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Food Sustainability and Waste Reduction in Spain: Consumer Preferences for Local, Suboptimal, And/Or Unwashed Fresh Food Products

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Abstract: Improving food sustainability and reducing food waste are among the top challenges for achieving global sustainable development. In particular, changes towards more sustainable consumption are of vital importance in creating a more sustainable world. To shed light on these issues, we analyze to what extent and how consumers' food preferences move towards more sustainable behavior. We assess the importance consumers attach to the following critical sustainable attributes of food related to food waste: (i) "Visual imperfections", (ii) "washed/unwashed", (iii) "size", (iv) "locally produced", and (v) "price". We hypothesize that consumer preferences for these attributes are heterogeneous. Therefore, we segmented consumers into homogenous groups according to preferences for these sustainability attributes. To do this, we employed a direct ranking preference method using data gathered in an experiment conducted with consumers living in a mid-sized town in the northeast of Spain in 2018. The results suggest a high degree of consumer heterogeneity, and we identified four clusters according to the importance consumers attach to these attributes. The results are encouraging for the promotion of sustainability because different groups of consumers might prefer to purchase food products with different sustainable characteristics, such as locally grown, foods with visual imperfections, and minimally processed foods.

Keywords: fresh potatoes; Spain; attribute importance; rank-ordered mixed logit

1. Introduction

Food sustainability is one of the main concepts considered to achieve global sustainable development. Sustainable food systems can improve efficiency and sustainability in the use of resources while simultaneously reducing natural resource damage and waste. To reach sustainable development goals, it is necessary to promote, enhance, and accelerate the shift towards a more sustainable food production and consumption [1]. To reduce the environmental negative effects of food systems, three primary actions are often considered: (i) Dietary changes towards healthy diets, (ii) technology and management innovations in production and transportation processes, and (iii) reductions in food loss and waste [2]. It is widely accepted that changes in food consumption patterns can provide higher environmental benefits than the transformation of food production [3]. Willett, et al. [4] estimate that changes in food production may reduce agricultural GHG emissions in 2050 by 10% while increasing consumption of plant-based diets could reduce emissions by up to 80%. In addition, an additional 5% reduction could be achieved by halving food loss and waste. In the same

way, improvements in food production practices may reduce water use by 30% and halving food loss and waste could reduce the use of water by 13%.

In a sustainable diet, production has a low environmental impact, protects and respects natural resources, and must be economically affordable [5]. Consequently, a shift towards healthier and sustainable diets is recommended to reduce the negative environmental impacts of the food system. Consumer food choices are influenced by different food quality attributes, such as price and health [6], together with altruistic motives, such as sustainability [7]. Thus, a large number of studies on sustainable food consumption have been conducted on a variety of topics relating to the three sustainability dimensions (economic, environmental, and social) that analyze choices made for environmental concerns, animal welfare, and fair trade food products [8]. In particular, local foods are considered more sustainable because they encompass the three sustainability dimensions, economic benefits (create economic value in the local economy, increase the income for farmers, create employment opportunities, etc.), environmental benefits (reduce the use of resources and the environmental effects of transportation (food miles) and conserve the traditional agricultural landscape and biodiversity, etc.), and social benefits (improve personal welfare by providing healthier, more nutritional, fresher, and better-tasting food, increase social justice and community power, etc.), among other sustainability benefits [9]. In addition, there is evidence that a fully local diet contributes to mitigating GHG emissions [5]. Thus, many studies focused on examining consumer perceptions and preferences for local foods [10–16]. They found that consumers often perceive that local foods are more sustainable than nonlocal foods, although this is not always true. First, local foods might not be more environmentally sustainable because they do not always reduce total greenhouse emissions (GHG), as this reduction also depends on emissions in production intensity and transportation mode [17]. Second, the reduction in GHG is only one aspect within the sustainability debate, and other sustainable dimensions should be considered as well. For example, social impacts are also highly relevant because consumers prefer local foods to support regional farms and local economic activities [14,18].

Reduction of food loss and waste is another important factor to reduce negative environmental impacts [4] on three sustainability dimensions (carbon, land, and use) [2]. Reducing food loss and waste improves the efficiency of natural resource utilization and reduces greenhouse gas (GHG) emissions. The environmental effects of food loss and waste depend on the type of food product, the geographical location of production and consumption, and the segment of the supply chain where food is lost or wasted. In developed countries, reducing waste at the consumer segment of the supply chain may have the largest environmental effects because most food is wasted in consumption. Moreover, if the objective is to reduce GHG emissions, food waste at the consumption stage should be the focus because food products incorporate all GHG emissions of the previous supply chain stages [2]. It is estimated that, in Europe, households contribute to over half of the total food waste [19] while [20] and [21] estimations are lower (between 30%–35% of all food waste). Households waste food at home in several ways, such as leaving food scraps and leftover food as well as not consuming food products after expiration. In addition, they indirectly cause additional food waste along the food chain because of their shopping decisions in the store. For instance, they normally neglect to buy food products because of visual imperfections, close expiration dates, or packaging damage. This behavior influences retailers' decisions and they apply aesthetic standards because it is assumed that consumers will not buy those suboptimal foods [22]. These food products that are perceived by consumers as relatively undesirable compared to normal products are called suboptimal [23]. These suboptimal food products are thrown away even though they are perfectly edible, but the production of unconsumed food has the same environmental impact as the consumed food [5]. The reduction of food waste could be possible if consumers would accept these suboptimal products under certain conditions [23,24].

Thus, analyzing how consumers' food preferences shift towards more sustainable behaviors is of vital importance in contributing to a more sustainable world. This paper aims to contribute to this general goal and it studies consumers' preferences for some sustainable food attributes related to food waste. Because the importance of an attribute is product-specific [25], we chose a particular

product for our analysis. We selected a perishable plant-based food product instead of a meat-based product because the former products use substantially less natural resources and have less impact on the environment [26]. Moreover, plant-based food products are the ones with higher food waste, in particular, fruit and vegetables (45%) and roots and tubers (45%), according to FAO figures [27]. Among these products, fresh potatoes are the ones with the highest loss rates, with a loss rate from 53% in Switzerland to 56% in the UK [28].

Consequently, consumers' preferences for different sustainable food attributes in fresh potatoes were selected for investigation, as well as the importance consumers attach to these attributes when shopping. In particular, we chose four sustainable attributes related to food waste, as well as price, to measure their importance. The five attributes selected were: (i) "Visual imperfections", (ii) "washed/unwashed", (iii) "size", (iv) "locally produced", and (v) "price". The first four attributes were selected based on their sustainability and food waste reduction implications and on their importance to consumers (as explained in Section 2.1). This selection was based on potato experts' opinions complemented by findings from previous research on consumers' acceptance and preferences for fresh potatoes. Thus, the first three attributes ("visual imperfections", "washed/unwashed", and "size") are directly related to food waste reduction. The fourth ("local") is a sustainable attribute valued by consumers and is associated with food waste reduction due to shorter transportation and distribution. In addition, consumers often perceive that buying local food products is also good for economic and social reasons (e.g., increase farmers' incomes, help to maintain the population of a territory), and that they are fresher and/or of better quality [29,30]. Finally, the price is included to take into account budget restrictions, following [24] finding that consumers need a price discount when purchasing suboptimal products.

Previous studies on consumer preferences for sustainable food attributes focus mainly on organic products and, to a lesser extent, on issues such as carbon footprint, waste reduction, and water management. Several empirical papers analyze the consumer preferences for other sustainable attributes for other food products [7,25,31–33]. More recently, researchers assessed consumer willingness to pay (WTP) for some sustainable attributes. For example, [34] examined WTP for food products that reduce water pollution, [35] studied WTP for the application of low carbon emission technologies, and [36] investigated biodiversity, water, by-product, and energy management. In addition, an emerging stream of research studies consumer preferences for suboptimal food products focusing mainly on the expiration date labels [7,22,24]. Finally, [37] study consumers' preferences for food products with upcycled ingredients taking into account a "carbon trust" label. Our paper follows the first stream of literature measuring consumers' importance attached to sustainability attributes related to food waste. We hypothesize that preferences for these attributes are heterogeneous across consumers. We examine whether there are particular segments of consumers interested in these attributes, their size and characteristics. We profile the identified segments based on sociodemographic characteristics and purchase and consumption habits for potatoes.

To fulfill our aim, we employ a direct ranking preference method following [38]. To study heterogeneity in preferences, we transformed the original ranking data into "pseudo-choices" or "pseudo-observations" and estimated a rank-ordered mixed logit model [39]. The data are from an experiment conducted with consumers in a mid-sized town in northeastern Spain in 2018.

2. Materials and Methods

2.1. Study Design: Lancaster Utility Theoretical Background

To reach our objective of assessing the importance consumers attach to different sustainability attributes related to food waste, a direct ranking question was used. Respondents have to rank the different attributes from most to least preferred, which represents the utility derived by each respondent from each of the attributes. This information can be used in the traditional random utility model (RUM), assuming that each respondent n faces a choice among J options. Thus, subjects get utility (U_{nj})

from choosing option *j* over other options available. To do this, the original ranking of the different attributes is transformed into "pseudo-choices" or "pseudo-observations" to maximize preferences [39]. Thus, for the first pseudo-observation, the choice set includes five options ($J = 5$), and the dependent variable identifies the option ranked as the most preferred. For the second pseudo-observation, the option ranked first is discarded, leaving a choice set consisting of *J-1* options, and the option ranked second is the chosen option. The process goes on until the choice set comprises only two options. Then, the original ranking of *J* options is transformed into *J-1* independent choices for each respondent obtaining the new dataset.

Utility (U_{nj}), according to the [40] Lancaster model, depends on the product attributes (X_{nj}). In addition, following the RUM, this utility consists of two components: One is observed by the analyst (V_{nj}), whereas the other is not observed by the analyst (ε_{nj}) and is assumed to be random and distributed *iid* extreme value (as for a logit model) in the following way:

$$\mathrm{U_{nj}} = \beta\prime_n \mathrm{X}_{nj} + \varepsilon_{nj} \quad (1)$$

The attributes included in the ranking question were selected taking into account their sustainability and food waste reduction implications and their importance to consumers.

Apart from the sustainability attributes, price was included, as previously mentioned, to account for budgetary restrictions and following [24] who states that consumers need a price discount in the suboptimal products in order to be willing to buy them. The rest of the attributes were selected based on expert opinions and a literature review concerning consumers' preferences for potatoes and fresh products. We had several meetings with a large potato producer, the main potato wholesaler in the region, and the technician of the extension agricultural department on roots and vegetables. The three of them agreed that the external appearance of fresh potatoes is the most important attribute, and in particular, they mentioned that the top consumer priority concerning appearance is a preference for washed potatoes. In addition, they indicated the visual appearance (potatoes should not have visual imperfections such as a bad shape or skin blemishes), and the size of the potatoes as another external characteristic important to consumers. This expert information was used to complement findings from previous empirical papers on consumers' acceptance and preferences for fresh potatoes. For the most important attribute mentioned by experts, washed versus unwashed, little empirical evidence was found, and what was found was conducted long ago [41]. Scott et al. [41] studied consumers' acceptance of washed and unwashed potatoes in Ohio. They found that the acceptance of washed potatoes was greater than unwashed, with a one cent ($) price premium for washed potatoes. Because the average price for the potatoes was not mentioned, it is not possible to put the WTP in relative terms. However, more recently, [28] have demonstrated that selling potatoes unwashed reduced potato waste in the supply chain from 53% to 48%. In addition, the authors analyzed consumers' acceptance of unwashed potatoes compared to washed and found that consumers would accept unwashed potatoes after knowing that selling them unwashed could reduce food waste by 53% (Consumers in the survey were informed that around 53% of all produced fresh potatoes were lost from field to plate. This equals approximately 5300 trucks of fresh potatoes per year. If potatoes were sold unwashed and in lightproof containers, the total annual losses in Switzerland could be reduced by 500 truckloads."). Apart from being an important attribute for consumers, this attribute is directly related to food waste reduction and was thus selected.

By contrast, [42] studied the factors affecting consumers' preferences regarding fresh potatoes in Maine (USA). They found that the two most important characteristics for consumers were the origin of the potato and skin quality. In particular, respondents were very interested in purchasing locally produced potatoes because they view locally produced potatoes as having positive benefits for the economy, the health, and the environment. The skin free from blemishes was the second most important attribute. This aspect was distantly followed by the size of potatoes with similar characteristics, such as skin color and cleanliness. The price and whether the potato was organic were ranked last. In light of this study, the last three attributes we chose were locally produced, visual imperfections, and the

size of the potatoes. In addition, the organic attribute was not included because, although organic is perceived as an environmentally-friendly attribute associated with sustainability [43], it is not related to food waste, which is the main focus of this study.

Being locally produced is also one of the sustainability attributes most important for consumers. Most empirical papers on consumers' preferences for sustainability attributes for fresh plant-based produce focused on local and organic produce. They have found that consumers positively value both of them separately [14]. Moreover, a growing number of papers study both local and organic claims and consistently find that consumers are willing to pay an extra price higher for local foods than for organic [12,13,44–48]. Additionally, with respect to fresh organic and local products, consumers appear to have overlapping values, with stronger preferences for local than for organic food [14,49]. This result supports the general trend that consumers are moving from buying organic food, shifting to local food [14,50]. The value of being locally produced was consequently selected instead of whether food was organic as a sustainability attribute because the former has been found to be more important to consumers [42] and also because it is the sustainability attribute more valued by consumers regarding fresh products. Among the different definitions of local food, we used a geopolitical boundary definition, and we informed respondents that the term local means "produced within the region" [51,52].

Visual imperfections (such as poorly shaped and skin blemishes, among other imperfections) and the size of potatoes, apart from being important to consumers, are directly related to food waste. When these two external appearance characteristics do not match the aesthetic standard, fresh products are generally neglected by consumers and considered as suboptimal. Sometimes these products are thrown away despite being perfectly edible, or in other cases, the suboptimal products are used by food industries with the corresponding loss in value [2]. Consequently, knowing the level of consumers' acceptance of visual imperfections and different sizes could help to reduce potential food waste.

2.2. Study Setting and Participants

The study was conducted in one of the largest towns in Spain located in the northeast in 2018. The target population was set as the town inhabitants older than 18 years responsible for buying the food and cooking in the family (or share this responsibility). This town was selected because its population sociodemographic characteristics are similar to those of the Spanish Census of Population (Table A1 in Appendix A). The final sample consisted of 151 participants.

2.3. Data Instrument and Measurement

The data were obtained from an artefactual experiment with consumers (see [53] for a definition of experiments types) to guarantee that the final participants were food purchasers having experience with the analyzed product [54,55]. The experiment consisted of a total of 13 sessions with around 12 participants for each session. The participants were recruited via consumer associations located in different neighborhoods and in public institutions around the town (universities, town hall learning centers, community activity centers, etc.). Only frequent food shoppers who were the main person responsible for cooking at home were invited to participate in the experiment. Thus, we did not expect to get a sample matching the population demographics but a sample representative of this part of the general population. In other words, we expected that our sample would consist of older participants and more females.

Upon arrival, participants received information about the working session and were asked to sign a consent of participation form. An identification number was given to each participant to maintain the required anonymity. The monitor explained the general instruction of the session and provided all the information in clear written instructions. First, before asking them to rank the importance of different potato attributes when shopping, we aim to mimic a potato shopping environment. Then, participants were asked to inspect different fresh potatoes, as sold in the town market. These potatoes had different attributes to be ranked after. All of them were white potatoes but differed according to geographical origin, size, washed/unwashed, and type of package (paper, mesh,

with and without transparent cellophane). The different potatoes were presented as they were sold in the stores in packages of around 3 kg. In Spain, the size of potatoes sold in the market normally ranges from 40 to 80 mm in diameter, exceptionally reaching 100 mm. However, to give respondents the opportunity to see the visual differences among potatoes, small bulk displays of the different potatoes were set up near the packaged potatoes. Finally, to get involved in the shopping experience, they were asked to indicate which potato they would probably buy. Then, they filled in a brief questionnaire containing the direct ranking questions to measure consumer preferences for the different attributes. In the direct ranking question, respondents were asked to rank the following attributes: (i) "Visual imperfections", (ii) "washed/unwashed", (iii) "size", (iv) "locally produced", and (v) "price" from most to least preferred, where 1 indicates the most preferred and 5 the least preferred. Before ranking, these attributes were explained to participants. In addition, the respondents were asked sociodemographic questions and about their purchase and consumption habits of potatoes (presented in Tables 1 and 2 at the beginning of the results section).

Table 1. Demographic characteristics of the sample and population (%, otherwise stated).

Characteristics	Sample (n = 151)	Population *
Gender [1]		
Male	24.0	49.1
Female	76.0	50.9
Age (average, standard dev) [1]	54.4 (13.6)	n.a.
18–34	6.4	22.8
35–44	14.4	20.2
45–54	29.6	19.0
≥55	49.6	38.0
Studies level [2]		
Primary	20.0	23.0
Secondary	24.0	48.7
Higher	56.0	28.3
Income range		
≤1500 €/month	22.4	n.a.
1501–2500 €/month	22.4	n.a.
2501–3500 €/month	20.0	n.a.
>3500 €/month	12.0	n.a.
Do not know/refuse to answer	23.2	n.a.
Family size (average, standard dev)	2.9 (1.0)	n.a.
Children less than 18 years old		
0	69.1	n.a.
1	17.9	n.a.
2	10.6	n.a.
>3	2.4	n.a.
Vegetarian	2.4	n.a.
Years living in the region (average)	50.0	n.a.
Frequency of shopping food		
Always	44.8	n.a.
Often	50.3	
Frequency of cooking at home		
Every day	81.5	n.a.
Several times a week	9.6	

[1] [57] INE (2017); [2] [58] IAEST (2018) * Province where the town is located.

Table 2. Potato purchase and consumption habits of respondents (%).

Purchase Potatoes Habits	%	Consumption Potatoes Habits	%
Frequency of purchase		Frequency of consumption	
Less than once a month	13.3	Less than once a week	10.5
Several times per month	55.7	Once a week	18.5
Once a week	31.0	Several times a week	71.0
Purchase format		Type of potato	
Bulk	48.2	White	83.0
Packaged	71.7	Red	41.1
Size of package		Type of cooking	
1 kg	2.4	Fried (never)	5.6
3 kg	65.5	Boiled (never)	5.6
5 kg	33.3	Baked (never)	14.4
Place of purchase			
Green grocery store	61.9		
Open market	5.3		
Supermarket	70.8		
Direct from the farmer	4.4		
Hypermarket	12.4		

2.4. Data Analysis

With the gathered information from the ranking question, the probabilities of first ranking, second ranking, etc., were calculated. These values indicate the order of participants' preferences, but they cannot address preferences' heterogeneity of respondents. To do that, we transformed the original data into a sequence of choices (as described in Section 2.1.), specify the utility function following the Lancaster theoretical model (Equation (1)), and estimated a rank-ordered mixed logit.

2.4.1. Rank-Ordered Mixed Logit

To estimate the utility function (Equation (1)), we used a mixed rank-ordered logit (MRL) because it combines the flexibility of the mixed logit and the ability to take into account the heterogeneity in preferences with the adequacy of our new transformed data from the ranking observations.

Assuming a standard logit, the probability of respondent n ranking J alternatives from best to worst as $j_1, \ldots ; j_m, \ldots ; j_J$, where j_m indicates the option chosen at the ranking of order m, is defined as the product of logit choice probabilities:

$$\text{Prob}(\text{ranking} \quad j_1, \ldots, j_m, \ldots, j_J) = \text{Prob}(U_{j_1} > \ldots > U_{j_m} > \ldots > U_{j_J}) = \prod_{m=1}^{J-1} \frac{e^{V_{njm}}}{\sum_{k=m}^{J} e^{V_{njm}}} \quad (2)$$

where $V_{nj} = \beta'_n X_{nj}$.

The β'_n coefficients differed across respondents representing the heterogeneity in respondents' preferences. In other words, the vector of parameters β_n is randomly distributed with a density distribution $g(\beta/\theta)$, where θ represents the coefficients of the probability distribution (i.e., the mean and the standard deviation). Equation (1) represents the probability for respondent n choosing a ranking conditional on β. The unconditional probability is the integral of these probabilities over the density of β:

$$\text{Prob}(\text{ranking} \quad j_1, \ldots, j_m, \ldots, j_J) = \int \prod_{m=1}^{J-1} \frac{e^{V_{njm}}}{\sum_{k=m}^{J} e^{V_{njk}}} \times g(\beta|\theta) d\theta \quad (3)$$

The mixed logit model is estimated with the transformed data set where the $J-1$ pseudo-observations are treated as $J-1$ choices in a panel. In the mixed logit, each respondent has her/his own coefficients, and these coefficients affect her/his entire ranking because the new "pseudo-observations" are correlated [39]. In our application, the β'_n random coefficients are assumed to follow a normal distribution. This estimation was done using the software NLOGIT 5.0.

2.4.2. Preference Heterogeneity

Estimated coefficients of the rank-ordered mixed logit for each of the respondents were utilized to segment them using cluster analysis (k-means). Thus, the segments were profiled by their sociodemographic characteristics and potato purchase and/or consumption habits defined in Tables 1 and 2. Bivariante analysis was used to statistically test the differences across cluster for the different characterization variables. In particular, the chi-square or the Bonferroni test [56] were utilized depending on the nature of these variables. Statistical analyses were done using STATA 16.0.

3. Results

Table 1 shows the characteristics of the sample as well as some population features for comparison. The population of our study was not the general population but the people who were responsible for shopping and cooking food at home. Table 1 shows that our sample comprises people who always or often do the grocery shopping (95.1%) and usually cooked at home every day or several times a week (91.1%).

Most of the respondents were female (76%), with an average age of 54.4 years, and they had lived in the region for 50 years on average. Respondents lived in households with three members on average, and 69.1% were without children under 18 years old at home. Around 45% of respondents stated that they received a net monthly income of less than €2500, and only 12% had more than €3500. Respondents with secondary education accounted for 24%, while participants with higher levels of education for 56%.

Table 2 presents that most respondents purchased and consumed potatoes at least once a month (86.7%) or once a week (89.5%), respectively. In addition, most consumers purchased packaged white potatoes in three-kilo containers. Potatoes were purchased in green grocery stores (61.9%) or in supermarkets (70.8%), with some consumers buying potatoes in both places. On the other hand, a minority of consumers indicated that they buy the potatoes in open markets or directly from farmers (5.3% and 4.4%, respectively). Finally, only 5.7% of respondents never consume potatoes fried or boiled, and 14.5% never eat baked potatoes.

3.1. Attribute Importance Ranking

Table 3 displays the percentage of respondents who mentioned the different attributes as first, second, third, fourth, and fifth preferred. The results from the probability of first ranked shows that the two most important attributes were locally produced and no visual imperfections, with 23.2% of respondents ranking one of these characteristics first. By contrast, the price and the size were the least important attributes.

Table 3. Probability of ranks (%).

	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Without visual imperfections	23.2	19.2	19.2	17.6	20.8
"Washed/unwashed"	21.6	24.0	15.2	21.6	17.6
Size (big, small, etc.)	12.8	19.2	25.6	24.0	18.4
Locally produced	23.2	18.4	21.6	17.6	19.2
Price	19.2	19.2	18.4	19.2	24.0

3.2. Analysis of Heterogeneity

We expected consumer preferences for the different attributes to be heterogeneous, and a ranked-order mixed logit was estimated, as described in Section 2. This estimation was done taking the least-preferred attribute (size) as the reference category to avoid multicollinearity. We selected size as the reference attribute because it exhibits the least value to participants (Table 3). Thus, dropping it from the estimation ensures that all parameter estimates are positive, facilitating the interpretation of results.

Table 4 shows the mean and the standard deviation of the estimated coefficients for the ranked-order mixed logit. These standard deviations were statistically significant at the 5% significance level, meaning that consumer preferences for the different attributes were heterogeneous. The mean of the estimated parameters was positive but not statistically significant, indicating that the importance given to these four attributes was not statistically different from the importance attached to the size attribute used as a reference.

Table 4. Estimation of the rank-ordered mixed logit.

	Coefficient (β'_n)	**Z-Ratio**	**Coefficient (β'_n)**	**Z-Ratio**
	Mean values		Standard deviation	
Without visual imperfections	0.2325	1.04	1.3035	2.70 ***
"Washed/unwashed"	0.2888	1.35	1.0741	2.33 **
Locally produced	0.2402	1.15	1.0999	2.49 **
Price	0.0428	0.20	1.2979	2.55 **

Number of observations: 500; Number of participants: 125. Log likelihood at convergence: −594.52; χ^2 = 420.4 (0.00). Pseudo R-square: 0.26. *** and ** denote statistical significance at 1% and 5% significance levels, respectively.

To test the overall statistical significance of the model, we calculated the likelihood ratio (LR) between the log likelihood of the model at convergence and the restricted log likelihood (−804.72), which accounts for 420.4 with a *p*-value of (0.00) corroborating the overall significance of the model.

Because the standard deviations of the mean estimated coefficients were statistically significant, we used the estimated parameters for each of the respondents (β'_n) to segment them into homogeneous groups using cluster analysis (k-means) [56] (Hair et al., 1998). From the cluster, four segments of similar sizes were obtained (Table 5). To select the number of clusters, a silhouette plot was drawn (available from the authors upon request) and the average silhouette coefficient was calculated for 2, 3, 4, 5, and 6 segments. Four clusters were selected because the silhouette coefficient was the highest (0.655, 0.696, 0.73, 0.716 and 0.675 for 2, 3, 4, 5, and 6 clusters, respectively) [59] (Kallas et al., 2019). In addition, the number of the observations misclassified (silhouettes less than zero, or observations that could have been classified in more than one cluster) is zero for 4 clusters, and 2, 10, 1 and 4 for 2, 3, 5 and 6 clusters, respectively [60] (Avni et al., 2014). Segment 1 comprised 24.8% of respondents, segment 2 21.6%, segment 3 24.8% and segment 4 28.8%. We conducted an analysis of variance (Bonferroni test) for the attribute estimated coefficients to check if the four segments were different across them.

Table 5 indicates that estimated parameters for attribute importance differed statistically across clusters (as indicated by different superscript letters using the Bonferroni test). In the case of no visual imperfections, the importance-estimated parameters differ across the four clusters. However, for "washed/unwashed", the estimated importance did not statistically differ between clusters 3 and 4. The importance for locally produced estimates did not statistically differ between clusters 1 and 3. Finally, no differences in attribute importance estimates were found between clusters 2 and 3 for price. To give name to the clusters, the mean values of the estimates for the attribute importance were used.

Cluster 1 received the name "price-sensitive" because consumers in this segment placed more importance to price than the rest of segments, and furthermore, price was a more important attribute for this group of consumers, followed by no visual imperfections. Similarly, cluster 2 was named "locavores" because they ranked locally produced higher than the rest of the segments and as the most important. They also attached high importance to a lack of visual imperfections, which was the second most important attribute for them. Cluster 3 was denominated, "external appearance lovers" because they placed the highest importance to visual imperfections and "washed/unwashed" compared to the rest of clusters, with these two attributes being the most important for them. Finally, cluster 4 was named "visual imperfection takers" because they attached the lowest importance to this attribute

compared to the rest of clusters, and consumers in this segment ranked this attribute as least important. In other words, consumers in segment 4 would accept potatoes with visual imperfections.

Table 5. Segment of potato consumer: characterization.

	Cluster 1 Price-Sensitive (24.8%)	Cluster 2 Locavores (21.6%)	Cluster 3 External Appearance Lovers (24.8%)	Cluster 4 Visual Imperfection Takers (28.8%)	Total Sample
Estimated coefficients (β'_n)					
Without visual imperfections	0.54 [a]	0.47 [b]	0.84 [c]	−0.77 [d]	0.22
"Washed/unwashed"	0.04 [a]	−0.26 [b]	0.70 [c]	0.51 [c]	0.27
Locally produced	−0.01 [a]	0.79 [b]	−0.21 [a]	0.55 [c]	0.25
Price	0.86 [a]	−0.30 [b]	−0.53 [b]	0.09 [c]	0.04
Personal characteristics					
Gender [1.71 (0.63)] [1]					
Female	71.0	81.5	71.0	80.6	76.0
Age(average) [1.47 (0.22)] [2]	50.3 [a]	54.4 [a]	57.2 [a]	55.6 [a]	54.4
45–54 [8.4 (0.04)] [1]**	48.4	14.8	29.0	25.0	29.6
≥ 55 [7.3 (0.06)] [1]*	29.0	51.8	58.1	58.3	49.6
Education level [12.0 (0.06)] [1]*					
Primary studies	9.7	33.3	12.9	25.0	20.0
Secondary studies	19.3	11.1	38.7	25.0	24.0
University degree	71.0	55.6	48.4	50.0	56.0
Children under 18 years [10.1 (0.12)] [1]					
0 children	64.5	63.0	80.0	68.6	69.1
1 child	9.7	22.2	13.3	25.7	17.9
More than 1 child	25.1	14.8	6.7	5.7	13.0
Years living in the region [2.3 (0.08)] [2]*	43.9 [a]	51.7 [a]	55.7 [b]	49.0 [a]	50.0
Potatoes purchase habits					
Potatoes are purchased:					
Packaged [8.5 (0.04)] [1]**	74.1	52.0	70.0	87.1	71.7
In 3 kg bags [5.6 (0.12) [1]]	68.2	80.0	73.9	48.1	65.5
In 5 kg bags [7.0 (0.07)] [1]*	45.0	20.0	17.4	46.1	33.3

Note: ** and * denote statistical significance at 5%, and 10%, respectively. [a,b,c,d] Superscript letters indicate that means were statistically different among clusters using the Bonferroni test. [1] The χ^2-square (p-value) test in brackets; [2] the analysis of variance (p-value) in brackets.

3.3. Segments Profiling

Table 5 shows the analysis of variance and the chi-square test results between the four clusters and the consumers' characteristics displayed in Tables 1 and 2. Only the characteristics that were statistically different across clusters, at least at the 10% significance level, were finally included in characterization.

The "price-sensitive" cluster consisted of a lower proportion of older consumers and those who had lived fewer years in the region. In addition, this segment comprised a higher percentage of respondents with a university education level and households with two children. Together with cluster 4, a higher proportion of these respondents buy potatoes in packages of 5 kgs. The "locavores" segment consisted of a lower percentage of people aged between 45 and 54 years and a higher percentage of consumers with primary studies. a lower proportion of these consumers purchase their potatoes packaged and when they do buy packaged potatoes, they mainly buy 3-kg bags. Consumers in cluster 3 ("external appearance lovers") were the oldest, had lived the longest in the region, and had the highest level of secondary studies. The majority live in households without kids, therefore, they did not usually purchase potatoes in large bag sizes. Finally, consumers in segment 4 ("visual imperfection takers") were more similar in terms of sociodemographic characteristics to the average consumer (last column) but differed the most in purchase and consumption habits from the rest of clusters. Most consumers purchased the potatoes in packages in either bags of 3 kg or 5 kg.

4. Discussion

Our first finding is that the importance given to the attributes "visual imperfections", "washed/unwashed", "locally produced", and "price" was not statistically different from the importance attached to the size attribute used as a reference. This result is in line with [42], who also found that the importance consumers attached to the size and surface cleanliness of the potatoes were equivalent.

Nevertheless, our findings differ from [42] because they state that the local origin and the skin quality are the most important attributes (although they do not statistically test for differences).

Taking into account the segments and their characteristics, the main findings on heterogeneity can be provided. There was a segment of consumers who would not accept either suboptimal, local, or unwashed potatoes because they gave the highest importance to the external appearance characteristics (visual imperfection) and "washed/unwashed", while valuing local origin the least ("external appearance lovers"). Moreover, they gave the least importance to the price. These consumers were generally older, had lived longer in the region, had secondary education, and did not have kids in the household. The second segment of consumers would accept suboptimal and local potatoes because they gave the lowest importance to visual imperfections and placed high importance on the local origin ("visual imperfection takers"). They also gave high importance to whether the potatoes are sold "washed/unwashed" and, assuming they prefer washed potatoes, as experts and the literature review stated, they would not be willing to consume unwashed potatoes. For them, the most important attributes were "locally produced" and "washed/unwashed", with both being of similar importance. These consumers were generally older, had no children or only one child in their household, and purchased mainly packaged potatoes.

Third, there was a segment of consumers who would accept local and unwashed potatoes but not suboptimal ones with visual imperfections ("locavores") because they attached the highest importance to the local origin followed by the visual imperfections and the lowest importance to whether the potatoes were washed or unwashed. They were characterized by a lower percentage of people aged between 45 and 54 years and a higher percentage with primary studies only. a lower proportion of consumers purchase the potatoes packaged, and when they do, they mainly buy 3-kg bags. Finally, there was a segment of consumers more sensitive to the price who also value, but to a lesser extent, the external appearance ("price-sensitive"). Similar results were found for fruit and vegetables by [61–63] and for dairy products by [64,65] for different attributes. For potatoes, [61] found four clusters of consumers according to preferences for two sustainable attributes (water use and carbon emissions footprints). They named the largest segment (60%) as "price sensitive" because consumers in their study derived the highest utility from the lowest price. Similarly, for tomatoes, [64] found four segments of consumers with different preferences for the production type, production method, and origin attributes. One of these clusters was named "price sensitive", representing 29% of consumers. For dairy products, [65] also found four clusters of consumers for brand, certification, and traceability attributes with the one named "price conscious" consisting of approximately 10% of consumers. Moreover, for dairy products, [64] found three clusters of heterogeneous consumers for two sustainability attributes (water use and carbon footprint) with a "price sensitive" cluster, including 35% of consumers. Considering that consumers were, in general, less willing to pay for food products with visual imperfections, consumers in this segment might accept suboptimal potatoes with visual imperfections if they are sold with a price discount. Consistent with previous studies, this means these consumers could accept suboptimal potatoes at discounted prices [7,23,24].

5. Conclusions

This paper analyzed consumers' preferences for local, suboptimal, and washed/unwashed fresh potatoes. In particular, the importance consumers attached to key sustainable attributes, such as (i) "visual imperfections", (ii) "washed/unwashed", (iii) "size", (iv) "locally produced", and (v) "price" were assessed. Heterogeneity in consumer's preferences for these attributes was hypothesized.

The findings indicated that for the aggregate consumer, the five attributes were roughly equally important. However, heterogeneity in consumer preferences for the attributes was detected, and four clusters were identified according to the importance consumers attached across attributes. Each of the clusters consisted of roughly one-fourth of the consumers in the sample and were named according to their preferences for the attributes as "price sensitive", "locavore", "external appearance lovers", and "visual imperfection takers".

Although we found certain differences across groups of consumers in terms of sociodemographic characteristics and purchase and consumption habits, they were not enough to provide any definitive profiling. This is one of the shortcomings of our paper. Further, we did not ask questions related to consumers' perceptions of environmental impacts and food waste of food systems. Another limitation is that the study considered only one product in only one specific area (province -NUTS3) in one European country (Spain). In addition, although we have provided some insights into consumers' acceptance of local, suboptimal, and less processed (unwashed) foods based on consumer preferences for particular attributes, we cannot provide monetary valuations of such attributes for consumers. This limitation constitutes a topic for future research: To measure consumer preferences for the most important attributes and to estimate their willingness to pay for them. Moreover, the small sample size is a limitation that need to be highlighted.

Our results are promising in terms of sustainability and food waste reduction implications in the case of fresh potatoes, the product with the highest food waste in the food chain. Only one-fourth of consumers might not accept local, suboptimal, or unwashed potatoes. In addition, this group of consumers attached the least importance to price, and therefore, they might not accept those products even at lower prices. We also found that half of consumers would buy local potatoes because they gave high importance to this attribute. Half of these consumers would also buy the potatoes unwashed but not suboptimal (visual imperfections), and the other half would purchase suboptimal potatoes with visual imperfections but washed. One-fourth of consumers might accept suboptimal potatoes because visual imperfections was the least important potato characteristic. However, another one-fourth might purchase them at price discounts because they gave some importance to the visual imperfections, but this importance is almost half of the importance they attached to the price.

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Appendix A

Table A1. Population by sex and age in Spain and in the town (%).

	Total	Sex		Age				
		Female	Male	18–34	35–44	45–54	55–64	More than 64
Spain	46,572,132	51.0	49.0	22.9	20.2	19.0	15.2	22.9
Town *	953,486	51.1	48.9	21.2	19,.6	18.7	15.4	25.2

Source: [57]. * Province where the town is located.

References

1. FAO. Public Consultation: Towards the Development of the Programme on Sustainable Food Systems 4 (SFSP) of the 10-Year Framework of Programmes on Sustainable Consumption and Production (10YFP). 2015. Available online: http://www.fao.org/fsnforum/sites/default/files/files/112_Sustainable_Food_Systems/Draft_note_10YFP-SFS_EN.pdf (accessed on 15 November 2018).
2. FAO. The State of Food and Agriculture 2019: Moving Forward on Food Loss and Waste Reduction. 2019. Available online: http://www.fao.org/3/ca6030en/ca6030en.pdf. (accessed on 6 May 2020).
3. Poore, J.; Nemecek, T. Reducing food's environmental impacts through producers and consumers. *Science* **2018**, *360*, 987–992. [CrossRef] [PubMed]

4. Willett, W.; Rockström, J.; Loken, B.; Springmann, M.; Lang, T.; Vermeulen, S.; Garnett, T.; Tilman, D.; DeClerck, F.; Wood, A.; et al. Food in the Anthropocene: The EAT–Lancet Commission on healthy diets from sustainable food systems. *Lancet* **2019**, *393*, 447–492. [CrossRef]
5. Chai, B.C.; van der Voort, J.R.; Grofelnik, K.; Eliasdottir, H.G.; Klöss, I.; Perez-Cueto, F.J. Which diet has the least environmental impact on our planet? a systematic review of vegan, vegetarian and omnivorous diets. *Sustainability* **2019**, *11*, 4110. [CrossRef]
6. Grunert, K.G. How Consumers Perceive Food Quality. In *Understanding Consumers of Food Products*; Frewer, L., van Trijp, H.C., Eds.; Woodhead: Cambridge, UK, 2007; pp. 181–199.
7. Aschemann-Witzel, J. Consumer Perception and Preference for Suboptimal Food Under the Emerging Practice of Expiration Date Based Pricing in Supermarkets. *Food Qual. Prefer.* **2018**, *63*, 119–128. [CrossRef]
8. Verain, M.C.; Sijtsema, S.J.; Antonides, G. Consumer Segmentation Based on Food-Category Attribute Importance: The Relation with Healthiness and Sustainability Perceptions. *Food Qual. Prefer.* **2016**, *48*, 99–106. [CrossRef]
9. Lehtinen, U. Sustainability and Local Food Procurement: a Case Study of Finnish Public Catering. *Br. Food J.* **2012**, *114*, 1053–1071. [CrossRef]
10. Paloviita, A. Consumers' Sustainability Perceptions of the Supply Chain of Locally Produced Food. *Sustainability* **2010**, *2*, 1492–1509. [CrossRef]
11. Feldmann, C.; Hamm, U. Consumers' Perceptions and Preferences for Local Food: a Review. *Food Qual. Prefer.* **2015**, *40*, 152–164. [CrossRef]
12. Costanigro, M.; Kroll, S.; Thilmany, D.; Bunning, M. Is it Love for Local/Organic or Hate for Conventional? Asymmetric Effects of Information and Taste on Label Preferences in an Experimental Auction. *Food Qual. Prefer.* **2014**, *31*, 94–105. [CrossRef]
13. Gracia, A.; Barreiro-Hurlé, J.; López-Galán, B. Are Local and Organic Claims Complements or Substitutes? a Consumer Preferences Study for Eggs. *J. Agric. Econ.* **2014**, *65*, 49–67. [CrossRef]
14. Meas, T.; Hu, W.; Batte, M.T.; Woods, T.A.; Ernst, S. Substitutes or Complements? Consumer Preference for Local and Organic Food Attributes. *Am. J. Agric. Econ.* **2015**, *97*, 1044–1071. [CrossRef]
15. Fernández-Ferrín, P.; Calvo-Turrientes, A.; Bande, B.; Artaraz-Miñón, M.; Galán-Ladero, M.M. The Valuation and Purchase of Food Products that Combine Local, Regional and Traditional Features: The Influence of Consumer Ethnocentrism. *Food Qual. Prefer.* **2018**, *64*, 138–147. [CrossRef]
16. Jefferson-Moore, K.Y.; Robbinsb, R.D.; Johnsonc, D.; Bradfordd, J. Consumer Preferences for Local Food Products in North Carolina. *J. Food Distrib. Res.* **2014**, *45*, 41–46.
17. Avetisyan, M.; Hertel, T.; Sampson, G. Is local food more environmentally friendly? The GHG emissions impacts of consuming imported versus domestically produced food. *Environ. Resour. Econ.* **2014**, *58*, 415–462. [CrossRef]
18. Schwarz, J.; Schuster, M.; Annaert, B.; Maertens, M.; Mathijs, E. Sustainability of global and local food value chains: An empirical comparison of peruvian and belgian asparagus. *Sustainability* **2016**, *8*, 344. [CrossRef]
19. FUSIONS. Estimates of European Food Waste Levels. 2016. Available online: http://www.eu-fusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf (accessed on 15 November 2018).
20. FAO. Global Food Losses and Food Waste-Extent, Causes and Prevention. In *Study Conducted for the International Congress Save Food*; FAO: Düsseldorf, Germany, 2011; Available online: http://www.fao.org/docrep/014/mb060e/mb060e00.pdf (accessed on 15 November 2018).
21. LEI. Reducing Food Waste by Households and in Retail in the EU. In *A Prioritisation Using Economic, Land Use and Food Security Impact*; LEI Wageningen UR: Den Haag, The Netherlands, 2015; Available online: http://edepot.wur.nl/290135 (accessed on 15 November 2018).
22. Collart, A.; Interis, M. Consumer Imperfect Information in the Market for Expired and Nearly Expired Foods and Implications for Reducing Food Waste. *Sustainability* **2018**, *10*, 3835. [CrossRef]
23. Aschemann-Witzel, J.; de Hooge, I.; Amani, P.; Bech-Larsen, T.; Oostindjer, M. Consumer-Related Food Waste: Causes and Potential for Action. *Sustainability* **2015**, *7*, 6457–6477. [CrossRef]
24. de Hooge, I.E.; Oostindjer, M.; Aschemann-Witzel, J.; Normann, A.; Loose, S.M.; Almli, V.L. This Apple is Too Ugly for Me! Consumer Preferences for Suboptimal Food Products in the Supermarket and at Home. *Food Qual. Prefer.* **2017**, *56*, 80–92. [CrossRef]
25. Verain, M.C.; Bartels, J.; Dagevos, H.; Sijtsema, S.J.; Onwezen, M.C.; Antonides, G. Segments of Sustainable Food Consumers: a Literature Review. *Int. J. Consum. Stud.* **2012**, *36*, 123–132. [CrossRef]

26. Sabate, J.; Soret, S. Sustainability of plant-based diets: Back to the future. *Am. J. Clin. Nutr.* **2014**, *100*, 476S–482S. [CrossRef]
27. FAO. Food Loss and Food Waste. Facts, 2015. Available online: http://www.fao.org/3/a-i4807e.pdf (accessed on 15 November 2018).
28. Willersinn, C.; Mouron, P.; Mack, G.; Siegrist, M. Food Loss Reduction from an Environmental, Socio-Economic and Consumer Perspective -The Case of the Swiss Potato Market. *J. Waste Manag.* **2017**, *59*, 451–464. [CrossRef] [PubMed]
29. Pearson, D.; Henryks, J.; Trott, A.; Jones, P.; Parker, G.; Dumaresq, D.; Dyball, R. Local food: Understanding consumer motivations in innovative retail formats. *Br. Food J.* **2011**, *113*, 886–899. [CrossRef]
30. Richards, T.J.; Hamilton, S.F.; Gomez, M.; Rabinovich, E. Retail intermediation and local foods. *Am. J. Agric. Econ.* **2017**, *99*, 637–659. [CrossRef]
31. de-Magistris, T.; Gracia, A.; Barreiro-Hurle, J. Do consumers care about European food labels? An empirical evaluation using best-worst method. *Br. Food J.* **2017**, *119*, 2698–2711. [CrossRef]
32. Gracia, A.; de-Magistris, T. Consumer preferences for food labeling: What ranks first? *Food Control* **2016**, *61*, 39–46. [CrossRef]
33. Stanco, M.; Lerro, M.; Marotta, G. Consumers' Preferences for Wine Attributes: a Best-Worst Scaling Analysis. *Sustainability* **2020**, *12*, 2819. [CrossRef]
34. Defrancesco, E.; Perito, M.A.; Bozzolan, I.; Cei, L.; Stefani, G. Testing consumers' preferences for environmental attributes of pasta. Insights from an ABR approach. *Sustainability* **2017**, *9*, 1701. [CrossRef]
35. Carley, S.; Yahng, L. Willingness-to-pay for sustainable beer. *PLoS ONE* **2018**, *13*, e0204917. [CrossRef]
36. Tait, P.; Saunders, C.; Dalziel, P.; Rutherford, P.; Driver, T.; Guenther, M. Estimating wine consumer preferences for sustainability attributes: a discrete choice experiment of Californian Sauvignon blanc purchasers. *J. Clean. Prod.* **2019**, *233*, 412–420. [CrossRef]
37. Grasso, S.; Asioli, D. Consumer preferences for upcycled ingredients: a case study with biscuits. *Food Qual. Prefer.* **2020**, *84*, 03951. [CrossRef]
38. Lagerkvist, C.J. Consumer Preferences for Food Labeling Attributes: Comparing Direct Ranking and Best-Worst Scaling for Measurement of Attribute Importance, Preference Intensity and Attribute Dominance. *Food Qual. Prefer.* **2013**, *29*, 77–88. [CrossRef]
39. Train, K. *Discrete Choice Methods with Simulation*; Cambridge University Press: Cambridge, UK, 2003.
40. Lancaster, K. a New Approach to Consumer Theory. *J. Political Econ.* **1966**, *74*, 132–157. [CrossRef]
41. Scott, R.C.; Leed, T.; Havas, N. Consumer Acceptance of Washed and Unwashed Potatoes as Influenced by Type of Container. 1953. Available online: https://kb.osu.edu/bitstream/handle/1811/69909/1/CFAES_ESS_242.pdf (accessed on 6 November 2018).
42. Jemison, J.M., Jr.; Sexton, P.; Camire, M.E. Factors Influencing Consumer Preference of Fresh Potato Varieties in Maine. *Am. J. Potato Res.* **2008**, *85*, 140–149. [CrossRef]
43. Petrescu, D.C.; Petrescu-Mag, R.M. Organic food perception: Fad, or healthy and environmentally friendly? a case on Romanian consumers. *Sustainability* **2015**, *7*, 12017–12031. [CrossRef]
44. Loureiro, L.M.; Hine, S. Discovering Niche markets: a Comparison of Consumer Willingness to Pay for Local (Colorado Grown), Organic, and GMO-Free Products. *J. Agric. Appl. Econ.* **2002**, *34*, 477–487. [CrossRef]
45. James, J.S.; Rickard, B.J.; Rossman, B.J. Product Differentiation and Market Segmentation in Applesauce: Using a Choice Experiment to Assess the Value of Organic, Local, and Nutrition Attributes. *Agric. Res. Econ. Rev.* **2009**, *38*, 357–370. [CrossRef]
46. Moser, R.; Raffaelli, R.; Thilmany-McFadden, D. Consumer Preferences for Fruit and Vegetables with Credence-Based Attributes: a Review. *Int. Food Agribus. Manag. Rev.* **2011**, *14*, 121–142.
47. Costanigro, M.; McFadden, D.T.; Kroll, S.; Nurse, G. An In-Store Valuation of Local and Organic Apples: The Role of Social Desirability. *Agribusiness* **2011**, *27*, 465–477. [CrossRef]
48. Hu, W.; Batte, M.T.; Woods, T.; Ernst, S. Consumer Preferences for Local Production and Other Value-Added Label Claims for a Processed Food Product. *Eur. Rev. Agric. Econ.* **2012**, *39*, 489–510. [CrossRef]
49. Yue, C.; Tong, C. Organic or Local? Investigating Consumer Preference for Fresh Produce Using a Choice Experiment with Real Economic Incentives. *HortScience* **2009**, *44*, 366–371. [CrossRef]
50. Adams, D.C.; Salois, M.J. Local Versus Organic: a Turn in Consumer Preferences and Willingness to Pay. *Renew. Agric. Food Syst.* **2010**, *25*, 331–341. [CrossRef]

51. Onozaka, Y.; Nurse, G.; McFadden, D.T. Local food consumers: How motivations and perceptions translate to buying behavior. *Choices* **2010**, *25*, 1–6.
52. Bir, C.; Lai, J.; Widmar, N.O.; Thompson, N.; Ellett, J.; Crosslin, C. "There's No Place Like Home": Inquiry into Preferences for Local Foods. *J. Food Distrib. Res.* **2019**, *50*, 29–45.
53. Harrison, G.W.; List, J.A. Field Experiments. *J. Econ. Lit.* **2004**, *42*, 1009–1055. [CrossRef]
54. Chang, J.B.; Lusk, J.L.; Norwood, F.B. How Closely Do Hypothetical Surveys and Laboratory Experiments Predict Field Behavior? *Am. J. Agric. Econ.* **2009**, *91*, 518–534. [CrossRef]
55. List, J.A. Does Market Experience Eliminate Market Anomalies? *Q. J. Econ.* **2003**, *118*, 41–72. [CrossRef]
56. Hair, J.F.; Anderson, R.E.; Tathan, R.L.; Black, W.C. *Multivariate Data Analysis*; Prentice-Hall International: Upper Saddle River, NJ, USA, 1998.
57. INE. Padrón Continuo a 1 de Enero de 2017. 2017. Available online: https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736177012&menu=resultados&secc=1254736195461&idp=1254734710990 (accessed on 27 November 2018).
58. IAEST. Estadística Local de Aragón. Ficha Territorial Zaragoza. 2018. Available online: http://bonansa.aragon.es:81/iaest/fic_mun/pdf/P50.pdf (accessed on 28 November 2018).
59. Kallas, Z.; Vitale, M.; Gil, J.M. Health innovation in patty products. The role of food Neophobia in Consumers' Non-hypothetical willingness to pay, purchase intention and hedonic evaluation. *Nutrients* **2019**, *11*, 444. [CrossRef]
60. Avni, N.; Fishbain, B.; Shamir, U. Water consumption patterns as a basis for water demand modeling. *Water Res. Res.* **2015**, *51*, 8165–8181. [CrossRef]
61. Peschel, A.O.; Grebitus, C.; Steiner, B.; Veeman, M. How does consumer knowledge affect environmentally sustainable choices? Evidence from a cross-country latent class analysis of food labels. *Appetite* **2016**, *106*, 78–91. [CrossRef]
62. Peschel, A.O.; Grebitus, C.; Alemu, M.H.; Hughner, R.S. Personality traits and preferences for production method labeling–A latent class approach. *Food Qual. Prefer.* **2019**, *74*, 163–171. [CrossRef]
63. Skreli, E.; Imami, D.; Chan, C.; Canavari, M.; Zhllima, E.; Pire, E. Assessing consumer preferences and willingness to pay for organic tomatoes in Albania: a conjoint choice experiment study. *Span. J. Agric. Res.* **2017**, *15*, 2. [CrossRef]
64. Steiner, B.E.; Peschel, A.O.; Grebitus, C. Multi-product category choices labeled for ecological footprints: Exploring psychographics and evolved psychological biases for characterizing latent consumer classes. *Ecol. Econ.* **2017**, *140*, 251–264. [CrossRef]
65. Wu, X.; Hu, B.; Xiong, J. Understanding Heterogeneous Consumer Preferences in Chinese Milk Markets: a Latent Class Approach. *J. Agric. Econ.* **2020**, *71*, 184–198. [CrossRef]