IMPACT OF HEDONIC EVALUATION ON CONSUMERS' PREFERENCES FOR BEEF ATTRIBUTES INCLUDING ITS ENRICHMENT WITH *n*-3 AND CLA FATTY ACIDS

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Abstract – The impact of hedonic evaluation on Spanish consumers' preferences towards beef attributes including its enrichment with polyunsaturated fatty acids (*n*-3: omega-3 and CLA: conjugated linoleic acid) was analysed using choice experiments (CE). 642 consumers from three Spanish cities were divided into two groups and half of them received information about *n*-3 and CLA fatty acids. Consumers evaluated the relative importance of beef attributes and their levels by conducting a CE, subsequently tasted four different beef samples and concluded by repeating the CE. Results showed higher consumers' overall acceptability scores for beef enriched with *n*-3 and CLA than conventional beef, and the information offered to consumers had no significance impact on their acceptability scores. However, the hedonic evaluation had a significant impact on consumer beef preferences, in particular, for the animal diet attribute. The utility for beef enriched with *n*-3 fatty acids increased significantly after tasting, especially for the non-informed consumers.

Key Words – polyunsaturated fatty acids, omega-3, conjugated linoleic acid, consumer preferences, meat, choice experiments.

I. INTRODUCTION

Health concerns are becoming one of the most relevant predictors for food consumption (4). This tendency has given rise to a new range of products on the market that try to improve health and reducing the risk of certain diseases. The number of reduced-fat foods and increased levels of unsaturated fatty acids have gained market shares. Thus, potential demand of enriched or functional meat is expected in Spain. The main objective of this paper was twofold: first to analyse the impact of hedonic evaluation on consumers' preferences for beef attributes including its enrichment with polyunsaturated fatty acids (*n*-3 and CLA), and second to assess the impact of information on overall beef acceptability scores for beef.

II. MATERIALS AND METHODS

Methodological framework

Our methodological framework consisted of three main steps: a choice experiment, a hedonic test and a repetition of the choice experiment. The first part focussed on analysing consumers' preferences using hypothetical choice experiments (CE) towards beef attributes and its enrichment with *n*-3 and CLA fatty acids. In the second stage, consumers' beef acceptability was carried out by blind tasting of four types of beef samples from animals fed one of four different diets: a) conventional (standard commercial diet), b) enriched with *n*-3, c) enriched with CLA and d) enriched with both *n*-3 plus CLA. Consumer overall acceptability of beef samples was assessed using a 9-point hedonic scale (1 = dislike extremely to 9 = like extremely). After tasting the samples, all consumers were told what type of beef they have tasted. Finally, in the third phase, the potential impact of hedonic evaluation on consumers' preferences for beef attributes including its enrichment with *n*-3 and CLA was analysed by repeating the CE from the first step.

Choice experiments

The application of the CE implies the presentation to "subjects" an array of "choice sets" representing different possible states of the good of interest (beef in our case). Subjects are asked to select their preferred "product" within each choice set or none. Then, the probability of choosing one product in each choice set can be calculated in order to obtain the relative importance of attributes and their levels. Further details about CE can be found in (1).

Attributes and choice set construction

From a literature review, we identified a set of attributes and their levels to construct the choice sets: fat (slight, moderate), price (high, medium-

high, medium-low, low), color (pale red, bright red), origin (local, other Spanish origin), and animal diet (conventional, enriched with *n*-3, enriched with CLA, enriched with *n*-3 plus CLA). Following an orthogonal fractional factorial design, 2 different versions of 8 choice sets were presented to individual respondents.

Consumer sample selection and data analysis

Consumers were from three Spanish cities (Barcelona, Zaragoza and Pamplona), over 18 years of age who regularly purchase food and beverages and having purchased beef in the last month. Data were analyzed using the NLOGIT 5 and the *Random Parameter Logit* model.

III. RESULTS AND DISCUSSION

The relative importance of beef attributes is presented in Table 1. The relative importance of the attributes before the hedonic test was different for both groups of consumers, showing that the information provided had an impact on their beef preferences. Thus, for non-informed consumers, fat was the most important attribute while it was the least important for the informed ones. There is a clear impact of information on their choices, indicating that consumers are less concerned about the amount of visible fat in beef as long as it is enriched with beneficial fatty acids. Diet was not important in the beef purchasing decisions of uninformed consumers, but was the second most important for informed consumers.

Table 1. Relative importance of beef attributes (%) for informed and non-informed consumers before and after the hedonic test.

Attributes	*Without* information		*With* information	
	Pre test	Post test	Pre test	Post test
Fat content	36.20***	19,70%***	11.39**	14.11%***
Colour	16.79***	9,91%***	16.65***	13.91%***
Origin	16.30***	7,34%***	15.40***	10.11%***
Diet	1.48	39,53%***	25.93***	28.68%***
Price	29.23***	23,50%***	30.64***	33.19%***

Significance levels: *** p<0.01; **p<0.05; * p< 0.10

Analysing preferences before and after the hedonic test within each group, results showed significant modifications in the relative importance of the attributes for the non-informed consumers, while minor changes happened for the informed ones in their beef choices. Thus, the heterogeneous preferences identified before the hedonic test tended to be more homogeneous between the groups of consumers after tasting. In this context, a significant change for non-informed consumers resulted in the diet preference which have moved from a non-significant preference to the most important one.

To better understand the attribute consumer preferences, the relative importance of the levels of each attribute was calculated (Table 2). Results for the animal diet attribute showed that the utility for beef enriched with *n*-3 increased, while the preference for beef from animals fed the conventional diet decreased for both groups of consumers. However, there is a consensus to reject beef enriched with CLA before and after the hedonic test. After tasting, utilities for CLA enriched beef were still not significant, while utilities for *n*-3 enriched beef increased significantly. Results show that consumers clearly prefer *n*-3 over CLA-enriched beef likely because consumers are more familiar with *n*-3 enriched food products, even those that received information about the enrichment process and the health benefits of *n*-3 and CLA.

Table 2: Utilities associated to beef attributes and their levels for informed and non-informed consumers before and after the hedonic test.

	Without information		*With* information	
	Pre test	Post test	Pre test	Post test
Amount of visible fat				
Slight visible fat	0.529***	0.399***	0.175*	0.208***
Moderate visible fat	-0.529***	-0.399***	-0.175*	-0.208***
Beef color				
Bright red	0.245***	0.199***	0.255***	0.205***
Pale red	-0.245***	-0.199***	-0.255***	-0.205***
Origin				
Locally produced	0.238***	0.148***	0.236***	0.149***
Other Spanish origin	-0.238***	-0.148***	-0.236***	-0.149***
Animal diet				
Conventional	0.008	-1.036***	-0.496***	-0.539***
Enriched with *n*-3	0.025	0.562***	0.208***	0.299***
Enriched with CLA	-0.018	0.133	-0.012	-0.067
Enriched with *n*-3 & CLA	-0.016	0.340***	0.300***	0.307***
Beef price				
6.6€ (high)	-0.515***	-0.562***	-0.642***	-0.647***
5.7€ (medium-high)	0.093	-0.127*	0.179***	0.016
4.8€ (medium-low)	0.339***	0.300***	0.299***	0.333***
3.9€ (low)	0.083	0.389***	0.164**	0.297***

Significance levels: *** p<0.01; **p<0.05; * p< 0.10

IV. CONCLUSION

Results showed that hedonic evaluation had a significant impact on defining consumer beef preferences, especially for non-informed consumers. Focusing on the animal diet attribute, utilities for *n*-3 enriched beef increased after tasting especially for non-informed consumers, while utilities for CLA enriched beef were still not significant after tasting for all consumers. Provided

information about the enrichment process and the health benefits of *n*-3 and CLA fatty acids had no significant impact on overall acceptability scores of beef.

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REFERENCES

1. Hensher, D., Rose, J. & Greene, W. (2005) Applied choice analysis: A primer. Cambridge University Press: Cambridge.
2. Killinger, K.M., Calkins, C.R., Umberger, W.J., Feuz, D.M., & Eskridge, K.M. (2004). Consumer visual preference and value for beef steaks differing in marbling level and color. Journal of Animal Science, 82(11), 3288-3293.
3. Lim, K.H., Hu, W., Maynard, L.J., & Goddard, E. (2013). U.S. Consumers' Preference and Willingness to Pay for Country-of-Origin-Labeled Beef Steak and Food Safety Enhancements. Canadian Journal of Agricultural Economics, 61(1), 93-118.
4. Lusk, J.L., Roosen, J., & Fox, J.A. (2003). Demand for beef from cattle administered growth hormones or fed genetically modified corn: A comparison of consumers in France, Germany, theUnitedKingdom and the United States. American Journal of Agricultural Economics, 85(1),16–29.
5. Realini, C.E., Font i Furnols, M., Sañudo, C., Montossi, F., Oliver, M. A. & Guerrero, L. (2013). Spanish, French and British consumers' acceptability of Uruguayan beef, and consumers' beef choice associated with country of origin, finishing diet and meat price. Meat Science, 95 (1), 14-21.