CENTRO DE INVESTIGACIÓN Y TECNOLOGÍA AGROALIMENTARIA DE ARAGÓN

CONSUMERS' VALUATION OF A LOCAL CARROT LANDRACE WITH ATYPICAL COLOR

Azucena Gracia[a], Ana María Sanchez[b], Cristina Mallor[b]

Centro de Investigación y Tecnología Agroalimentaria de Aragón (CITA) & Instituto Agroalimentario de Aragón-IA2.

[a]Unidad de Economía Agroalimentaria y de los Recursos Naturales

[b]Unidad de Hortofruticultura

XII Congreso de Economía Agraria "La sostenibilidad agro-territorial desde la Europa Atlántica". Lugo, 4-6 septiembre 2019

Introduction

•In spite the great diversity in the colour of carrots (orange, yellow, white and purple), the market in Europe is mainly reduced to orange carrots.

•Local landraces have been largely replaced by orange carrots.

•European consumers are familiar with the typically considered orange carrot's colour and can be reluctant to others, even original carrots were of different colors.

•On the other hand, consumers are increasingly interested in local foods because their freshness, taste, higher quality, environmental friendliness and social sustainability.

Introduction

•In addition, purple carrots can attract the attention as rich sources of anthocyanins with significant antioxidant capacities and good nutritional value.

•Besides atypical colours produce culinary opportunities.

However, the commercial success of atypical local landrace carrots may be limited until consumers integrate them in their every day habits.

Objective

•**The aim of the paper** is to investigate consumer's valuation of a local carrot landrace from the Spanish region of Aragon atypically coloured in purple.

In particular:

- To assess **consumers' preferences** for carrots with different characteristics (**color, price, variety, and production system**).
- To estimate **consumers' willingness to pay (WTP)** for the local **purple carrots**.

Materials and methods

Choice experiment (CE) was used because:

- Ability to value multiple attributes simultaneusly
- Consistent to the random utility theory (RUM) and Lancasters maximization utility model
- Similar to consumer purchase decision

The choice experiment tasks were done after inspecting and tasting both, orange and purple carrots

Choice experiment design

- **Half kilo of whole carrots**

Attributes and levels:

- **Price (Euro/box):** 0.5 - 0.8 -1.1 - 1.4
- **Colour: Orange - Purple**
- **Method of production: conventional - organic**
- **Variety: non-local - local**

Choice experiment design

"**Street and Burgess"** Choice Design for main effects and **two-way interaction effects**

Each choice set have three alternatives:
Two designed alternatives + a non-buy option

Number of choice sets = 24
Number of blocks = 6
Each respondent faces 4 choice sets

Methodology: data collection

- Data was obtained from an experiment with food consumers in 2016-2017.
- Population consisted of people living in Aragon older than 18 years.

- Participants were recruited via consumer associations, and public institutions (universities, technological centres, and town hall centres).
- A total of 18 sessions of around 12 participants were carried out.
- The final sample of 202 participants was stratified by age, gender, education level, and province of residence.

Methodology: data collection

First part of the experiment: hedonic liking

Participants should rate their liking of the two carrots

- Visual observation:
  - Whole
  - Sliced

- After tasting:
  - Taste
  - Texture
  - Overall

Zanahoria Entera

	Me disgusta muchísimo 1	2	3	4	5	6	7	8	Me gusta muchísimo 9
Naranja									
Morada									

Zanahoria Cortada

	Me disgusta muchísimo 1	2	3	4	5	6	7	8	Me gusta muchísimo 9
Naranja									
Morada									

Zanahoria Morada

	Me disgusta muchísimo 1	2	3	4	5	6	7	8	Me gusta muchísimo 9
Sabor									
Textura									
Global									

Methodology: data collection

Second part: Choice experiment

To mitigate hypothetical bias

CHEAP TALK

- Final questionnaire collecting information on:
  - Food purchase and consumption habits
  - Carrots purchase and consumption habits
  - Socio-demographics and personal characteristics

Specification and estimation

$$U_{njt} = ASC + \beta_1 PRICE_{njt} + \beta_2 PURPLE_{njt} + \beta_3 LOCAL_{njt} + \beta_4 ORGANIC_{njt} + \varepsilon_{njt}$$

- n = number of respondents
- j = available choosing options (A, B or none)
- t = number of choice sets
- ASC= dummy: 0 for A and B options; and 1 otherwise (no-buy)
- PRICE = price levels in the choice options (negative impact in utility)
- PURPLE, LOCAL and ORGANIC = Dummy: 1 if the attribute is present and 0 otherwise
- LOCAL*PURPLE and ORGANIC*PURPLE = Interactions variable by multiplying LOCAL and PURPLE and ORGANIC and PURPLE dummies variables
- ε_{njt} = an observed random term distributed following an extreme value type (Gumbel) distribution

An Error Component Random Parameter Logit model (ECRPL) was finally selected (NLOGIT 5.0 Software)

Results: sample

	Sample N=202	Population
Gender*		
Female (1=female;0= otherwise)	51.5	50.9*
Age (average, standard deviation)	46.2 (20.4)	42.7*
de 18 a 44 años	43.5	42.6
de 45 a 54 años	15.8	19.2
más de 54 años	40.6	38.2
H*ousehold* ***size*** (average, standard deviation)	3.0 (1.2)	2.5*
*Education level***		
Primary	23.8	17.0**
Secondary	48.0	50.0**
Higher (1=**hedu**;0= otherwise)	28.2	33.0**
Province of residence		
Huesca	18.3	17.0*
Teruel (1=Teruel; 0=otherwise)	12.4	11.0*
Zaragoza	69.3	72.0*
Household monthly net income		
Less than 1,500€/month	22.8	Na
Between 1,501 and 2,500 €/month	21.8	Na
Between 2,501 and 3,500 €/month	18.3	Na
More than 3,500 €/month (1=**hinc**;0= otherwise)	10.4	Na
Do know/no response	26.7	Na

Results: RPL estimations

Estimates for the random parameters logit with correlated errors model

	Parameters in utility function		Standard deviation of parameters distribution		WTP (€/package)	
Attributes	Mean Estimation	Z-ratio	Coefficient	Z-ratio	Mean Estimation	Z-ratio
ASC	-3.986***	-20.06	---	---		
PRICE	-1.991***	-13.73	---	---		
PURPLE	-0.685***	-5.26	1.519***	10.88	-0.34***	-5.19
LOCAL	0.678***	6.17	0.818***	6.25	0.34***	6.09
ORGANIC	0.479***	3.90	0.642***	4.34	0.24***	3.88

Results: RPL estimations

- ASC was **negative and significant**: consumers obtain higher utility from choosing any alternative than from the non-buy option.
- The **price** variable (PRICE) was **negative** and statistically **significant**.
- The estimated parameters and WTP for the main effect of the **PURPLE** variable was **negative** and statistically **significant**.
- Then, consumers' **utility for the purple carrots was lower than for the orange ones** and consumers' **valuation** for purple carrots was **negative**.

Results: RPL estimations

- The **interaction** between the **ORGANIC and PURPLE and the LOCAL and PURPLE** variables was **not statistically significant**.

- The estimated parameters and WTP for the main effects of the **LOCAL and ORGANIC variables** were **positive** and statistically significant.

- Then, **consumers positively value the local variety and the organic production method.**

- Finally, **consumers' preferences are indeed heterogeneous** because the standard deviations of estimated parameters were statistically different from zero.

Economic results

WTP (€/package)	Mean Estimation	Z-ratio
PURPLE	-0.34***	-5.19
LOCAL	0.34***	6.09
ORGANIC	0.24***	3.88

- On average, 0.34 and 0.24 is the price premium that consumers were **willing to pay** to purchase a package of carrots produced from the **local landrace** or **organically produced**, respectively.

- Then, the **most value attribute**, *ceteris paribus*, is the **local** but closely followed by the organic landrace.

- On contrary, –0.34 represented the discount for consumers to purchase a package of purple carrots, meaning that **consumers prefer the orange carrots.**

Discussion

- **Local origin** of the carrots **was positively value** by consumers.
- The **purple carrots were less value** than the orange one.
- However, consumers' preferences were heterogeneous and **a segment of 32% of consumers had positive WTP for the purple carrots** representing the segment of consumers accepting these carrots.
- **Further analysis** is required **to profile this segment** of consumers using the hedonic liking scales and the socio-demographic characteristics.



CENTRO DE INVESTIGACIÓN Y TECNOLOGÍA AGROALIMENTARIA DE ARAGÓN

Thank you

for your attention

Azucena Gracia[a], Ana María Sanchez[b], Cristina Mallor[b]

Centro de Investigación y Tecnología Agroalimentaria de Aragón (CITA)

& Instituto Agroalimentario de Aragón-IA2.

[a]Unidad de Economía Agroalimentaria y de los Recursos Naturales

[b]Unidad de Hortofruticultura