EFFECT OF DIFFERENT LIVESTOCK PRODUCTION SYSTEM ON SENSORY CHARACTERSITICS OF THREE SPANISH BOVINE BREEDS

S. Zamuz[1], M., Pateiro[1], M. López-Pedrouso[2], R. Rodríguez-Vázquez[2], M. Oliván[3], S. García-Torres[4], M.A. Sentandreu[5], J.M. Lorenzo[1], C. Zapata[2], D. Franco[1]

[1]Meat Technology Centre of Galicia, San Cibrao das Viñas–32900, Spain.
[2]Department of Zoology, Genetics and Physical Anthropology, University of Santiago de Compostela, Santiago de Compostela–15782, Spain.
[3]Servicio Regional de Investigación y Desarrollo Alimentario (SERIDA), Villaviciosa–33300, Spain.
[4]Center of Scientific & Technological Research of Extremadura (CICYTEX), Guadajira–06187, Spain.
[5]Instituto de Agroquímica y Tecnología de Alimentos (CSIC), Valencia–46980, Spain.

*Corresponding author email:danielfranco@ceteca.net

I. INTRODUCTION

The sensory acceptability is a major factor in order to address the needs of the consumers, affecting their purchasing decisions [1]. Within beef palatability, tenderness and odour are usually considered key factors for meat quality. Production and technological factors such as breed, diet, slaughter age and ageing conditions (times and temperature) have a strong influence in the final perception of the beef. Amongst these factors, breed is one of the most important, because is closely related to different livestock production system [extensive, semi-extensive (SE) or intensive (IN)] [2]. The aim of this study was to evaluate the effect of SE and IN production systems on the beef sensory attributes from three Spanish native breeds [(Asturiana de los Valles (AV), Retinta (RE) and Rubia Gallega (RG)].

II. MATERIALS AND METHODS

Thirty-six calves distributed to 12 AV, 12 RE and 12 RG were used in this study. AV and RG are located in the north of Spain (Asturias and Galicia, respectively) while RE is found in the west of Spain (Extremadura). From the total number, half of the animals were reared in SE system based on natural pasture and supplementation with commercial feeding and the other half only had access to commercial feeding in the finishing period (IN system). Calves from RG were slaughtered at 9 months whereas AV and RE were at 15 months of age. Sensory analysis was carried out according to [3]. Twelve trained panelists selected from the Meat Technology Center of Galicia participated in this study. A randomized incomplete equilibrated blocks design was followed, where each panelist evaluated samples identified with a three-digit random numbers. The following textural parameters: tenderness, juiciness, fibrousness, coarseness and smoothness attributes were assessed. Odour (overall and fat) and flavour (overall, fat, liver and acid) completed the sensory attributes. The intensity of each attribute was measured on a lineal structured scale from 0 (sensation not perceived) to 10 (maximum sensation). XLSTAT 2012.6.09 (Addinsoft, New York, N.Y., USA) was used to analyze data. Two-way ANOVA was conducted and Turkey's HSD mean separation test was used for post hoc analysis (α=0.05). Principal component analysis (PCA) was carried out with the significantly different attributes and it was conducted to establish the relation between the sensory attributes and the different breeds and production systems of studied bovine breeds.

III.RESULTS AND DISCUSSION

Average scores for each attribute for beef of AV, RE, RG reared under semi-extensive and intensive systems are shown in Figure 1. Significant effect among breeds in all attributes were showed ($P<0.05$) and textural parameters showed the highest differences among the samples in agreement with [4]. Contrary to Dikeman et al. [5], breed had an important effect in overall flavour intensity. In addition, the highest values (6.97) of this attribute were showed in RE calves reared in SE system. The PCA was able to separate the three Spanish autochthonous bovine breeds reared in semi-extensive and intensive systems. The two-dimensional projection was able to explain the 75.76 % of the variability (Figure 2). The PC1 was characterized by fat odour, tenderness, juiciness and acid flavour explaining the 51.54 % of the total variability, while PC2 was characterized by coarseness, fat flavour and liver flavour, representing the 24.22 % of the total variability.

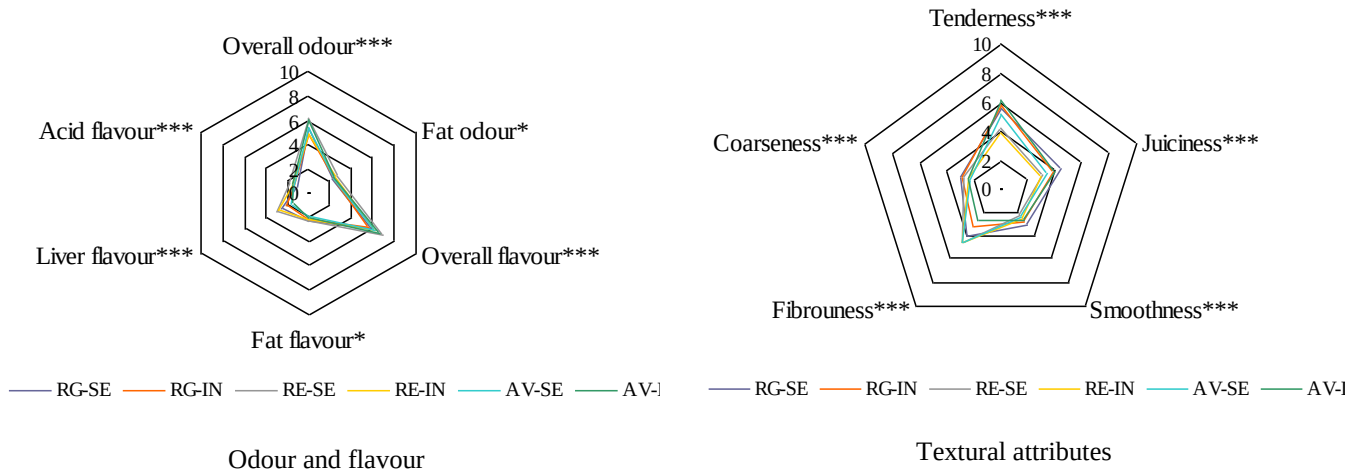

Figure 1. Mean values of intensity for beef attributes (Significance: * P<0.05; ***P<0.001).

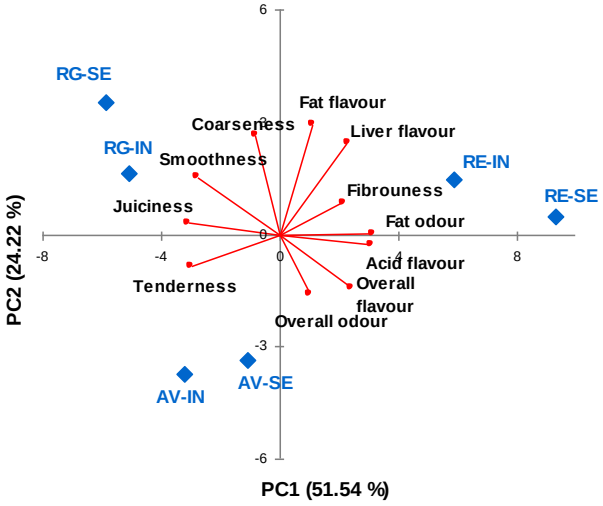

Figure 2. PCA plot for the three breed (AV, RE and RG) and production systems (SE and IN)

The tenderness and juiciness are on the left side of PC1 opposite to fibrousness. Campo et al. [2] previously reported this relationship among textural attributes of beef striploin steaks from seven European breeds. In general, AV and RG samples are more closely located to textural attributes with the exception of fibrousness, while RE samples were placed close to odour and flavour attributes.

IV. CONCLUSIONS

The sensory attributes of beef from three Spanish autochthonous breeds (AV, RE and RG) were affected by rearing systems. Liver flavour, tenderness and fibrousness were the most representative sensory attributes in order to establish a separation among breeds and livestock production systems.

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