ORIGINAL ARTICLE

The best late season peaches profile

O melhor perfil de pêssego tardio

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Abstract

This work aimed to determine the best late season peaches profile via a Best Worst Discrete Choice Experiment. The survey was performed in the city of Zaragoza - Spain, in October 2008. In total, 316 people stated their preferences towards late season peaches. On average, a peach produced in the Calanda area with Protected Designation of Origin (PDO), weighting around 254 g and conditioned in normal packaging or in bulk, may be considered the best late season peach. Among different types of analyzed consumers, all preferred peaches with PDO, produced in the Calanda area. Regarding to fruit size, for many types of consumers, the bigger the better. Only for women and consumers over 50 years old, medium size peaches are preferable to the largest ones. In addition to the fruit size, market segmentation should consider the different kinds of packaging.

Keywords: Best-worst discrete choice experiment; PDO Calanda peach; Stated preference; Zaragoza; Consumer; Preference.

Resumo

O objetivo deste trabalho foi determinar o melhor perfil de pêssego tardio. Realizou-se um Experimento de Escolha Discreta do tipo Melhor Pior para cumprir com os objetivos. A pesquisa foi realizada na cidade de Zaragoza – Espanha, em outubro de 2008. No total, 316 pessoas declararam suas preferências em relação aos pêssegos tardios. No geral, o melhor pêssego tardio é aquele produzido na região de Calanda, com Denominação de Origem Protegida (DOP), com peso em torno de 254 g e condicionado em embalagem normal ou a granel. Entre os diferentes tipos de consumidores analisados, todos preferiram pêssegos com DOP, produzidos em Calanda. Quanto ao tamanho da fruta, para vários tipos de consumidores, quanto maior, melhor. Apenas para as mulheres e consumidores com mais de 50 anos de idade, pêssegos de tamanho médio são preferíveis aos de maior tamanho. Além do tamanho, a segmentação de mercado deve considerar os tipos de embalagem.

Palavras-chave: Experimento de escolha discreta-melhor pior; Pêssegos com DOP Calanda; Preferência declarada; Zaragoza; Consumidor; Preferência.
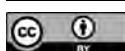
1 Introduction

Since 2008, peach consumption has declined in Spain. Peach consumption was 5.19 kg per capita and it diminished to 3.73 kg per capita, in 2015. This reduction in consumption was partially due to the economic crisis, which Spain has been suffering. Similar trend has been observed in other countries such as Italy, France, Greece and USA. According to Iglesias (2017), the main causes for the decrease of peach consumption is the inconsistent fruit quality (too hard or too soft), lack of taste, the absence of flavor identification related to different varieties (sweet or not), and the absence of brands.

There are initiatives to increase peach production and consumption in Spain. Since 1990 to 2016, twelve breeding programs have mainly focused on producing more adapted cultivars for growing conditions and higher fruit quality (size, color, taste and texture). Four areas of Aragón participated and one of them was focusing on the improvement of peaches produced in the Calanda area (Iglesias, 2017).

In 1999, the Regulatory Council (RC) of peaches with Protected Designation of Origin Calanda (PDO Calanda Peaches) was created with the aim of maintaining the control of peaches produced in the Calanda area, which covers part of Teruel and Zaragoza provinces, in Spain. The peach flesh hardness, at harvest, varies in pressure resistance between 3.5 and 5.0 kg /0.5 cm^2 (measured by Magness-Taylor method). The sugar content, which is determined by SSC (Soluble Solid Content), must be at least 12 degrees Brix (Aragón, 2017).

In addition to the fruit characteristics, the high quality of PDO Calanda Peaches is the result of special cultivation techniques, such as fruit manual bagging. The control of the entire production process, from field to consumer, ensures that the peach achieves high quality. Quality differentiation and certification process have an important impact on PDO Calanda Peach cost (Aguaviva, 2015). A premium price in the consumer market is crucial for its economic sustainability.

It is important to know the consumer's behavior in order to guide product quality programs, provide better marketing strategies, and consumer acceptability (Voicu, 2013). There are few studies dealing with consumer preference toward peaches in Spain. This lack of information hampers marketing strategies assessment such as branding, Protected Designation of Origin, fruit size and the use of different packaging in order to boost its production.

The main objective of this research was to study the stated consumers' preferences toward late season peaches through a discrete choice experiment in the city of Zaragoza (Spain) in order to determine the best fruit profile.

This works was structured as follows. The next section explains the employed methodology: Best-Worst Discrete Choice Experiment. The third section presents results, first showing average preferences and then preferences for different consumers' socio-demographics characteristics. The last section presents the conclusions.

2 Methodology

We began with a qualitative research approach, followed by a quantitative survey. The qualitative stage included literature review about fruit quality and market tendencies, interviews with fruit and vegetable section managers of three retail distribution chains in Zaragoza, and local market monitoring. The context found in previous studies were much different than from Zaragoza and, therefore, there was a need for more specific information. Thus, focus group with consumers of Zaragoza and interviews were important to complement the problem understanding.

2.1 Best-Worst Discrete Choice Experiment (BWDCE)

The quantitative survey included a Best-Worst Discrete Choice Experiment (BWDCE). It was developed by Louviere and Woodworth (Finn & Louviere, 1992). The method is consistent with Random Utility Theory

(Luce, 1959) and MNL models (McFadden, 1974). The Marginal approach, which assumes that consumers select first the best and then the worst alternative in each choice set, has been employed in this study.

2.2 Empirical models and experimental design

The attributes adopted in the quantitative phase were a result of the previous step. In total, we considered four attributes: (1) fruit origin; (2) type of packing; (3) fruit size; and (4) price. Each attribute had three levels as listed in Table 1.

Table 1. Attributes and levels employed in the experiment.

Attribute	Level	Attribute	Level
Origin	From Calanda with PDO	Size	Smallest
	From Calanda without PDO[1]		Medium[1]
	Other places without PDO		Largest
Packing	Active packing	Price	1.5 €/kg
	No active packing[1]		2.5 €/kg
	Bulk		3.5 €/kg

[1]Reference levels to estimate effect codes.

Price levels were stipulated through market monitoring. In model 2 and 3 (represented by Equation 2 and 3, respectively), price and peach size were considered as quantitative (numeric) variables for estimation purposes and the remaining attributes were considered as categorical (qualitative) variables. Model 1 (Equation 1) was calculated considering fruit size as categorical variable. The qualitative variables were estimated by code effects. Louviere et al. (2000) stated that codes effects are correlated in each attribute but are uncorrelated with the overall mean, unlike dummies. The estimated parameters (beta) should be interpreted as the marginal utility compared to a reference level.

$$
\begin{aligned}
U(X_i) = {} & \beta_1 Price_i + \beta_2 From\,Calanda\,with\,PDO_i + \\
& \beta_3 From\,other\,area\,without\,PDO_i + \beta_4 Bulk_i + \\
& \beta_5 Active\,packaging_i + \beta_6 Smallest\,size_i + \beta_7 Largest\,size_i + e_i
\end{aligned}
\tag{1}
$$

$$
\begin{aligned}
U(X_i) = {} & \beta_1 Price_i + \beta_2 From\,Calanda\,with\,PDO_i + \\
& \beta_3 From\,other\,area\,without\,PDO_i + \\
& \beta_4 Bulk_i + \beta_5 Active\,packaging_i + \beta_6\,fruit\,size_i + e_i
\end{aligned}
\tag{2}
$$

$$
\begin{aligned}
U(X_i) = {} & \beta_1 Price_i + \beta_2 From\,Calanda\,with\,PDO_i + \\
& \beta_3 From\,other\,area\,without\,PDO_i + \beta_4 Bulk_i + \\
& \beta_5 Active\,packaging_i + \beta_6 Fruit\,size_i + \beta_7 Fruit\,size_i^2 + e_i
\end{aligned}
\tag{3}
$$

The reference level for the origin is peaches "from Calanda without PDO". The marginal utility between peaches "from Calanda with PDO" and the reference level represents the generic PDO brand value. The marginal utility between reference level and "produced in other places" assesses how much consumers value the production of peaches in the Calanda area, but without the guarantees associated to the PDO brand.

Different peaches sizes were shown to respondents in the interviews. The weight of a smallest peach was about 160 g, a medium size was around 250 g, and the largest one was around 380 g. The first weight corresponds to a peach that would be refused by the PDO norms. The second is the minimum peach size accepted by the PDO norms, and the largest represents a size that almost nobody would be able to eat at once.

The experiment included two different types of packing, one normal and other active. Respondents were informed that active packing had the same aspect, without implying negative health effects and allowing keeping stocks 12 days more than without active packing.

Preferences are not the same among individuals. Thus, interaction effects were calculated between late season peaches' attributes (X_i) and consumers' socioeconomic characteristics and consumption habits (Z_j) (Equation 4). Consumers' characteristics were coded with dummy variables, taken value 1 when consumer was a woman and zero otherwise; older than 50 years old (zero otherwise); with elementary education, from a family with lower income than 1,500 euros/month; with high loyalty toward PDO Calanda peaches; and consuming them regularly.

$$U(X_i) = \sum_{n=1}^{N} (\beta_n X_i) + \sum_{m=1}^{M} (\beta_m X_i Z_j) + e_i \tag{4}$$

The configuration of the experimental design corresponded to a fractional factorial design. Nine choice sets allowed the estimations of main effects of the attributes' levels of a no label design. In order to obtain unbiased and efficient parameters, attribute levels were combined, following suggestions of Street et al. (2005). Those suggestions allowed generating a balanced and orthogonal design. Its D-efficiency index was checked as suggested by Pihlens et al. (2008) and the design's efficiency was estimated in 100%. Table 2 provides an example of a choice set.

Table 2. Example of a choice set in the experiment.

Least preferable	Situation 4	Most preferable
	Alternative A	
	2.50 €/kg	
	From Calanda area **with** PDO	
	Bulk	
	Medium	
	Alternative B	
	3.50 €/kg	
	From other area **without** PDO	
	Normal packing	
	Largest	
	Alternative C	
	1.50 €/kg	
	From Calanda area **without** PDO	
	Active packing	
	Smallest	

2.3 Data collection and analysis

The questionnaire was applied to consumers attending two hypermarkets, in the city of Zaragoza (Spain), at the end of October 2008, when the PDO Calanda peaches marketing season was finishing. The reason to undertake the surveys during the marketing season was that consumers should have those products more in mind. Customers were selected randomly. Once data were collected and systematized, estimations were carried out using the biogeme program, version 1.7 (Bierlaire, 2008).

3 Results and discussion

3.1 Sample profile and late season peach consumption habits

In total, we collected information from 316 PDO Calanda peach consumers. Sampling errors were estimated for infinite populations, according to guidelines of Trespalacios et al. (2005). Consumers of PDO Calanda peaches were the target population in this study; there was no information about how many consumers of PDO Calanda peaches were in the city of Zaragoza. Thus, we considered the same probability of selecting target and non-target population. Therefore, surveys sampling error estimation is 5.6%.

Consumers' characteristics are shown in Table 3. Proportionally, the sample is overrepresented by consumers who were between 35 and 64 years old. The least represented age class was from 15 to 24 years old. In Spain, *per capita* consumption of fruit increases with the consumer age (Cerdeño, 2011).

The percentage of women (59.2%) on the survey was higher than for the overall Aragon population (50.1%). According to Cerdeño (2006) women are to a great extent responsible for fruits and vegetables purchase in Spain. Madrid (2005) also confirms that women are the ones purchasing food in 66% of the households.

Surveyed consumers had higher education level, on average, than the average population of Aragon. The percentage of consumers attending college was 31.3% and elementary school was 27.5%, while in Aragon those percentages were 24.4% and 34.1%, respectively.

Table 3. Sampled consumers' socioeconomics characteristics.

Characteristic	Sample	Population	
	Number	%	%
Consumers' age			
From 15 to 24 years	17	5.4	11.9
From 25 to 34 years	62	19.6	18.4
From 35 to 49 years	110	34.8	26.9
From 50 to 64 years	80	25.3	20.1
65 years or over	47	14.9	22.7
Consumers' gender			
Female	187	59.2	50.1
Male	129	40.8	49.9
Consumers' education			
Elementary	87	27.5	34.1
High school	130	41.1	41.4
College	99	31.3	24.4
Household income			
Less than 900 €/month	23	7.3	-
From 901 to 1,500 €/month	84	26.6	-
From 1,501 to 2,100 €/month	72	22.8	-
From 2,101 to 3,000 €/month	81	25.6	-
From 3,001 to 4,000 €/month	32	10.1	-
More than 4,000 €/month	24	7.6	-
Total	316	100.0	100.0

People who participated in this study had incomes more centered to around middle levels than households' income in other surveys for the entire Aragon. There was a higher proportion (12.0%) of low-income level (less than 750 €/month) in Aragon than in the survey (7.3% get less than 900 €/month).

In the survey, consumer stated in 64.9% of cases that they consumed PDO Calanda peaches more than once a week (Table 4). Smaller percentage of consumers (14.9%) eats PDO Calanda peaches once each two weeks, 9.8% once a month and 10.4% only once during the PDO market season. In this work, those who had consumed PDO Calanda peaches, at least once a week, were considered as regular consumers.

Table 4. PDO Calanda peaches consumption frequency and loyalty degree in the city of Zaragoza.

Characteristic	Number	%
PDO Calanda peaches consumption frequency		
More than once a week	205	64.9
Once each two weeks	47	14.9
Once a month	31	9.8
Once all season	33	10.4
Loyalty to PDO Calanda peaches		
High	213	67.4
Medium	31	9.8
Low	72	22.8
Total	316	100.0

The survey valued the alternative product to PDO Calanda peach. Consumers were asked which fruit they would buy if PDO Calanda peaches were not available in the market. In total, 17 fruits were mentioned, the main ones were: other peaches (23% of consumers), apples (14%), oranges (12%), bananas (9%) and melons (9%). People who mentioned that they would buy another peach were considered as consumers with the lowest loyalty degree towards PDO Calanda peaches. Those who mentioned that they would buy other kind of stone fruit were considered as consumers with medium loyalty degree. Consumers who would not get another stone fruit were considered as consumers with highest loyalty degree.

Consumers from Zaragoza city were considered loyal to the PDO Calanda brand. Approximately 2/3 of them would buy very distinct fruit if they would not find PDO Calanda peaches in the market, while 22.8% would buy another peach and 9.8% would purchase a stone fruit.

3.2 Main-effects models

All estimated models in the Table 5 considered that all market had same preferences for late season peaches. As mentioned earlier, peach size was a categorical variable in Model 1 while Models 2 and 3 took into account peach sizes as a numerical variable. The difference between model 2 and 3 is the functional form. Model 2 expresses peach size preferences by a first-degree polynomial whereas Model 3 describes preferences by a second-degree polynomial.

Model 2 results show a positive relationship between peach size and utility. It means that consumers enjoyed large peaches. According to Kays (1998), consumers like large peaches because they have higher relation between flesh (edible) and stone (no edible part), i.e., the preference is based on economics aspects.

Consumers really disliked small peaches. Model 1 shows that consumers had high negative utility (-0.25) when they shifted medium size peaches (250 g) for the smallest size peaches (160 g). This negative utility was greater than the positive utility (0.11) of swapping medium size peaches for largest size peaches (380 g). These results converge to the previous work, such as Bruhn (1995).

California Tree Fruit Agreement (2005) affirm that consumer not only disliked smallest peach sizes, but also the largest peach size was not the most desired size. They found that the most appreciated peach size in USA was between a tennis ball and a baseball. Model 3 results show that in Zaragoza the most desired late season peach size weighs around 254 g per fruit. This weight corresponds to a 5 kg box with 20 fruits.

Table 5. Estimated parameters considering different approaches for peach size.

Variable	Model 1	Model 2	Model 3
Price	-0.31***	-0.31***	-0.31***
From Calanda with PDO	0.95***	0.94***	0.94
From Calanda without PDO [1]	-0.08	-0.08	-0.08***
From other area without PDO	-0.87***	-0.85***	-0.85***
Bulk peaches	-0.03^{ns}	-0.03^{ns}	-0.03^{ns}
Normal packaging[1]	0.18	0.18	0.18
Active packaging	-0.15***	-0.15***	-0.15***
Smallest size	-0.25***	-	-
Medium size[1]	0.14	-	-
Largest size	0.11***	-	-
Peach size ($\beta*X$)	-	0.02^{ns}	-0,66^{ns}
Peach size ($\beta*X^2$)	-	-	1,30^{ns}
Number of estimated parameters	7	6	7
Number of observations	5,688	5,688	5,688
Final log-likelihood	-4,847	-4,914	-4,914
Adjusted rho-square	22.3%	21.3%	21.2%
CAIC	9,761	9,887	9,896

The symbol *** represents estimated parameter statistically significant at 1% and "^{ns}" it is not statistically significant. [1]The attribute-level of reference.

Traditionally, peaches are sold in boxes (in bulk) at supermarkets' gondola in Spain. However, there is a trend to move toward a wide range of packaging to adapt the product to consumers' needs and tastes. The results show that consumers were indifferent between peaches conditioned in normal packaging and in bulk. Statistically, bulk peaches parameter is not statistically different from zero. This result is the opposite of those found by Campbell et al. (2013) in Canada. They observed that plastic packaging was a viable strategy for increasing peach demand.

Although active packaging has many technical advantages compared to normal packaging, consumers disgusted active packaging. In the models (Table 5), estimated parameters of active packing are negative and statistically different from zero. Probably, there were not enough discussion among consumers about fruit packaging, which made it poorly understood by them. Consumers may also be realizing that the new product could be artificial, which may have negative consequences on health or its taste.

The strongest preferences were observed regarding to production area and PDO brand. Peaches produced in Calanda area without PDO Calanda brand provided higher utility than those produced in other areas without PDO brand. Thus, consumers recognized the existence of the positive link between Calanda production environment and fruit's quality.

Recently, Massaglia et al. (2019) found similar preference in Italy. For Italian consumers, country of origin is the most important attribute on their purchase decision. Local production, which may guarantee the sustainability of local companies, is the fourth most important attribute. The geographical indication and brand are the seventh and tenth most important attributes, respectively.

Consumers like PDO Calanda Peaches brand. All estimated models show that consumers perceived higher utility with certified peaches by the PDO Calanda Council. The value-added of the PDO Calanda brand occurred for several reasons. The PDO product quality uncertainty was reduced. PDO brand provided more precise indication about the high expected quality of peaches and, consequently, the consumers' ability to match with the observed quality was improved (Menapace et al., 2011).

Tradition was another aspect that explain PDO Calanda brand preference. Previous works suggested that consumers from Zaragoza had clear preference for PDO labels. Espejel et al. (2007a) and Resano et al. (2009) found strong preferences toward PDO Spanish air-cured ham in this place. In this sense, Espejel et al. (2007b) also observed similar preference toward olive oil with PDO "Aceite del Bajo Aragón".

In summary, Calanda peaches' market strategies may be oriented towards experience attribute-oriented consumers, such as suggested by Zhou et al. (2018), for US consumers. Thus, fruit sweetness and flavor should be improved as much as possible. According to those authors, experience attribute-oriented consumers tend to be less price sensitive.

The price affected peach choice. The estimated value of -0.31 says that consumers perceive a negative utility when peach price increases. This result was expected because, if consumers behave rationally, *cateris paribus*, they prefer to pay less money for a determined product.

In all models, the number of observations was the same (316 consumers * 9 choices set per consumer * 2 choices per choice set = 5,688 observations). Model 1 explains better the consumers' response variance (Adjusted R^2 = 22.3%) than model 2 or 3. Model 1 has the best fit because it has the lowest CAIC.

Although this work presents results in terms of marginal utility, it is important to highlight some previous works. Alfnes & Rickertsen (2007) and Lusk & Schroeder (2006) found that hypothetical discrete choice experiment and experimental auction yield same alternatives rank, nevertheless, obtain different WTP values. Normally, auction bids are significantly lower that WTP values estimated through DCE. However, when consumers are more familiar with the product, such as with late season peaches in Zaragoza, the inconsistences between those two methods are smaller (Su et al., 2017; Gracia et al., 2011).

3.3 Interaction-effect model

Late season peach market does not have same preference. The heterogeneity of preferences is presented in Table 6. Age influenced the preference for late season peaches. Consumers who were older than 50 years had stronger preference to PDO Calanda Peaches brand. Informally, older consumers said that they had worked in the Calanda area and they maintained relationship with people from this geographical area. Older consumers disliked the largest peach size but had similar disliking for smallest size fruit than younger consumers. Although increasing price for all consumers will decrease utility, older consumers were less sensitive to peach price.

Surprisingly, income did not influence price sensitivity and the attitude toward peach size. In both cases, the interaction between income and peach price or size were not statistically significant. Statistical difference was found between consumer income and preference for production area as well as toward packaging. Low income consumers had less disutility with peaches from other areas and with those sold in bulk.

The preferences of a consumer with elementary education were similar to preferences of those consumers in high school or college. Consumers with elementary education level only disliked more peaches sold in active packaging. Probably, more educated consumers dealt with more innovative environments, and they felt less neophobia against this new presentation.

Table 6. Interaction effect among late season peaches' characteristics and consumers' characteristics.

Variable	Mean effect	Interaction effect					
		Older than 50	Low income	Elementary education	Woman	Loyal	Regular
Price	-0.64***	0.12**	0.01[ns]	0.03[ns]	0.18***	0.09*	0.15***
From Calanda with PDO	1.01***	0.11*	-0.01[ns]	-0.02[ns]	-0.05[ns]	-0.13**	0.05[ns]
From Calanda without PDO[1]	0.02	-0.05	-0.19	-0.04	-0.05	0.09	-0.06
From other area without PDO	-1.03***	-0.06[ns]	0.20***	0.06[ns]	0.10**	0.04**	0.00[ns]
Bulk peaches	-0.17***	0.08[ns]	-0.10**	0.06[ns]	0.09**	0.12***	-0.02[ns]
Normal packaging[1]	0.34	-0.02	0.02	0.05	-0.07	-0.08	-0.09
Active packaging	-0.17***	-0.05[ns]	0.08*	-0.11**	-0.01[ns]	-0.04**	0.11**
Smallest size	-0.33***	0.06[ns]	0.05[ns]	-0.01[ns]	0.06[ns]	0.05[ns]	-0.05[ns]
Medium size[1]	0.14	0.07	-0.04	-0.02	0.03	-0.03	-0.01
Largest size	0.19***	-0.12***	-0.01[ns]	0.04[ns]	-0.10**	-0.02[ns]	0.06**
Number of estimated parameters	49						
Number of observations	5,688						
Final log-likelihood	-4,772						
Adjusted rho-square	22.9%						
CAIC	10,016.4						

The symbol ***, **, and * represent estimated parameter statistically significant at the 1%, 5% and 10% levels, respectively, and "[ns]" it is not statistically significant. [1]The attribute-level of reference.

Different gender had different preference toward late season peaches. Women had less disutility with prices than men as well as with peaches from other areas coming not from Calanda and with bulk peaches. Women had less utility with the largest peaches than with medium size.

Loyalty degree explains the different preferences concerning price, PDO brand and packaging. Consumers with the higher loyalty degree had smaller disutility with prices. Consumers with highest loyalty degree had stronger preferences for bulk peaches and less preference for PDO Calanda Peaches brand than other kind of consumer. Loyalty degree did not interfere on peach size preference.

Besides having less disutility with price, regular consumers had smaller disutility with active packing. Regarding of different origins, peaches sizes, peaches conditioned in normal packing or in bulk, regular consumers had the same utility than sporadic.

4 Conclusions

This study has generated new information of consumers' preferences about peaches consumption in the city of Zaragoza, Spain. This information may guide the private sector in their market strategy in order to obtain higher profits; and the public sector may use the information to develop polices to increase peach consumption.

The reputation of peaches produced in Calanda area has been a consequence of their differentiated quality. The Regulatory Council determines and controls peaches quality, as well as it certificates the product authenticity with their brand. Producing peaches under a PDO brand have been more expensive, but the product may be commercialized with higher prices.

Consumers differentiate peach quality by origin, and they prefer a product with quality guaranty. Although it was no estimated consumers' willingness to pay for different late season peaches' attributes and there has been no accompanying the certification costs, there were strong indications that PDO Calanda peaches is a good business to accredited growers. Thus, it may contribute to the social and economic development of Calanda area.

Peach size has strong visual attraction and it influenced purchase significantly when different sizes options were offered. Smallest size peaches were the least accepted in the market and, with certain limit, large size was preferred. Not everybody was able to eat one largest size peach (380 g) at once. On average, the most appreciated peach size was around 254 g (5 kg boxes with 20 fruits), i.e., a medium size fruit.

Packaging has contributed to adapt the product to the modern consumer needs and wishes. Consumers showed a slight preference for normal packing peaches (on average, consumers were statistically indifferent between normal parking and bulk peaches). Considering the objective quality, peaches presented in active packing have higher quality than peaches conditioned in normal packing; however, consumers perceived it as opposite. They valued positively the perishable feature of peaches because they associated it with freshness. In order to contribute to market success of this technological innovation, it is necessary to make efforts to inform consumers that peaches do not lose their freshness and natural properties, because those features are not necessarily related to the eating deadline.

In general, for consumers of Zaragoza, the best late season peach profile was the one in which the fruit was produced in the Calanda area, with the PDO Calanda brand, weighing around 254 g (5 kg box with 20 fruits), presented in normal packaging or in bulk, and with a price as low as possible.

Preferences heterogeneity was estimated through interaction effects between late season peaches and consumers' characteristics. One model for consumers with different PDO Calanda Peaches consumption frequency (regular and sporadic) had been calculated, other model for loyalty degree (highly loyal or not), and so on for gender, education level (elementary or not), age (younger than 50, 50 and older) and household income (less or more than 1,500 €/month). Men and regular consumers preferred larger peaches than women and sporadic consumers. Another finding was that regular consumers as well as those with high loyalty, women and older than 50 years old were less sensitive to price. Thus, the willingness to pay for all attributes levels by these consumers are higher.

It is important to highlight that interviews, which occurred more than 10 years ago, is one of this research limitations. In this period, consumers' preference may have changed, as well as the retail market dynamics. Thus, results should be interpreted with caution.

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