

PHYSICOCHEMICAL CHARACTERIZATION OF MEAT FROM MIRANDESA BREED CALVES

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Abstract – The aim of this study was to evaluate physicochemical characteristics of Mirandesa breed. Twenty animals registered in the studbook of this breed, slaughtered at eleven months were used to evaluate meat quality (chemical composition, color parameters, WHC and shear force) of *longissimus thoracis* of Mirandesa breed. This breed is characterized by a high protein level (21.73%), low intramuscular fat (2.07%) and high redness (16.68). These first results obtained in this study are a starting point for the characterization of this type of meat, because these physicochemical characteristics respond to the demand required by the current meat consumers.

Key Words – chemical composition, color parameters, shear force

I. INTRODUCTION

Mirandesa is a native breed of Portugal, classified as an endangered cattle breed. Since 1995 has the quality mark Protected Designation Origin (PDO) which has allowed the conservation of the breed, ranking in 2007 as the second Portuguese meat with PDO. The production of PDO meat has a greater acceptance due to the growing interest of consumer for natural products, produced under traditional systems and respectful with the environment [1]. Moreover, the use of local breeds is a good alternative to beef production system since these breeds are more closely linked to the environment and can help promote biodiversity and sustainable agricultural production [2]. The production system of Mirandesa is based on small family farms that use traditional or grazing systems based on feeding with breast milk supplemented with feed, corn, potatoes, corn silage and fodder and finished with concentrate (2-4 months) [3]. Scarce information on meat quality of the Mirandesa breed have been reported until now, making necessary to study more deeply the characteristics of Mirandesa for the correct characterization of the breed and its products. Therefore, the aim of this study was to evaluate physicochemical characteristics (chemical composition, color and texture parameters) of male Mirandesa calves slaughtered at eleven months.

II. MATERIALS AND METHODS

The study was carried out with twenty males of Mirandesa breed slaughtered at eleven months. The calves were reared in an extensive production system and finished after weaning for 120 days. During the finishing period, animals were fed *ad libitum* with hay, oats and a flour mixture. Animals were slaughtered in a commercial abattoir and carcass was cut following the methodology proposed by Soares [4], and the muscle *longissimus thoracis* (LT) was extracted from the left half of each carcass, between the fifth and the tenth rib. After 48 h of slaughter, the pH, color, water holding capacity (WHC), texture and proximate composition were determined according to Pateiro *et al.* [5]. ANOVA of one way using SPSS package (SPSS 19.0, USA) was performed and LSM were separated using Duncan's t-test ($P < 0.05$).

III. RESULTS AND DISCUSSION

The chemical composition, color parameters, WHC and textural traits of meat from Mirandesa calves are shown in Table 1. The pH values ranged from 5.45 to 5.66, which are considered within the acceptable range for beef ($5.4 \leq \text{pH} \leq 5.7$; [6]). These pH values obtained were similar to those found by other authors in Rubia Gallega calves [7], crosses of Rubia Gallega with Holstein-Friesian [5] or calves of Mertolenga breed [8]. Regarding colour parameters, the values obtained were similar to those obtained by other authors [5].

The mean percentages of moisture (76.2±0.4), protein (21.7±0.6) and ashes (1.25±0.07) were similar to those obtained in other animals of Rubia Gallega calves [7] and its crosses with Holstein-Friesian [5]. The greatest differences were found in IMF content, since the aforementioned authors observed lower IMF values [5, 7].

WHC was measured in three ways: cooking loss (CL), drip loss (DL) and pressing loss (PL). CL has a great importance in the properties of meat, because it affects consumer acceptance. As well, appearance, suitable for preservation, weight, color and to some extent tenderness and juiciness, are affected by WHC, due to the water losses that occur during cooking. The obtained results measured as CL ranged from 19.33 to 40%. This outcome is in agreement with data reported by Domingo *et al.* [9], who found mean CL values of 28.38%. Regarding texture, shear force values ranged from 52.9 N to 125.0 N, within the values found by other authors [5, 7-8].

Table 1 Proximate composition and physicochemical parameters of Mirandesa calves

	MEAN	MAX	MIN	SD
pH	5.53	5.66	5.45	0.07
Chemical composition (%)				
Moisture	76.16	77.00	75.46	0.40
Protein	21.73	22.72	19.99	0.62
Ashes	1.25	1.38	1.16	0.07
Intramuscular fat	2.07	3.63	1.11	0.72
Colour parameters				
Lightness (L*)	41.51	43.86	38.56	1.56
redness (a*)	16.68	18.89	14.08	1.40
Yellowness (b*)	9.42	10.48	8.04	0.64
WHC (%)				
Pressing losses (%)	20.29	34.47	15.67	4.05
Drip losses (%)	0.39	0.83	0.16	0.18
Cooking losses (%)	34.38	40.00	19.33	4.27
Textural parameters				
Shear force (N)	87.01	124.96	52.93	19.73

IV. CONCLUSION

This research allows obtaining more accurate results of Mirandesa meat quality in order to conserve the breed and its production systems. The scarce information with this type of product makes this study useful for the research community and final consumers who are increasingly demanding high quality food products.

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