a premium for this origin cue even though local food are not perceived as expensive (Feldman and Hamm *et al.*, 2005).

This outcome brings a new discussion on the public initiatives and policies related to the development of rural territories. In fact, re-connecting producers and consumers is developed under several national and international legal frameworks where farmers are supported to maintain such types of food chains (Kneafsey *et al.*, 2013). This discussion in Argentina has a strong implication for the structure of the honey added-value chain since 95% of the locally produced honey is exported to worldwide markets (Ministry of Agro-industry for the year 2014). Our results highlight the need in Argentina to participate in the development of a local market for local honey due to the potential role that may play satisfying consumers preference and demand.

Our results showed that consumers with high agreement level towards the SFSC exhibited higher WTP for some local honey and lower WTP for non-local one both before and after the hedonic evaluation. However, this tendency was related to the global acceptability and the consistency. In this context, consumers value the attributes of honey that are available in their local market as commented by Subovsky *et al.* (2002), which strengthens the idea of making greater efforts for the development of local markets of local produced honeys that highlight their own attributes in each region. The richness of floral biodiversity and the special climatic conditions of the producing region in Mar de Plata plays a key factor in promoting the expansion of the apiculture activities (Subovsky *et al.*, 2002). This represents a challenge and great potential for the diversification, differentiation and added value to the territorial apicultural production. Argentina is the world's leading honey exporter. However, per capita domestic consumption is very low and, in general, consumers are poorly informed about the characteristics and quality criteria of their local product (Gallez, 2006). The local consumption of honey is relatively low. Only 0.06 kg/inhabitant/year is consumed compared for instant to European countries where it reaches on average 0.67 kg/inhabitant/year (FAOSTAT, 2018). Although the local consumption is relatively small, the domestic market has a potential attractive to increase. Therefore, the development of the SFSC represent an opportunity which involves moving from a commodity market with internationally fixed prices to an internally market where the price is determined by local demand that is expected to be fairer for the honey producer (Santini *et al.*, 2013; De Fazio *et al.*, 2016) given the lower transport cost and the lower participation of intermediaries.

This market approach may also involve additional challenges to ensure that the supply of products is constant and sustainable over time, and can guarantee a homogeneous quality of the products offered. The changes in the production process and the new marketing channel may generate higher levels of trust between producers and consumers due to their greater proximity. In the territory where consumers value local products represent a significant advantage for the development of this type of short chain. However, it is necessary to generate a greater flow of information to strengthen the identity of foods with the territory. In return, there are few sales points with direct sales and the trade fair modality offers limited possibilities to stimulate increases in the honey production as they are organized only once a week. In this context, the development of the SFSC may contribute to the stability of the income flow of the producers and allows the possibility of differentiation of the product by small producers, benefitting both consumers and producers and therefore local economies by increasing the likelihood of generating new jobs in the rural territory.

Our findings, in the same line of Gallez (2006), showed that local consumer preference is tightly related to their usual purchases of honey that is commercialized through informal channels, generally packaged by the producers. These honeys have not undergone great variations of colour or type of crystallization. This preference pattern is related to the fact that honey from conventional supply chain are presented in a much darker colour than their original colour mainly due to heat treatment and other processing technology related to viscosity quality cues. The consistency attribute was a key factor affecting consumer preferences. In fact, the same honey may have a very different appearance if presented in a liquid or crystallized consistency.

5. Conclusions

Results showed that the honeys produced from local farmers and commercialized by the SFSC were preferred and received the highest liking score, in particular, honeys with light colour and solid consistency. Dark honeys received the lowest preference and acceptance levels since consumers in Mar de Plata are not familiar with this honey type. The hedonic evaluation had a significant impact on consumers' preference for the non-local honeys. The sensory experience played a relevant role in affecting the WTP; the WTP increased or decreased accordingly to the variation of the global acceptability score.

In general terms, consumers exhibited an average agreement level towards the role of the SFSC. The positive functions of the SFSC were better evaluated by female, retired respondents, consumers above 65 years old and unipersonal household. Results showed that consumers with high agreement level with the importance of the SFSC exhibited the highest WTP and liking scores for the locally produced honey, in particular when it is

associated to light colour and solid consistency. Consumers' opinions towards the SFSC and their hedonic evaluation played a relevant role in affecting consumers WTP. Results suggested a major role of the sensory experience compared to consumers' opinions in affecting the WTP values. Re-connecting producers and consumers with in-site tasting experience may contribute to the development of local added-value chain of honey products.

6. Reference

- Arango, N.E., and Restrepo, L. A. M. 2013. Análisis de percepción de marca Producto Miel de Abejas en el mercado de Bogotá. *Poliantea*, 712:8
- Arrabal, M. and Ciappini, M. 2000. Prueba de aceptabilidad en miel. *Invenio-Revista de investigación académica*, 4-5:141-147.
- Aubry, C., and Kebir, L. (2013). Shortening food supply chains: A means for maintaining agriculture close to urban areas? The case of the French metropolitan area of Paris. *Food Policy*, 41, 85-93
- Augère-Granier, M.L. 2016 Short food supply chains and local food systems in the EU, European Parliamentary Research Service, available at http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/586650/EPRS_BRI2016586650_EN.pdf
- Balogh, P., Békési, D., Gorton, M., Popp, J., & Lengyel, P. (2016). Consumer willingness to pay for traditional food products. *Food Policy*, 61, 176-184.
- Berti, G. and Mulligan, C. 2016. Competitiveness of small farms and innovative food supply chains: The role of food hubs in creating sustainable regional and local food systems. *Sustainability*, 87: 616.
- Browne, M. W. and Cudeck, R. 1993. *Alternative ways of assessing model fit*. Sage focus editions, 154: 136-136.
- Bryła, P. 2015. The role of appeals to tradition in origin food marketing. A survey among Polish consumers. *Appetite*, 91: 302-310.
- Canfora, I. 2016. Is the short food supply chain an efficient solution for sustainability in food market?. *Agriculture And Agricultural Science Procedia*, 8: 402-407.
- ChoiceMetrics 2016 Ngene 1.1.2 User Manual and Reference Guide, Australia.
- Cosmina, M., Gallenti, G., Marangon, F., and Troiano, S. 2016. Attitudes towards honey among Italian consumers: A choice experiment approach. *Appetite*, 99: 52-58.
- Craviotti, C. and Soleno, W.R. 2015. Circuitos cortos de comercialización agroalimentaria: un acercamiento desde la agricultura familiar diversificada en Argentina. *Mundo agrario*, 1633.
- D'amico, M., Di Vita, G., Chinnici, G., Pappalardo, G., and Pecorino, B. 2014. Short food supply chain and locally produced wines: factors affecting consumer behavior. *Italian Journal of Food Science*, 263: 329-334
- De Fazio, M. 2016. Agriculture and sustainability of the welfare: the role of the short supply chain. *Agriculture and agricultural science procedia*, 8: 461-466.
- Deliza, R. and MacFie, H.J. 1996. The generation of sensory expectation by external cues and its effect on sensory perception and hedonic ratings: a review. *Journal of Sensory Studies*, 112: 103-128.
- Feldmann, C. and Hamm, U. 2015. Consumers' perceptions and preferences for local food: A review. *Food Quality and Preference*, 40: 152-164.
- Gallez, L. 2006. Los colores, aromas y texturas de nuestras mieles. *Revista AgroUNS*, 3.
- Galli, F., Bartolini, F., Brunori, G., Colombo, L., Gava, O., Grandi, S., and Marescotti, A. 2015. Sustainability assessment of food supply chains: an application to local and global bread in Italy. *Agricultural and Food Economics*, 31: 21.

- Giampietri, E., Finco, A. and Del Giudice, T. 2015. exploring consumers' attitude towards purchasing in short food supply chain. *Calitatea*, 16S1: 135.
- Giampietri, E., Finco, A. and Del Giudice, T. 2016. Exploring consumers' behaviour towards short food supply chains. *British Food Journal*, 1183: 618-631.
- Guerrero, L., Claret, A., Verbeke, W., Vanhonacker, F., Enderli, G., Sulmont-Rossé, C. Hersleth, M. and Guàrdia, M. D. (2012). Cross-cultural conceptualization of the words Traditional and Innovation in a food context by means of sorting task and hedonic evaluation. *Food Quality and Preference*, 25(1), 69-78
- Guptill, A. and Wilkins, J. L. 2002. Buying in to the food system: Trends in food and retailing in the US and implications for local foods. *Agriculture and Human Values*, 19: 39–51.
- Harrison, G. 2007 Making choice studies incentive compatible B. Kanninen Ed., Valuing Environmental Amenities Using Stated Choice Studies, Springer, The Netherlands, pp. 67–110
- Hensher, D., Rose, J. and Greene, W. 2005 Applied choice analysis: A primer. Cambridge University Press: Cambridge.
- Hu, W., Batte, M. T., Woods, T. and Ernst, S. 2012. Consumer preferences for local production and other value-added label claims for a processed food product. *European Review of Agricultural Economics*, 393: 489-510.
- Kallas, Z., Escobar, C., and Gil, J.M. (2012). Assessing the impact of advertising on wine preference using Choice Experiments. *Appetite*, 58(1), 285–298.
- Kallas, Z.; Martínez, B.; Panella, N. and Gil J.M. 2016 the effect of sensory experience on expected preferences toward a masking strategy for boar-tainted frankfurter sausages. *Food Quality and Preference*, 54: 1-12.
- Kneafsey, Moya, Laura Venn, Ulrich Schmutz, Bálint Balázs, Liz Trenchard, Trish Eyden-Wood, Elizabeth Bos, Gemma Sutton, and Matthew Blackett 2013. "Short food supply chains and local food systems in the EU. A state of play of their socio-economic characteristics." JRC scientific and policy reports 25911.
- Loomis, J.B. 2014. Strategies for overcoming hypothetical bias in stated preference surveys. *Journal of Agricultural and Resource Economics*, 391: 34-46.
- Lusk, J.L. and Schroeder, T. C. 2004. Are choice experiments incentive compatible? A test with quality differentiated beef steaks. *American Journal of Agricultural Economics*, 862: 467-482.
- Mai, N., Gretar Bogason, S., Arason, S., Víkingur Árnason, S., & Geir Matthíasson, T. (2010). Benefits of traceability in fish supply chains—case studies. *British Food Journal*, 112(9), 976-1002.
- Marsden, T., Banks, J. and Bristow, G. 2000. Food supply chain approaches: exploring their role in rural development. *Sociologia ruralis*, 404:, 424-438.
- McFadden, D. 1974 Conditional logit analysis of qualitative choice behavior. In P. Zarembka, Ed Frontiers in econometrics. New York: Academic Press.
- Migliore, G., Schifani, G. and Cembalo, L. 2015. Opening the black box of food quality in the short supply chain: Effects of conventions of quality on consumer choice. *Food Quality and Preference*, 39: 141-146.
- Mundler, P. and Laughrea, S. 2016. The contributions of short food supply chains to territorial development: A study of three Quebec territories. *Journal of Rural Studies*, 45, 218-229.
- Murphy, M., Cowan, C., Henschion, M. and O'reilly, S. 2000. Irish consumer preferences for honey: a conjoint approach. *British Food Journal*, 1028: 585-598.
- Olesen, I., Alfnes, F., Røra, M. B., & Kolstad, K. (2010). Eliciting consumers' willingness to pay for organic and welfare-labelled salmon in a non-hypothetical choice experiment. *Livestock Science*, 127(2-3), 218-226
- Piana, M.L., Persano Oddo, L., Bentabol, A., Bruneau, E., Bogdanov, S. and Guyot Declerck, C. 2004. Sensory analysis applied to honey: state of the art. *Apidologie*, 35Suppl 1: S26-S37.

- Poe, G. L., Giraud, K.L. and Loomis, J.B. 2005 'Computational methods for measuring the difference of empirical distributions. *American Journal of Agricultural Economics*, 87: 353–365
- Realini C.E., Kallas, Z., Pérez, M., Gómez, I, Olleta, J.L., Beriain, M.J., Albertí, P. and Sañudo, C. 2014 Relative importance of cues underlying Spanish consumers' beef choice and segmentation, and consumer liking of beef enriched with n-3 and CLA fatty acids. *Food Quality and Preference*, 33: 74–85.
- Renting, H., Marsden, T. K. and Banks, J. 2003. Understanding alternative food networks: Exploring the role of short food supply chains in rural development. *Environment and Planning A*, 35(3): 393–411.
- Ridley W., Shook, S. and Devadoss, S. 2015. Evaluations of consumers' preference structure for locally-produced beef. *Journal of Food Products Marketing*, 21: 1-13.
- Río Lanza, A. B. D., Sanzo Pérez, M. J. and Vázquez Casielles, R. 2001. Los productos agroalimentarios tradicionales: hábitos de compra y consumo de miel. *Estudios sobre consumo*, 59: 63-81.
- Roininen, K., Arvola, A. and Lähteenmäki, L. 2006. Exploring consumers' perceptions of local food with two different qualitative techniques: Laddering and word association. *Food quality and preference*, 17(1): 20-30.
- Roman, A., Popiela-Pleban, E., Kozak, M., and Roman, K. 2013. Factors influencing consumer behavior relating to the purchase of honey part 2. Product quality and packaging. *Journal of Apicultural Science*, 57(2): 175-185.
- Roth, A.V., Tsay, A.A., Pullman, M.E., and Gray, J.V. (2008). Unraveling the food supply chain: strategic insights from China and the 2007 recalls. *Journal of Supply Chain Management*, 44(1), 22-39
- Santini F., Gomez y Paloma, S., Kneafsey M., Venn L., Schmutz U., Balasz B., Trenchard L., Eyden-Wood T., Bos E., Sutton G. and Blackett M. 2013 Short Food Supply Chains and Local Food Systems in the EU. A State of Play of their Socio-Economic Characteristics. Publications Office of the European Union, available at <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC80420/final%20ipts%20jrc%20080420%20online.pdf>
- Sanzo, M. J., Del Río, A. B., Iglesias, V. and Vázquez, R. 2001. El efecto de la actitud y de la calidad percibida sobre la intención de compra de un producto agroalimentario tradicional. In XI Congreso Nacional de ACEDE. Zaragoza.
- Schäufele, I., & Hamm, U. (2017). Consumers' perceptions, preferences and willingness-to-pay for wine with sustainability characteristics: A review. *Journal of Cleaner production*, 147, 379-394
- Sims, R. 2009. Food, place and authenticity: local food and the sustainable tourism experience. *Journal Of Sustainable Tourism*, 17(3): 321-336.
- Subovsky, M.J., Castillo, A.E., López, Á.S. and Cano, N. 2002. Importancia de la calidad de la miel. *Agrotecnia*, 9: 25-28.
- Thøgersen, J., Pedersen, S., Paternoga, M., Schwendel, E. and Aschemann-Witzel, J. 2017. How important is country-of-origin for organic food consumers? A review of the literature and suggestions for future research. *British Food Journal*, 119(3): 542-557.
- Van der Lans IA, Van Ittersum K, De Cicco A. and Loseby M 2001. The role of the region of origin and EU certificates of origin in consumer evaluation of food products. *European Review of Agricultural Economics*, 28: 451-477.
- Ványi, G. Á., Csapo, Z. and Karpati, L. 2011. Evaluation of consumers' honey purchase habits in Hungary. *Journal of Food Products Marketing*, 17(2-3): 227-240.
- Wu, S., Fooks, J., Messer, K. D. and Delaney, D. 2015. Consumer Demand for Local Honey. *Applied Economics*, 47(41): 4377-4394.
- Yeow, S. H. C., Chin, S. T. S., Yeow, J. A. and Tan, K. S. 2013. Consumer purchase intentions and honey related products. *Journal of Marketing Research and Case Studies*, 2013(1): 1-15.

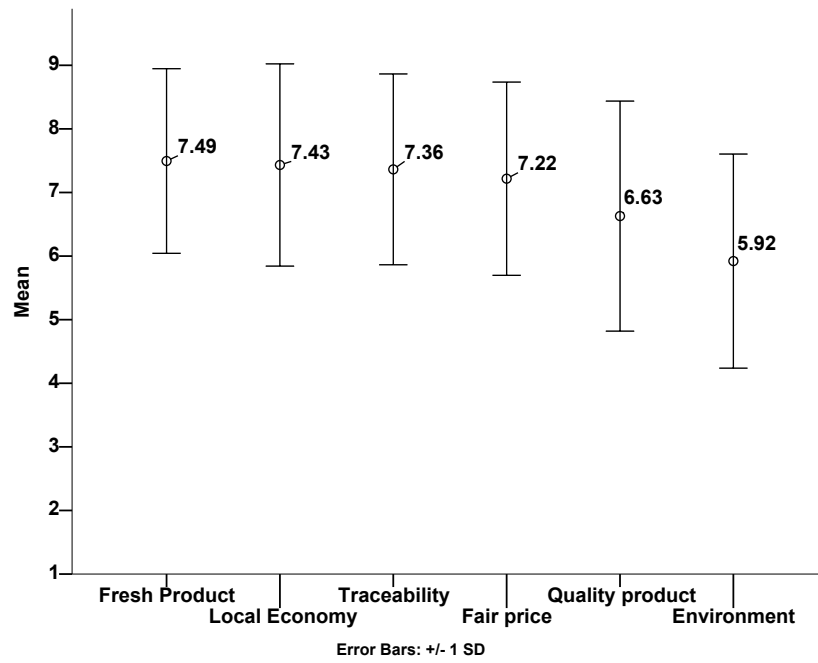


Figure 1: Mean by items for measuring opinions towards SFSC

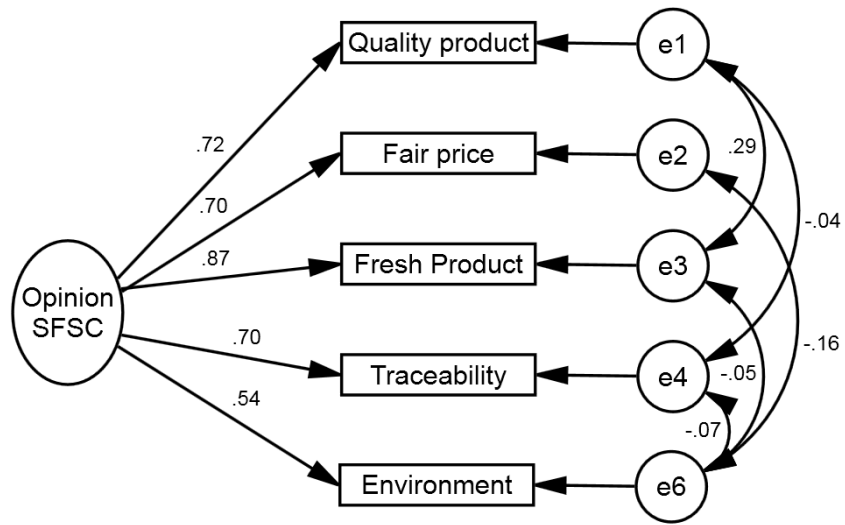


Figure 2: Confirmatory Factorial analysis of the opinion towards the SFSC

Table 1: Summary of the main socio-demographic variables of the sample.

Education	%	Gender	%
Primary	6.2	Female	70.8
Secondary	30.9	Male	29.2
Higher/University	62.9		
Employment	%	Family income perception	%
Student	19.7	Far below average	4.5
Employee	47.2	Below average	12.9
Self-employed	10.1	On average	25.3
Businessman	1.7	Above average	42.1
Retired	12.9	Far Above average	11.8
Housewife	2.2	I don't know	3.4
Unemployed	6.2	Age (mean)	42.8
Family members	%	Age categories	%
1 Person/household	22.5	18-30 years	32.6
2 Persons/household	27.5	30-45 years	25.3
3 Persons/household	24.2	45-65 years	32.5
>3 Person/household	25.8	>65 years	9.6
Have children	%	Number of children (mean)	2.12
No	56.7		
Yes	43.3		

Table 2: the six honey products selected in each choice sets and the hedonic test

Honey type	Colour	Consistency	Origin
Honey 1	Light	Solid	Local (Directly from farmers in Mar de Plata)
Honey 2	Light	Liquid	Local (Directly from farmers in Mar de Plata)
Honey 3	Light	Solid	Other origins (Not from Mar de Plata and not directly obtained from farmers)
Honey 4	Light	Liquid	Other origins (Not from Mar de Plata and not directly obtained from farmers)
Honey 5	Dark	Solid	Other origins (Not from Mar de Plata and not directly obtained from farmers)
Honey 6	Dark	Liquid	Other origins (Not from Mar de Plata and not directly obtained from farmers)

Table 3: The scenario-specific product design used in the choice experiment exercise

	Choice set 1	Choice set 2	Choice set 3	Choice set 4	Choice set 5	Choice set 6
Honey types	Price levels combinations					
Light and Solid Honey, Local	40\$	50\$	35\$	50\$	60\$	45\$
Light and Liquid Honey, Local	60\$	50\$	50\$	40\$	35\$	45\$
Light and Solid Honey, Other origins	45\$	35\$	40\$	50\$	60\$	50\$
Light and Liquid Honey, Other origins	35\$	50\$	60\$	50\$	40\$	45\$
Dark and Solid Honey, Other origins	45\$	60\$	40\$	35\$	50\$	50\$
Dark and Liquid Honey, Other origins	60\$	35\$	50\$	50\$	40\$	45\$
Do not purchase any (none of them)	-	-	-	-	-	-

\$= Argentine Pesos (ARS); 100\$ (ARS)=6,24USD

Table 4: Exploratory Factorial Analysis regarding the opinions towards the SFSC

Opinions towards Short Food Supply Chains	Factor 1
The Short Food Supply Chains assures me that I'll purchase a fresh product	0.905
The Short Food Supply Chains assures me that I'll purchase a quality product.	0.778
The Short Food Supply Chains assures me the traceability of the product.	0.680
The Short Food Supply Chains assures me that I'll pay a fair price.	0.671
The Short Food Supply Chains assures me that it is beneficial for the environment.	0.501
The Short Food Supply Chains assures me that I'll contribute to the development of the territory and the local economy.	0.417
Total explained variance	54.4%
Cronbach' Alpha	0.833
Goodness of fit test	$\chi^2 = 39.26 (0.000)$

Table 5: Opinions towards the SFSC and the socio-economic variables

Socio-economic variables		Mean of the SFSC indicator
Gender	Male	40.2
	Female	43.6
Age	18-30	41.1
	31-45	41.1
	46-65	42.9
	>65	45.2
	Student	40.9
Employment situation	Employed	42.5
	Self-employment	42.3
	Manager	45.2
	Retired	46.4
	Unemployed	42.5
Household members	1 person	44.9
	2 persons	43.1
	3 persons	42.1
	> 3 persons	40.9
Education level	Primary	41.3
	Secondary	43.3
	University	42.2

Differences between shadowed cells are significant for each socio economic variable ($p < 0.05$).

Table 6: Least square means of the sensory parameters evaluated

Honey types	Colour	Consistency	Odour	Flavour	Global
Honey 1 (Light & Solid, Local)	6.81 ± 1.69	7.02 ± 1.82	6.46 ± 1.63	7.05 ± 1.84	6.88^a ± 1.69
Honey 2 (Light & Liquid, Local)	6.73 ± 1.43	6.45 ± 1.79	6.27 ± 1.48	6.79 ± 1.61	6.62^a ± 1.49
Honey 3 (Light & Solid, Other)	6.38 ± 1.80	6.22 ± 2.03	6.17 ± 1.58	6.17 ± 1.91	6.18^b ± 1.71
Honey 4 (Light & Liquid, Other)	6.42 ± 1.68	6.05 ± 1.82	5.98 ± 1.65	6.43 ± 1.78	6.24^b ± 1.71
Honey 5 (Dark & Solid, Other)	5.81 ± 1.84	5.07 ± 2.07	4.92 ± 2.06	4.29 ± 2.32	4.58^c ± 2.08
Honey 6 (Dark & Liquid, Other)	6.36 ± 1.58	5.97 ± 1.77	5.77 ± 1.67	5.42 ± 2.17	5.66^d ± 1.75

a, b, c, d: significance difference across the global evaluation of the honey products (i.e. by column)

Table 7: Hybrid RPL model estimates including consumers' opinions towards SFSC

Estimates	Expected		Experienced	
	Expected	Experienced	Expected	Experienced
	Random β_s		WTP	
High agreement with SFSC × ASC of Honey 1 (Light, Solid, Local), β_1	8.38^{***}	9.23^{***}	63.06^{***a}	55.96^{***x}
Low agreement with SFSC × ASC of Honey 1 (Light, Solid, Local), β_2	5.94^{***}	7.75^{***}	44.68^{***b}	46.98^{***y}
High agreement with SFSC × ASC Honey 2 (Light, Liquid, Local), β_3	3.91^{***}	7.09^{***}	39.10^{***a}	41.56^{***x}
Low agreement with SFSC × ASC Honey 2 (Light, Liquid, Local), β_4	4.01^{***}	7.17^{***}	40.16^{***a}	42.03^{***x}
High agreement with SFSC × ASC Honey 3 (Light, Solid, Other), β_5	9.26^{***}	8.58^{***}	43.58^{***a}	40.85^{***x}
Low agreement with SFSC × ASC Honey 3 (Light, Solid, Other), β_6	9.06^{***}	8.21^{***}	42.63^{***a}	38.34^{***x}
High agreement with SFSC × ASC Honey 4 (Light, Liquid, Other), β_7	0.41	5.81^{***}	4.18^b	25.56^{***y}
Low agreement with SFSC × ASC Honey 4 (Light, Liquid, Other), β_8	2.89^{**}	7.03^{***}	29.53^{***a}	30.96^{***x}
High agreement with SFSC × ASC Honey 5 (Dark, Solid, Other), β_9	2.76^{**}	3.01	29.77^{***a}	20.05^x
Low agreement with SFSC × ASC Honey 5 (Dark, Solid, Other), β_{10}	2.97^{***}	-0.27	32.09^{***a}	-1.83^x
High agreement with SFSC × ASC Honey 6 (Dark, Liquid, Other), β_{11}	1.24	2.02	13.59^a	15.07^y
Low agreement with SFSC × ASC Honey 6 (Dark, Liquid, Other), β_{12}	2.25[*]	2.91^{**}	24.68^a	21.75^{***x}
Non- Random β_s				
Price of Honey 1 (Light, Solid, Local), α_1	-0.13^{***}	-0.16^{***}		
Price of Honey 2 (Light, Liquid, Local), α_2	-0.10^{***}	-0.17^{***}		
Price of Honey 3 (Light, Solid, Other), α_3	-0.21^{***}	-0.21^{***}		
Price of Honey 4 (Light, Liquid, Other), α_4	-0.10^{***}	-0.22^{***}		
Price of Honey 5 (Dark, Solid, Other), α_5	-0.09^{***}	-0.15^{***}		
Price of Honey 6 (Dark, Liquid, Other), α_6	-0.09^{***}	-0.13^{***}		
S.D. of random β_s				
High agreement with SFSC × ASC of Honey 1 (Light, Solid, Local), η_1	2.46^{***}	2.97^{***}		
Low agreement with SFSC × ASC of Honey 1 (Light, Solid, Local), η_2	3.02^{***}	3.96^{***}		
High agreement with SFSC × ASC Honey 2 (Light, Liquid, Local), η_3	5.01^{***}	4.69^{***}		
Low agreement with SFSC × ASC Honey 2 (Light, Liquid, Local), η_4	3.72^{***}	4.09^{***}		
High agreement with SFSC × ASC Honey 3 (Light, Solid, Other), η_5	2.08^{***}	2.67^{***}		
Low agreement with SFSC × ASC Honey 3 (Light, Solid, Other), η_6	2.25^{***}	3.24^{***}		
High agreement with SFSC × ASC Honey 4 (Light, Liquid, Other), η_7	4.03^{***}	6.53^{***}		
Low agreement with SFSC × ASC Honey 4 (Light, Liquid, Other), η_8	2.83^{***}	5.86^{***}		
High agreement with SFSC × ASC Honey 5 (Dark, Solid, Other), η_9	3.23^{***}	5.26^{***}		
Low agreement with SFSC × ASC Honey 5 (Dark, Solid, Other), η_{10}	2.40^{***}	5.79^{***}		
High agreement with SFSC × ASC Honey 6 (Dark, Liquid, Other), η_{11}	5.45^{***}	5.38^{***}		
Low agreement with SFSC × ASC Honey 6 (Dark, Liquid, Other), η_{12}	2.79^{***}	3.86^{***}		
Pseudo R ²	0.42	0.47		

a, b: significance difference across products for the expected treatment

x,y: significance difference across products for the experienced treatment

*** P value <0.01, **P value < 0.05, * P value < 0.1

Table 8: Hedonic evaluation and consumers' opinions towards SFSC

Honey types	Global hedonic evaluation	
	High Agreement with SFSC	Low agreement with SFSC
Honey 1 (Light & Solid, Local)	7.22^a ±1.69	6.60^b ±1.68
Honey 2 (Light & Liquid, Local)	6.81^a ±1.48	6.49^a ±1.54
Honey 3 (Light & Solid, Other)	6.43^a ±1.76	5.95^a ±1.67
Honey 4 (Light & Liquid, Other)	6.16^a ± 1.86	6.39^a ±1.59
Honey 5 (Dark & Solid, Other)	4.66^a ± 2.25	4.45^a ± 1.96
Honey 6 (Dark & Liquid, Other)	5.71^a ± 1.73	5.61^a ± 1.81

^{a, b}: significance difference between Low and high agreement levels with SFSC (i.e. by row)