

SENSORY CHARACTERISTICS OF MEAT FROM HOLSTEIN FRIESIAN CULL COWS: EFFECT OF FEEDING AND FINISHING

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Abstract – Sensory quality has become an important component of meat quality. The aim of this work was to evaluate the sensory quality of loins from Holstein Friesian cull cows, comparing two different finishing and feeding (commercial concentrate vs. “pastone” silage) strategies. There were no significant effects ($P>0.05$) on sensory descriptors between the two types of feeding and finishing; only animal flavor (considered to be a negative attribute) and hardness were different ($P<0.05$) between the two diets. Rancid odors and flavors were not detected in any sample.

Key Words- Cull cow, feeding finishing, sensory characteristics.

I. INTRODUCTION

In the Galician region (NW of Spain), there is a census of around 339,841 dairy cows [1] that mainly belong to the Holstein-Friesian breed. At the farm level, there is a continuous renewal of the mothers, so the productive lives of these cows are about five years. In Galician it is possible to feed the cows with abundant and quality grass, but overall this feeding system is not sufficient for an optimal finish [2]. An alternative would be to improve the diets of cows being finished using “pastone” silage. The major objective of this finishing and feeding strategy would be to increase the weight and the price of cows and improve their condition score, their fatty state and the physicochemical and sensory characteristics of the meat [3].

Sensory quality has become an important component of meat quality. Sensory characteristics are key elements in the preferences and acceptability of consumers who also consider nutritional aspects, safety and service in their purchase decisions. Sensory quality is measured by various

subjective sensations, mainly including the meat's hardness, juiciness, flavor and odor [4].

The aim of this work was to evaluate the sensory quality of loins from Holstein Friesian cull cows comparing two different finishing and feeding (commercial concentrate vs. “pastone” silage) strategies.

II. MATERIALS AND METHODS

II.1. Samples

In order to carry out this study, twelve Holstein-Friesian cows from the experimental herd of the Agricultural Research Centre of Mabegondo (A Coruña, Spain) were used. During their last 4-6 months, the animals were finished with two types of feed. One group was finished with a commercial concentrate while the second group was fed with “pastone” silage (composed only of corncobs). The animals were slaughtered at the age of sixty months. Immediately after slaughter, carcasses were weighed and chilled to 4°C in a cold chamber for 24 h. After this time, the *Longissimus dorsi* muscle was removed from the left half of each carcass, between the fifth and the tenth rib. Following that, the muscle was cut into steaks (about 2.5 cm thick), packed in vacuum packaging (80%) and stored at 4°C for 21 days.

The sensory evaluation was done with cooked samples. Before cooking, the steaks were placed in a white plastic plate and the panelists evaluated the color intensity (red color) and the brightness of the raw meat. After this, the steaks were cooked on a griddle, without salt, to an internal temperature of 65-70°C. Immediately after cooking, the steaks were cut into 2 cm thick slices, covered with

aluminum foil and kept at 75°C before being served to the panelists.

II.2. Sensory analysis

The sensory panel was always composed of 8-10 members, selected and trained according to [5].

There were sixteen training sessions. During the ten first sessions, the panel identified, selected and generated the descriptors present for meat samples, analyzing 10-12 different meat products. Because of the large number of descriptors, a number of terms that were not cited or cited infrequently were deleted. Moreover, certain similar descriptors were grouped under a single representative attribute descriptor.

In order to familiarize the panel with different intensities of the sensory properties and to assimilate the scoring scale to be used, six training sessions were carried out.

Finally, the samples were evaluated in four sessions (three samples per session) using the descriptors that had been generated in the previous sessions. A linear scale of 0 (sensation not perceived) to 9 (maximum level of the sensation) was used. During the sensory evaluations, the panelists were situated in a private booth illuminated, according to [6,7].

II.3. Statistical analysis

For the statistical analysis of the results, data were analyzed using the SPSS (version 19.0, Chicago, IL, USA). One-way analysis of variance (ANOVA) was used to analyze the effect of finishing feeding type on meat sensory traits.

III. RESULTS AND DISCUSSION

Table 1 shows the final sensory attributes generated by the panelists and employed in the evaluation of the meat samples. Twenty-one sensory traits grouped as odor (intensity, cereals, dairy, greasy, vegetable, animal and rancid), taste (sweet, acid and salty), flavor (cereal, dairy, greasy, vegetable, animal and rancid) and texture (stringiness, hardness, juiciness and

chewiness) were assessed.

These descriptors are comparable with those described in previous studies on the sensorial characterization of beef [8,9,10].

Table 1. Sensory descriptors on meat samples generated and employed by panelists.

PANELIST CODE:											SAMPLE:										
DESCRIPTORS																					
ODOR		0	1	2	3	4	5	6	7	8	9										
INTENSITY		0	0	0	0	0	0	0	0	0	0										
CEREALS		0	0	0	0	0	0	0	0	0	0										
DAIRY (milk, butter)		0	0	0	0	0	0	0	0	0	0										
GREASY		0	0	0	0	0	0	0	0	0	0										
VEGETABLE		0	0	0	0	0	0	0	0	0	0										
ABNORMAL ODORS																					
ANIMAL		0	0	0	0	0	0	0	0	0	0										
RANCID		0	0	0	0	0	0	0	0	0	0										
OTHERS (specify)		0	0	0	0	0	0	0	0	0	0										
TASTE		0	1	2	3	4	5	6	7	8	9										
SWEET		0	0	0	0	0	0	0	0	0	0										
ACID		0	0	0	0	0	0	0	0	0	0										
SALTY		0	0	0	0	0	0	0	0	0	0										
FLAVOR		0	1	2	3	4	5	6	7	8	9										
INTENSITY		0	0	0	0	0	0	0	0	0	0										
CEREALS		0	0	0	0	0	0	0	0	0	0										
DAIRY (milk, butter)		0	0	0	0	0	0	0	0	0	0										
GREASY		0	0	0	0	0	0	0	0	0	0										
VEGETABLE		0	0	0	0	0	0	0	0	0	0										
ABNORMAL FLAVOR		0	0	0	0	0	0	0	0	0	0										
ANIMAL		0	0	0	0	0	0	0	0	0	0										
RANCID		0	0	0	0	0	0	0	0	0	0										
OTHERS (spceify)		0	0	0	0	0	0	0	0	0	0										
TEXTURE		0	1	2	3	4	5	6	7	8	9										
STRINGINESS		0	0	0	0	0	0	0	0	0	0										
HARDNESS		0	0	0	0	0	0	0	0	0	0										
JUICINESS		0	0	0	0	0	0	0	0	0	0										
CHEWINESS		0	0	0	0	0	0	0	0	0	0										
GENERAL IMPRESSION		0	1	2	3	4	5	6	7	8	9										
		0	0	0	0	0	0	0	0	0	0										

Figure 1 shows the mean scores given by the panelists for culled cow samples with different finishing strategies, commercial concentrate vs. “pastone” silage. There were no significant effects ($P>0.05$) on sensory descriptors between the two types of feeding and finishing; only animal flavor (considered to be a negative attribute) and hardness were different ($P<0.05$) between diets: it was higher for meat from animals fed with commercial concentrate. Similarly, some authors [11,12] did not find significant differences between diets on sensorial attributes of meat of cattle breeds.

Combining both feeding and finishing strategies, the highest scores were found for red color (on average rating 5.17), odor intensity (5.24) and juiciness (4.29), very similar to those reported by [13,14] for beef samples. Taking into account that meat color, tenderness and juiciness are the most important organoleptic characteristics of meat quality [13,15] and using a score of 5 as the acceptability limit, all samples were found to be acceptable by the panelists.

Rancid odors and flavors, associated with quality deterioration in muscle foods, were not detected in any sample, which suggests a low level of lipid oxidation and/or the presence of oxidized compounds below the threshold level [16].

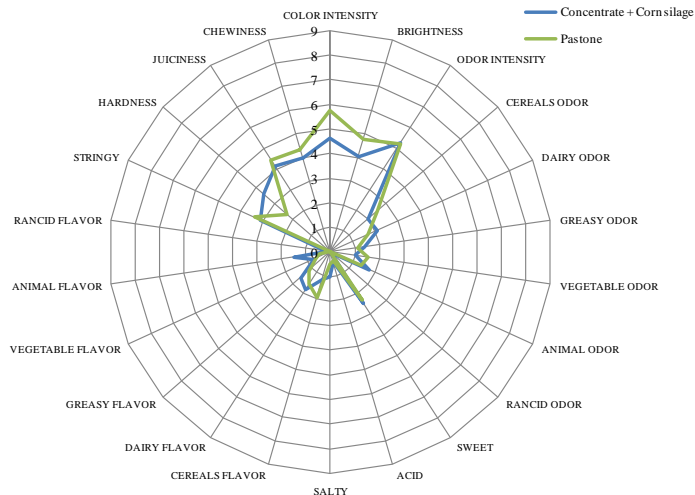


Figure 1. Mean values of sensory properties of loin samples of cull cows Holstein-Friesian.

CONCLUSION

The results of the study showed that meat quality was not different between the two diets in the study, commercial concentrate vs. “pastone” silage (composed only of corncobs). In general, the meat quality had a good acceptability by the panel members.

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