

## **Acceptance of a vegetable with designation of origin in two cities in southern Chile**

### **Aceptación de una hortaliza con denominación de origen en dos ciudades del sur de Chile**

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#### **ABSTRACT**

Considering that the regional origin of foods can increase consumer acceptance, the relative importance of the designation of origin (DO) in the decision to purchase tomatoes in Temuco and Puerto Montt, Chile was evaluated, consumer segments were distinguished according to their preferences by administering a survey to 400 people. A conjoint analysis was used to determine that the variety of tomato (41.8%) was more important than DO (19.5%) and price (17.0%). Presentation and size were the least important attributes. Consumers preferred long-life tomatoes and in bunch, with Angol DO at the lowest price. A hierarchical cluster analysis distinguished three segments. The first (52.5%) was sensitive to variety. The second (13.0%) was also sensitive to variety, but they preferred to pay the highest price. The third (34.5%) was sensitive to price. All three segments preferred the tomato with Angol DO. The segments differed significantly according to gender, size of family group and level of satisfaction with their food-related life. The results indicate a good acceptance of tomatoes with Angol DO; however, particular relevance must be given to the variety of tomato produced.

#### **Keywords**

designation of origin • tomato • Angol.

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## RESUMEN

Considerando que la región de origen de los alimentos puede aumentar la aceptación de los consumidores, se evaluó la importancia relativa de la información referida a la denominación de origen (DO) en la decisión de compra de tomates en Temuco y Puerto Montt, Chile, y se diferenciaron segmentos de consumidores según sus preferencias, mediante una encuesta a 400 personas. Utilizando análisis conjunto se determinó que la variedad de tomate (41,8%) fue más importante que la DO (19,5%) y el precio (17,0%). La presentación y el tamaño fueron atributos poco importantes. Los consumidores prefirieron tomate larga vida y en racimo, con DO de Angol, al menor precio. Mediante análisis de conglomerados jerárquicos se diferenciaron tres segmentos. El primero (52,5%) fue sensible a la variedad. El segundo (13,0%) también fue sensible a la variedad, pero prefirieron pagar el precio más elevado. El tercero (34,5%) fue sensible al precio. Los tres segmentos prefirieron el tomate con DO de Angol. Los segmentos se diferenciaron significativamente según género, tamaño del grupo familiar y nivel de satisfacción con su alimentación. Los resultados indican buena aceptación hacia tomates con DO de Angol, sin embargo, se debe dar especial relevancia a la variedad de tomate a producir.

### Palabras clave

denominación de origen • tomate • Angol

## INTRODUCTION

The literature shows that signaling of national or regional origin has effects on consumers' hedonic liking and that domestic, or regional, products are favored over products from elsewhere. Like country of origin, region is also used as a quality cue and food safety signal (7, 37, 39, 40). However, the region of origin (RO) has some specific aspects. van der Lans *et al.* (2001) indicate that using RO for product differentiation can be compared to the implementation of a brand strategy. Moderating factors such as consumers' origins appear to have a significant effect (40), suggesting that a feeling of belonging to a specific region creates positive emotions towards food from that area, enhancing the effect of origin (14).

It seems that RO is a good strategy for adding value to food products (9).

Several studies indicate that consumers value the regional origin of foods positively (4, 5, 7, 8, 19, 23, 26, 38), although they value more the protected designations of origin (DO) than the protected geographical indications (GI). It should be pointed out that most of these works have considered processed foods and meat, and there are few studies with fresh products such as fruits and vegetables, even though greater effects can be expected from region of origin labeling for less processed foods (26).

However, two conditions are necessary for successful marketing based on RO (40). First, a significant proportion of the target market should be aware of the region. Second, consumers' regional associations should be favorable and relevant (9, 40). In keeping with this,

Grunert (2005) found that origin has no effect on product quality evaluation when consumers lack knowledge about the region of origin. Similar findings were obtained by Teuber (2011) in Germany and by du Plessis and du Rand (2012) in South Africa. In this sense, Teuber (2011) concluded that the positive impacts of a region certification scheme must be communicated to consumers in order to be successful. Differences have also been found between countries - some give high importance to the regional origin of foods and others do not (9, 28) - as well as between different areas in the same country (28). Additionally, the acceptance of products with DO and GI may be related to some consumer characteristics, such as gender (9, 26), age (9, 20), education level and income (20).

Although most protected DO and GI are registered in developed countries (26), in Latin America studies are underway to register DO and GI in order to add value to different foods (5, 12, 22, 24). Indeed, GIs and DO may represent an opportunity for developing countries to move into lucrative niche markets (22). For example, in Brazil Brandão *et al.* (2012) found that consumer perception of GI in meat is generally positive, and this attribute is recognized as a quality indicator. Consumers believe that this meat offers security and is more reliable than the product that does not mention the source. In addition, consumers value this attribute and are willing to pay more for meat with the seal of GI.

In Chile, GI and DO are recognized and protected by Law 19.039 on Industrial Property. It defines GI as that which identifies a product as originating from a country, region or location in national territory, when the quality, reputation or other characteristic is ascribable, essentially, to its geographical origin.

A DO identifies a product as originating from the country, or a region or location in the national territory, when the quality, reputation or other characteristic is ascribable essentially to its geographic origin, considering, in addition, other natural and human factors that affect the characterization of the product.

The Seal of Origin program began in 2011 as an initiative of the Ministry of Economy, Development and Tourism and the National Institute of Industrial Property (INAPI) to promote the use and the protection of Chilean products by registering GI and DO so as to drive entrepreneurship and productive development in Chilean communities (12).

The procedure to request a GI or DO in Chile establishes that "any person, natural or legal, can request the registration of a GI or a DO by presenting an application to INAPI, as long as it represents a significant group of producers, manufacturers or craftsmen, whose farms or establishments of extraction, production, processing or development is within the area established for the GI or DO requested. Further, the national, regional, provincial or communal authorities may request this registration when a GI or DO for a product is within the territory of its competence" (12).

However, the Seal of Origin program and the official seal were launched officially by the Government of Chile only in July 2012 (27); therefore, there are still few products with the certification.

Among the primary agricultural products, currently the only one that is certificate is the Pica lemon (GI). Lluteño maize, oregano from Putre, olive from Azapa, watermelon from Paine, lamb from Chiloé and cherries from Chile Chico are all in the process of certification (27). Although the Government of Chile has made considerable progress in promoting

the official seal of origin (websites, television news, electronic and written media), its recent implementation and the scant supply of products with this seal in the market explain that it is still relatively unknown by consumers and that its acceptance or non-acceptance by the consumer has yet to be assessed.

In this context, tomatoes of various varieties have been produced for decades in the municipality of Angol (Araucanía Regions) to supply markets in southern Chile in the summer. In the popular culture of the south, consumers are convinced that tomatoes produced in Angol are of superior quality (particularly in organoleptic aspects) than the tomatoes produced in other regions of the country. This is demonstrated in the use of the name "Angolino tomato" on the shelves where tomatoes are sold. On this basis, FONDEF (Fund for the Promotion of Scientific and Technological Development) Project D10R1016 "Development of the Angolino Tomato using Designation of Origin with Production Protocol" is attempting to demonstrate scientifically the veracity of this popular belief.

Although several studies have dealt with the importance of country of origin in consumer preferences in Chile (30, 32, 36, 41), there are much fewer studies that have focused on the preferences for foods produced in a particular region of Chile.

In Temuco, Chile, Schnettler *et al.* (2009) determined that consumers prefer the traditional variety of tomato produced in Angol over the same variety produced in central Chile. Nevertheless, little remains known in Chile regarding consumer acceptance of foods with DO and GI. Therefore, the aims of this study were to evaluate the importance of information referring to DO in tomato relative to other

attributes in the decision to purchase, and to distinguish and characterize consumer segments in relation to their preferences and characteristics.

The RO cue evokes beliefs about the region: traditions, inhabitants, culture, etc.

Consumers' general beliefs about a product's RO are thought to be an important source for their affective feelings related to regional products (14, 40). In this regard, recent studies have concluded that food counts among the important life domains that affect an individual's subjective well-being (17, 33). It has been reported that there is a relation between satisfaction with food-related life and preferences for foods with different attributes (34, 35). Therefore, it is expected that the preference for a certain DO will differ according to one's satisfaction with food-related life.

Therefore, we propose the following hypotheses:

- H1. Consumers will prefer traditional variety of tomato with Angol designation of origin.
- H2. Consumer preferences will be associated with their demographic characteristics and their degree of satisfaction with food-related life.

## MATERIALS AND METHODS

### Survey

Accidental non-probability sampling was used to recruit a sample of 400 consumers in Temuco and Puerto Montt, over 18 years of age responsible for the purchase of vegetables for their household.

The number of respondents was obtained using the stratified random sampling formula with simple allocation for non-finite populations ( $N > 100,000$ ;

Temuco: 245,347 inhabitants according to the 2002 census), considering 95% confidence and 5% estimation error with  $p$  and  $q$  values of 0.5 (13). Thus, 200 people were surveyed in each city.

The survey was applied personally by two previously trained interviewers at the exit of two supermarkets in Temuco and Puerto Montt between August and October 2012.

The interviewers approached people as they were leaving the supermarkets, explained to them the objectives of the survey and the strictly confidential treatment of the information obtained, and then asked if they were prepared to answer the questionnaire (mall intercept type).

The response rate was 65%. Prior to the application of the survey, the questionnaire was validated by a preliminary test with 10% of the survey sample.

The preliminary test was done in the two supermarkets selected in Temuco, using the same method of addressing the participants as in the definitive survey. As the validation of the instrument was satisfactory, no changes were required in either the questionnaire or the interview procedure.

A questionnaire with closed questions was used to determine whether the respondent had received information about DO, if they knew what it meant and the weekly consumption of tomatoes in the home.

The questionnaire included the SWFL (Satisfaction with Food-related Life) scale. SWFL was proposed and tested by Grunert *et al.* (2007) in eight European countries (Cronbach's  $\alpha$ : 0.81-0.85); the five items on the scale are grouped into a single dimension: 1. Food and meals are positive elements, 2. I am generally pleased with my food, 3. My life in relation to food and meals is close to ideal, 4. With

regard to food, the conditions of my life are excellent, 5. Food and meals give me satisfaction in daily life.

The respondents were asked to indicate their degree of agreement with these statements using a 6-level Likert scale (where 1: disagree completely and 6: agree completely). In this study, the same survey method was used as that used by Grunert *et al.* (2007).

The response categories for each item on the SWFL were presented with a verbal description. In this study, the Spanish-language version of the SWFL was used, which has shown good levels of internal consistency in previous studies in Chile (33, 35) with Cronbach's  $\alpha$  coefficients between 0.82 and 0.88. In this study the SWFL showed a good levels of internal consistency (Cronbach's  $\alpha$ : 0.81) with a single factor with 66.1% of the explained variance. Based on sum scores of the scale, the distribution of the answers over four scale categories for satisfaction with food-related life were obtained (dissatisfied, somewhat satisfied, satisfied and extremely satisfied). These categories represent the respondents' degree of satisfaction with food-related life.

These classification questions were included: gender, age, size of family group, area of residence, studies of the head of the household, and the possession of ten domestic goods. These two last variables help determine the socioeconomic group, which was classified as ABC1 (high and middle-high), C2 (middle-middle), C3 (lower-middle), D (low) and E (very low) (1).

### Statistical analysis

A conjoint analysis (CA) was employed to determine the acceptance of tomatoes with DO. CA is a decompositional methodology that allows the relative importance of the attributes of a product

and the part worth utility values for each level of an attribute to be estimated. The estimated part worth utility values indicate how influential each level of an attribute is in the formation of consumer preferences for a particular combination, *i. e.*, the degree of preference for each level of an attribute (18).

Table 1 shows the attributes and levels defined in the study. The levels established for the attribute "DO" correspond to Angol, Rengo and without information.

The level "Rengo" was included because it is an important tomato-producing area in the Libertador General Bernardo O'Higgins Region of Chile, which in 2013 concentrated the greatest proportion of surface (20.7%) with this vegetable (25).

For the attribute "variety", the levels traditional (Cal Ace), long-life and bunch are the tomato varieties commonly sold in the cities of this study. It is worth noting that the "traditional" variety was the most widely cultivated in Angol 20 years ago, subsequently being replaced mainly by the "long-life" variety.

The level "pink" was included as an example of a product with local tradition.

The "pink" tomato is an old variety that has been cultivated in the Angol area for more than 100 years; its origin is associated with the Italian immigrants who arrived in the Lumaco area of the Araucanía Region. This is why it is considered the first cultivated tomato of that area. It has characteristics of color, size, shape and flavor that make it unique from other tomato varieties. The attribute presentation (packaging) was included because the products with DO are sold packaged (12). Size was included because it is one of the attributes that defines the quality in tomatoes perceived by consumers (15). The price levels were established on the basis of the lowest, highest and average prices of tomatoes at the time of the survey in the cities where the study was conducted. From these attributes and levels, a total of 144 combinations ( $3 \times 4 \times 2 \times 2 \times 3$ ) were obtained; however, to facilitate the respondents' answers, it was decided that a fractional factorial design would be used, obtained with the macro MktEx from the SAS Institute (21).

**Table 1.** Design of the conjoint experiment.

**Tabla 1.** Diseño del análisis conjunto.

Card	Designation of origin	Variety	Presentation	Size	Price (US\$ kg <sup>-1</sup> )
A	Without	Pink	Tray	Large	0.91
B	Angol	Traditional	Tray	Small	1.23
C	Rengo	Long-life	Tray	Large	1.23
D	Angol	Long-life	Tray	Large	1.51
E	Without	Pink	In bulk	Large	1.51
F	Without	Long-life	In bulk	Small	0.91
G	Angol	Bunch	Tray	Large	0.91
H	Rengo	Traditional	Tray	Large	0.91
I	Without	Bunch	In bulk	Large	1.23
J	Rengo	Bunch	Tray	Small	1.23
K	Rengo	Pink	Tray	Large	1.23
L	Without	Traditional	Tray	Small	1.51

The national currency values (Chilean pesos) were converted to dollars using the average 2013 value (\$495.31/US\$).

Los valores en moneda nacional (pesos chilenos) fueron convertidos a dólares usando el valor promedio de 2013 (\$495,31/US\$).

This allowed the number of stimuli to be reduced to twelve with one specification for each attribute, taking the precaution of not including unpackaged tomatoes with DO. The stimuli were presented to respondents in cards that combined verbal and graphic information.

The verbal description used words to present the attributes and levels derived from the factorial designs. The graphical representation used as stimuli drawings, sketches or photographs (18). The DO, variety, size and the price per kilogram was indicated verbally (in written form). Graphically, each variety of tomato was presented in bulk and packaged in trays, using photographs.

The country currently has an official seal; however, the Seal of Origin program was only officially launched by the Government of Chile in July 2012 (35), the month prior to the application of the survey in this study. Therefore, the information about DO was presented verbally similar to the information presented on wine bottles that have DO in Chile.

Figure 1 shows an example of the cards used in the conjoint design. Each respondent ordered the cards with the

combination of attributes from most to least preferred, on a scale of 1 to 12 (1 = most preferred; 12 = least preferred).

Prior to asking the respondents to put the cards in order, the following definition was read to them: "A designation of origin identifies a product as coming from a geographical region, attributing it with certain qualities or a reputation fundamentally associated with its geographical origin, taking into consideration additional factors (for example human) that affect the characterization".

A conjoint analysis was carried out by means of the TRANSREG procedure of SAS 9.3 (SAS Institute Inc., Cary, NC, USA).

The relative importance that consumers gave to the different attributes and the utility values obtained for each level of the selected factors were determined.

The root mean square error (RMSE) was calculated to measure the difference between the observed and the predicted data. A RMSE value = 0 indicates perfect fit, thus, the lower the RMSE value, the better the fit of the model. In addition, the market share of the possible products that could share the market was simulated.



**Figure 1.** Example of card used in the conjoint design.

**Figura 1.** Ejemplo de tarjeta usada en el diseño de análisis conjunto.



The market share simulation was carried out using the maximum utility model (21). A hierarchical cluster analysis was chosen to determine consumer segments according to the partial utility scores of the levels of the attributes. Ward's procedure, which calculates the squared Euclidean distance, was carried out with the CLUSTER procedure of SAS.

The number of clusters was taken on the basis of the  $R^2$  obtained and from a strong increase produced in the Cubic Clustering Criterion and Pseudo-F values.

To describe the segments, a Pearson Chi-square ( $\chi^2$ ) test was applied for the discrete variables and a one-factor analysis of variance was applied for the continuous variables (99% and 95% confidence level).

The continuous variables in which the Levene's statistic indicated homogeneous variances, and for which the analysis of variance resulted in significant differences ( $P \leq 0.001$  or  $P \leq 0.05$ ), were separated according Tukey's multiple comparison test.

The continuous variables in which the Levene's statistic indicated non-homogeneous variances and for which the analysis of variance resulted in significant differences ( $P \leq 0.001$  or  $P \leq 0.05$ ) were separated according to Dunnett's T3 test for multiple comparisons.

## RESULTS AND DISCUSSION

In the sample of consumers surveyed, there were more women, people between 35 and 54 years of age, people from families with three to four members,

urban residents, and people from socio-economic group ABC1. The majority of respondents indicated that they had not received any information on DO and did not know its meaning. Respondents predominated where tomatoes are eaten in the home three times per week.

According to the results of the SWFL scale, most respondents are satisfied or somewhat satisfied with their food-related life (table 2, page 181).

No significant differences were observed between the samples of the two cities ( $P > 0.1$ ).

### Importance of the attributes and preferences

Using a conjoint analysis, it was established that in the total sample, the attributes of greatest importance in the purchase of tomatoes were the variety, followed by DO and price.

The attributes presentation (packaged) and size were of less importance in the decision to purchase.

The signs of the preference values of the attribute levels indicated a preference for the long-life and bunch varieties (greatest preference for bunch) and a rejection of the varieties traditional and pink.

In addition, the respondents preferred the tomatoes with Angol DO and rejected the Rengo DO and the product with no information. Likewise, preference was observed for the tomatoes large and in bulk. Therefore, these results lead to partial acceptance of hypothesis 1.

The consumers rejected the three levels of price: utility or preference became more negative as the price increased, indicating there is no association between price and quality.



**Table 2.** Characteristics of the survey sample in Temuco and Puerto Montt, Chile. October, 2012.

**Tabla 2.** Características de la muestra encuestada en Temuco y Puerto Montt, Chile. Octubre de 2012.

Sample	Composition	Total sample (n = 400) %
Gender	Male	20.2
	Female	79.8
Age	< 35 years	39.2
	35-54 years	49.2
	55 years or more	11.6
Family size	1-2 family members	26.2
	3-4 family members	49.6
	5 or more	24.2
Residence	Urban	92.8
	Rural	7.2
Socioeconomic group	ABC1 (high and middle-high)	37.0
	C2 (middle-middle)	25.2
	C3 (middle-lower)	25.2
	D (low) - E (very low)	12.6
Frequency of tomato consumption	Daily	12.0
	Three times per week	49.0
	Two times per week	30.2
	Other	8.8
Had received information about the Designation of Origin	Yes	30.0
	No	70.0
Understood the meaning of Designation of Origin	Yes	26.5
	No	73.5
Satisfaction with food-related life	Dissatisfied	3.8
	Somewhat satisfied	26.2
	Satisfied	52.0
	Extremely satisfied	18.0

The preference for the lowest price is consistent with previous studies on vegetables conducted in Chile and Argentina (2, 30). The RMSE of the conjoint analysis was 0.15, which indicated a good goodness-of-fit (table 3, page 182).

The higher value placed on the attributes related to variety, DO and price have some implications for agricultural policy. These implications are related not only to the agrifood sector, but also to the tomato producers.

**Table 3.** Distribution and relative importance of the three clusters and overall sample based on preferences for tomatoes.  
**Tabla 3.** Importancia relativa correspondiente a los tres clusters y muestra total basada en las preferencias hacia tomates.

Attribute & Levels	Total sample (n = 400)	Group 1 (n = 210)	Group 2 (n = 52)	Group 3 (n = 138)	F	P-value
<b>Variety</b>						
Traditional	-0.125	-0.292	-0.265	0.182	2.865	0.058
Long-life <sup>1</sup>	0.727	1.125 a	0.824 ab	0.085 b	6.722	0.001
Bunch <sup>1</sup>	1.084	1.382 a	1.523 a	0.464 b	10.048	0.000
Pink <sup>1</sup>	-1.686	-2.215 b	-2.082 b	-0.732 a	16.259	0.000
Relative importance (%) <sup>1</sup>	41.8	51.8 a	35.6 b	28.9 c	96.430	0.000
<b>Designation of origin</b>						
Angol <sup>1</sup>	0.710	0.473 c	0.757 b	1.052 a	6.297	0.002
Rengo	-0.295	-0.341	0.004	-0.337	2.100	0.124
Without DO <sup>2</sup>	-0.415	-0.132 a	-0.761 b	-0.715 b	6.902	0.001
Relative importance (%)	19.5	19.3	20.7	19.2	0.385	0.861
<b>Presentation</b>						
Tray <sup>2</sup>	-0.180	-0.033 a	-0.065 ab	-0.447 b	5.409	0.005
In bulk <sup>2</sup>	0.180	0.033 b	0.065 ab	0.447 a	5.409	0.005
Relative importance (%)	11.5	11.6	10.2	12.0	1.003	0.368
<b>Size</b>						
Large <sup>2</sup>	0.186	0.215 b	0.955 a	-0.149 c	25.439	0.000
Small <sup>2</sup>	-0.186	-0.215 c	-0.955 c	0.149 a	25.439	0.000
Relative importance (%) <sup>2</sup>	10.2	9.7 b	14.3 a	9.5 b		0.000
<b>Price</b>						
Low <sup>1</sup>	-2.368	-0.954 b	4.520 a	-7.117 c	658.813	0.000
Medium <sup>1</sup>	-3.211	-1.293 b	6.125 a	-9.648 c	658.813	0.000
High <sup>1</sup>	-3.948	-1.590 b	7.534 a	-11.861 c	658.813	0.000
Relative importance (%) <sup>1</sup>	17.0	7.6 c	19.2 b	30.4 a	236.318	0.000

Root-mean-square error (RMSE) = 0.15.

<sup>1</sup>Different letters in the line indicate significant differences according to Dunnett's T3 multiple comparison test ( $P \leq 0.05$ ).

<sup>2</sup>Different letters in the line indicate significant differences according to Tukey's multiple comparison test ( $P \leq 0.05$ ).

<sup>1</sup> Letras distintas en una misma fila indican diferencias estadísticamente significativas según Prueba de Comparaciones Múltiples T3 de Dunnett ( $P \leq 0,05$ ).

<sup>2</sup> Letras distintas en una misma fila indican diferencias estadísticamente significativas según Prueba de Comparaciones Múltiples de Tukey ( $P \leq 0,05$ ).

With respect to the high value of the attribute related to variety, this work allows the use of subjective indicators so that policy makers can design and implement adequate incentives for certain varieties of tomato and promote policies reorient and take care of production (11), for example through subsidies to acquire insurance that insures against the risks to the crop. In addition, the results of this study shed light on the importance of registering those DO that are in the country's interest to protect, considering the value consumers place on this attribute. This avoids the proliferation of a DO that may not be valued by consumer markets.

Since DO are recognized and protected by Law 19.039 of the Industrial Property Act (Art. 92) in Chile, it would be important to convene the representative groups of tomato producers to create institutional forums for discussion concerning the adequate definition of DO for their products. In this sense, the local producers

themselves would be participants in the regulation of DO.

### Consumer segments

A cluster analysis distinguished three consumer segments with significant differences in the preference for most of the levels of the attributes ( $P \leq 0.001$  or  $P \leq 0.05$ ), except in the preferences for the traditional variety of tomato ( $P > 0.05$ ) and the DO Rengo ( $P > 0.1$ ) (table 3, page 182).

The groups also differed in the importance assigned to variety, size and price ( $P \leq 0.001$ ).

The segments did not differ in the importance assigned to the DO or the presentation (package) ( $P > 0.1$ ).

Considering the rest of the survey questions, the groups only differed in gender, degree of satisfaction with food-related life ( $P \leq 0.05$ ) and family size ( $P \leq 0.001$ ) (table 4). Therefore, from these results it is possible to accept hypothesis 2.

**Table 4.** Characteristics with significant differences ( $\text{Chi}^2$ ) in groups (%) identified by cluster analysis.

**Tabla 4.** Características de los segmentos identificados (%) con diferencias estadísticas ( $\text{Chi}^2$ ) entre ellos obtenidas con análisis cluster.

Characteristic	Group 1 (n = 210)	Group 2 (n = 52)	Group 3 (n = 138)
<b>Gender</b>	<b>P = 0.012</b>		
Male	16.2	34.6	21.0
Female	83.8	65.4	79.0
<b>Family size</b>	<b>P = 0.000</b>		
1-2 family members	25.2	28.8	26.8
3-4 family members	53.3	23.1	53.6
5 family members or more	21.4	48.1	19.6
<b>Satisfaction with food-related life</b>	<b>P = 0.035</b>		
Dissatisfied	3.3	3.8	4.3
Somewhat satisfied	22.9	15.4	35.5
Satisfied	51.4	65.4	47.8
Extremely satisfied	22.4	15.4	12.3
P value corresponds to the (bilateral) asymptotic significance obtained in Pearson's Chi-squared test.			

Group 1 "Consumers sensitive to variety" (n = 210, 52.5% of the survey sample): gave the greatest importance (significantly more than other groups) to the variety (51.8%).

The people in this group preferred the varieties bunch and long-life, although they did not differ statistically from Group 2. It is worth noting that this was the group that showed the greatest preference for the long-life variety. Although the consumers in this group preferred the lowest price, similarly to the total sample, Group 1 stood out for the low importance assigned to the price (7.6%). This group also stood out for the significantly lower rejection of the tomato with no information about its origin (table 3, page 182).

Group 1 presented the greatest proportion of women (83.8%) and those extremely satisfied with their food-related life (22.4%) (table 4, page 183).

Group 2 "Consumers sensitive to variety, preferred to pay a higher price" (n = 52, 13.0% of the sample): although the most relevant attribute for this group was the variety, the group valued the size of the tomatoes (14.3%) significantly more than the other groups.

Regarding the variety, consumers in this group preferred the varieties bunch and long-life, standing out for the greatest preference for the tomato bunch variety (table 3, page 182).

Group 2 is distinguished as being the only one that showed positive utilities toward the three price levels, with the preference value increasing as the price increased. This indicates that these consumers associate price with quality.

Group 2 had the highest proportion of men (34.6%), from families with five or more members (48.1%) and satisfied with their food-related life (65.4%) (table 4, page 183).

Group 3 "Consumers sensitive to price" (n = 138, 34.5% of the sample): assigned greatest importance to the price (30.4%), significantly more than the other groups.

The people in this group showed the greatest rejection to the three price levels.

The second most-important attribute was the variety of tomato. Although this group preferred the long-life and bunch varieties, the preference values were significantly lower than Group 1. This group stood out for the lower rejection of the "pink" variety.

Group 3 was distinguished for the significantly higher preference for the tomato with Angol DO and for being the only one to prefer the small tomato, significantly more so than the other groups (table 3, page 182).

Group 3 had the greatest proportion of people somewhat satisfied with their food-related life (35.5%) (table 4, page 183).

Regardless of the importance assigned to the attributes, the most preferred variety for all three groups was in bunch and the least preferred was the "pink" variety.

Likewise, the three groups preferred the tomatoes in bulk, but when offered the packaged tomatoes, the three groups preferred the Angol DO.

The preference for the bulk produce may be associated with the opportunity to choose each tomato individually for purchase. In this respect, it should be mentioned that consumer preference for tomatoes in bulk could have negatively affected the importance assigned to the DO. This may be due to the conjoint design used in this study, which considered the requirement that products with DO must be sold packaged (12). Although this aimed to adjust to the INAPI norms for marketing product with certification of origin, it does not reflect the current form of marketing tomatoes in the cities studied in terms of the packaging.

The greatest volumes of this vegetable offered are marketed in bulk; there is only a small offering of tomatoes packaged in trays in supermarkets, but not in other retail shops, such as greengrocers and open-air markets. This result suggests that consumer acceptance of DO in vegetables must also include consumer acceptance of the packaged product, since the requirement that DO products be packaged could negatively affect the willingness to purchase.

Table 5 presents the results of the market share simulation. The largest market share (25.5%) was for the tomatoes without information about DO, long-life variety, small, at the lowest price. The next largest share (23.8%) was for the tomatoes with Angol DO, bunch variety, packaged in a tray, large, at the lowest price. The third largest share (16.0%) was for tomatoes with Angol DO, long-life, packaged in a tray, large, at the lowest price. It should be emphasized that the market participation of Angol DO was 45.1%, long-life variety 45.5% followed by

bunch (33.3%), and the low price reached 62.9%.

The literature indicates that region of origin is used by consumers as a quality cue and food safety signal (37, 38); however, the results of the conjoint analysis reveal that the DO information was an attribute of secondary importance in both the total sample and the three consumer segments. This is consistent with previous studies into olive oil in France and Tunisia (8) and cider in Germany (38).

The result of the total sample and that corresponding to Groups 1 and 2 (65.5% in total) is consistent with what was obtained by Schnettler *et al.* (2009) in a previous study on tomatoes, in which the variety was more important than the crop's area of origin.

The results from Group 3 (34.5%) reflect the greater importance given to price over RO in lamb meat in South Africa (10). In this respect, the importance of information regarding the origin depends on the availability of additional information.

**Table 5.** Tomatoes: expected market share (Maximum utility model).

**Table 5.** Tomates: participación de mercado esperada (modelo de máxima utilidad).

Denomination of origin	Type/variety	Presentation	Size	Price (US\$ kg <sup>-1</sup> )	Market share (%)
Without	Long-life	In bulk	Small	0.91	25.5
Angol	Bunch	Tray	Large	0.91	23.8
Angol	Long-life	Tray	Large	1.51	16.0
Without	Pink	Tray	Large	0.91	7.3
Rengo	Traditional	Tray	Large	0.91	6.5
Without	Bunch	In bulk	Large	1.23	5.8
Angol	Traditional	Tray	Small	1.23	5.3
Rengo	Long-life	Tray	Large	1.23	4.0
Rengo	Bunch	Tray	Small	1.23	3.8
Rengo	Pink	Tray	Large	1.23	1.3
Without	Pink	In bulk	Large	1.51	0.5
Without	Traditional	Tray	Small	1.51	0.5

Consumers will rely on origin labels only if no better indicator to evaluate the product is available (26), as is the case for the variety in this study.

However, in Spain Resano *et al.* (2007) found that regional origin was the most influential attribute in the choice of cured ham. Therefore, it may be suggested that the importance of RO in the decision to purchase is associated with the country, the food and the attributes origin is compared to.

Another aspect worth noting is the knowledge of the regions where the food is produced. In this regard, Teuber (2011) attributes the low importance of RO in Germany to the awareness and knowledge about GI and DO being very limited.

Dekhili *et al.* (2011) determined that RO was more important in the election of olive in Tunisia than in France. Tunisia is a producer of olive oil, and consumers identify the region where the oil is produced, whereas in France, where this product is imported, consumers give more importance to the country of origin. This underscores the importance of consumers being aware of the positive aspects of foods produced in a particular region, which must be communicated to consumers in order to be successful (38). This offers another possible explanation for the secondary importance of DO in this study, given that over 70% of the sample had no prior information about DO and did not know its meaning.

Therefore, for the DO to be an attribute valued by consumers, the benefits associated with the DO must be conveyed beforehand so this attribute is positioned in the consumer's mind. However, another possible explanation is that the conjoint design cards did not identify certification as a source to ensure credibility to consumers, such as the seal of origin

recently implemented by the Government of Chile, which would constitute a study limitation. Therefore, new studies are required to assess the importance and acceptance of DO endorsed by the official seal of origin.

Despite the secondary importance of DO, the preference for tomato with Angol DO in the total sample and in the three segments partially confirms the results of previous studies, which indicate that consumers value the regional origin of foods positively (3-9, 19, 23, 26, 37).

Accordingly, the consumers did not prefer the product with DO over the one without this information, but rather they preferred only the product with Angol DO. This confirms the need for consumers to be aware of and know the region of origin (9, 16, 39), which is what occurred with the tomatoes produced in Angol in southern Chile, but not with tomatoes produced in other areas of the country, such as Rengo.

Although these results suggest there would be good acceptance of tomatoes with DO from Angol among consumers of southern Chile, because there would be knowledge of the product, the opposite effect is to be expected in cities of central Chile, where the Angolino tomato is likely not as well known and there is greater familiarity with the tomatoes produced in Rengo. This will have to be treated in new investigations in other cities in Chile.

Despite the positive acceptance of the tomatoes with Angol DO, one relevant aspect for the producers to consider is the variety of tomato. The greater importance assigned to this attribute over the origin in the total sample and the three segments indicates that the variety dominated consumer preferences in the choice of tomato, which is consistent with the previous study conducted by Schnettler *et al.* (2009).

Nevertheless, in that study the consumers preferred the traditional variety (Cal Ace) over the long-life variety. In this study the consumers preferred the tomatoes in bunch first and then the long-life tomatoes, which represents a change in consumer preferences. Although the causes of this behavior will have to be dealt with in future investigations, it is possible to suggest that the preference for tomatoes in bunch is related to the presence of the stems, which the consumer probably associates with greater freshness or a more natural product.

With respect to the long-life variety, it is possible that the consumer has become accustomed to the constant supply of this tomato throughout the year, which has led to its longer life being valued over the traditional tomato, the supply of which is confined almost exclusively to the summer months.

The total rejection of the "pink" variety could be related to food neophobia, which causes consumers to reject unknown products (34). Therefore, a successful introduction of a tomato with Angol DO must consider consumer preferences for the varieties, which according to the results of this study should correspond to tomato in bunch or long-life.

The characteristics with statistical differences between the identified segments are more related to the importance assigned to the variety and the price than for the DO information. However, the significantly higher presence of men in Group 2 than Group 1 is consistent with studies that report that men value the regional origin of foods more positively (9, 26). Indeed, the significantly greater preference of Group 2 for the tomato with Angol DO compared to Group 1 is also consistent with the results previously obtained by Schnettler *et al.* (2009).

However, the relation between gender and preference for Angol DO are not clear, because the greatest preference for Angol DO was in Group 3, which had a higher proportion of men than Group 1, but its gender profile did not differ statistically from the total sample. Nor is it possible to establish a clear relation between the size of the family group and consumer preferences, because the only segment that differed from the total sample was Group 2, which is not really big enough to be representative within the total sample.

The differences in the degree of satisfaction with food-related life between the groups confirm the relation between satisfaction with food-related life and preferences for foods with different attributes (34, 35). Nevertheless, the results cannot establish a relation between the affective feelings related to regional products and the level of subjective well-being in the domain of food. However, there may be a relation between the level of satisfaction with food-related life and the importance assigned to price. Group 1 had the greatest proportion of people extremely satisfied with their food and was the one that assigned the least importance to price. By contrast, Group 3 assigned greatest importance to this attribute and showed greater sensitivity to the increase in price, at the same time concentrating the highest proportion of people somewhat satisfied with their food-related life.

Although new studies are needed to delve more deeply into the causes of this relation, it is possible to suggest that a smaller preoccupation by the price of foods would affect a greater level of well-being. By contrast, if the consumer selects what foods to buy based mainly on the price, preferring clearly the lowest, their well-being in the domain of food can be clearly reduced in light of the restriction



that price imposes on access to the desired foods. Although the segments did not differ by socioeconomic level, and this is not a problem of spending power, being able to choose foods without giving priority to the price probably makes it possible to access food of better quality or to choose on the basis of personal preference, which would positively affect a greater level of satisfaction with food-related life.

One aspect to emphasize is that significant differences between the segments were not detected according to the city of residence. This reaffirms the positive possibilities of a successful introduction of tomato with Angol DO not only in the Araucanía Region, but also in other cities in southern Chile. However, as has been suggested, the success of the launch of this product onto the market must be accompanied by a commercial strategy that incorporates promotional instruments that present this attribute to the consumer and communicate the advantages to acquire a product with DO.

The development of DO endeavors to add value to food products (9), which according to the results of this study could affect the preference for the Angolino tomato. However, it would not be expected that consumers would be prepared to pay a higher price for this attribute, in contrast to what was reported by Brandão *et al.* (2012) on meat with GI in Brazil. Therefore, considering the characteristics and preferences of the identified consumer segments, the focus should be on Group 1 as the target market for the introduction of the tomato with Angol DO. Although it was not the group that showed the greatest preference for the Angolino tomato, the low importance assigned to the price in the decision to purchase and the lower rejection of the packaged tomato are traits that may facilitate acceptance by these consumers.

Nevertheless, the producers must bear in mind the preferences for tomato varieties before introducing the tomato with Angol DO to the market.

Limitations of this study include the non-probabilistic nature of the sample, which does not allow generalization of the results. At the same time, the sample is not representative of the country's population distribution.

However, the consumer distribution in this survey was similar to the samples obtained in previous studies on supermarket consumers in Chile (29, 31, 34, 36). Therefore, although the results and conclusions of the present study may not be applicable to the whole population, they might be valid for consumers that normally purchase foods from supermarkets. Also, all data were self-reported, thus responses may be affected by social desirability and recall or response bias.

## CONCLUSIONS

The results of the total sample indicate that tomato variety was the attribute that dominated consumer preferences. The information referring to DO in tomato and price were attributes of secondary importance in the decision to purchase.

Presentation and size were the least important. Consumers preferred long-life tomatoes and in bunch, with Angol DO at the lowest price. For the DO to be an attribute valued by consumers, the benefits associated with the DO must be conveyed beforehand so this attribute is positioned in the consumer's mind. From an agricultural policy point of view, the high value placed on the attributes variety and DO have implications related not only to demand, but also to tomato producers.

Three market segments were identified with differences in gender, size of family group and degree of satisfaction with their food-related life.

The first was sensitive to variety.

The second was also sensitive to variety, but preferred to pay the highest price.

The third was sensitive to price. All three segments preferred the tomato with Angol DO. Likewise, the three groups preferred long-life and bunch varieties.

The results of this study indicated a good acceptance of tomatoes with Angol DO. However, a successful introduction of a tomato with Angol DO must consider consumer preferences for the varieties and package. This must be considered by the producers in the selection of the variety

to cultivate, but it must also be taken into account by the retailers who market vegetables, in the sense of promoting the advantages associated with the purchase of these packaged products.

Additionally, the launch of this product onto the market must be accompanied by a commercial strategy that incorporates promotional instruments that present the certification of origin to the consumer and communicate the advantages of acquiring a product with DO. Although the producers and retailers are responsible for these campaigns, the Ministry of Agriculture, through the Seal of Origin Program, must support the communicational strategies that promote the advantages of consuming packaged vegetables with DO.

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