INFLUENCE OF BREED ON BOVINE MEAT QUALITY AND PALATIBILITY

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Background

The situation of the native bovine breeds has developed in Spain in a parallel way to the rurals breeds in other countries (Ibañez et al., 1997), having decreased the number, among other reasons, due to the progresive introduction of the select breeds of which usable parts are better in systems of intensive production, althoug they do not offer a higher meat quality in relation to our native breeds.

The new models of extensive production in the Mediterraneo Basin are leaning to animals adapted to the specific conditions of these systems and capable of producing the demanded and valued products for being "natural". The main aim is the production of meat, as well as the fight against fire risks, because it has been proved that with the extinction of the extensive stock in wide marginalized places, it was provoked the exodus of a rural population (depopulation of the countryside) with a wide environmental culture. According to Orozco (1985) there are different reasons to preserve the domestic animal breeds, such as the cultural, economic-biological, practical and scientific.

Objectives

On this study we try to evaluate the meat quality (technological and sensorial) of steer bulls of the Serrana breed from Soria native breed implanted in the mountain, and Charolais breed fed with concentrate "ad libitum" from weaning state.

Methods

This study has been based on two groups of 15 animals each have been the base of this study, fed from weaning state with concentrate "ad libitum", in the open air during the period between October 1996 and June 1997. Each group had animals of different breed: Charolais and Serrana Soriana breed.

The animals are of the Serrana Soriana Breed, belonging to the Agrupación Negra Ibérica. It is a native breed coming from the highlands of the Sistema Ibérico, having been used in the past as an instrument for work, meat and milk. Female calves'shoulder heigh is 138 cm being the average weight is 518 kg, while male calves are born with an average weight of 38 kg. They have an average growing of 1,3 kg a day and a conversion Index of 5-5,5, during the fattening period which goes from the waning - 6-7 months with a weight of 210 kg - until the 13-15 months with an approximate weight of 550 kg.

10 animals of each lot were slaughtered, being considered yearling. After a 7-day maduration, it is then made the technological and sensorial analysis of the longissimus dorsi muscle indicated as follows:

* Technological analysis

- The pH measure, carried out 24 hours after the slaughter, on the canal, in the dorsal region, with a portail Crison pHmeter 507.
- The holding water capacity (HWC) was determined, through compression, described by Grau and Hamm(1953).
- Physical colour parameters were measured by the CIE- L* a* b* (Minolta 200 colorimeter) and myoglobin concentration (Hornsey, 1956).
- The shear force, was measured by texturometer TA. XT2. Stable Micro Systems.
- The chemical composition (proteins, fat, ashes and moisture). It was carried out under the analytical official methods (BOE 29/8/1979) and the International rules ISO R-1442 (moisture), ISO R-936 (ashes), ISO R-1443 (fat) and ISO R-937 (total nitrogen).

* Sensorial analysis.

It was carried out by 9 judges trained in five sessions, using 2 samples/lot/session in an homologated sampling room (Afnor, 1987) of ETSIA of the Universidad Pública de Navarra.

The sensorial evaluation was realized applying the techniques of the descriptive quantitative analysis (Stone et al 1974) with a trained panel formed by 9 tasters. The organoleptic characteristics about aroma, flavour and texture previously evaluated are detailed in table 2. These characteristics were measured pointing at their intensity in a scale of 100 mm.

- Statistic treatment.

It was carried out an analysis of unifactorial variation with the S.P.S.S. program.

Results and discussions

The analytical and sensorial analysis results are expresed on tables 1 and 2.

The breed effect has a significant influence on the value of pH-24, with slightly lower values to the Serrana breed with regard to the Charolais breed and even with regard to other original Spanish breeds (Albertí et al., 1993).

Differences are also noticed in the content of myoglobin and in the L* and a* cordinates, amounting to the dark colour of the meat of the original breed.

Shear force values are higher in the Serrana breed, what does not imply a toughness layer but the need for more time of maduration of the carcass for this breed, because the content in total collagen does not change in both breeds.

Significant differences have been found in the sensorial analysis with larger value to the Serrana breed in residual flavour and noticeable differences in greasiness corresponding also higher values to this breed, existing a positive correlation between this and the continuated juiciness (r= 0,65, p<0,001).

Finally, a positive correlation is noticed (r= 0,58, p<0,001) between the technological and sensorial toughness measure, coinciding with the work undertook by the other authors (Bouton et al., 1975), even though the toughness measured sensorialy does not show significative difference between breeds just like in other works (Santolaria, 1993; Mamaqui, 1996; Campo et al., 1997).

Conclusions

Both breeds show significative differences in pH-24, myoglobin, L*, a* and shear force, with higher values to the Serrana breed, what mus not be indicative of a badly quality of meat but rather the need for more maduration time of the carcass in this original breed.

This breed also shows higher values in residual flavour and in greasiness.

Data in form of tables

Table 1 - Results of the technological analysis.

	CHAROLAIS n=10	SERRANA n=10	SIGNIFICATION LEVEL
pH-24	5,51 ± 0,08	5,42 ± 0,07	*
HWC (% ejecled water)	20,14 ± 2,25	19,98 ± 1,64	NS
Moisture (%)	74,55	75,10	NS
Protein (%)	22,96 ± 0,68	22,79 ± 0,07	NS
Fat (%)	1,96 ± 0,43	2,32 ± 0,68	NS
Ashes (%)	1,02 ± 0,03	1,00 ± 0,03	NS
Myoglobin (mg/g)	4,05 ± 0,56	6,32 ± 1,00	**
L*	42,21 ± 2,00	36,27 ± 1,18	**
a*	20,84 ± 1,25	22,25 ± 1,64	**
b*	10,97 ± 0,82	10,43 ± 1,06	NS
Shear force (kg/cm^2)	6,31 ± 1,46	7,21 ± 1,00	*
Collagen	0,51 ± 0,02	0,51 ± 0,01	NS

N.S.: No significative. **: Significative difference (p<0,05).

Table 2 - Results of the sensorial analysis

SERRANA	CHAROLAIS n=10	SERRANA n=10	SIGNIFICATION LEVEL
Characteristical aroma	80,99 ± 20,60	70,42 ± 6,82	N.S.
Liver aroma	37,02 ± 10,52	35,31 ± 6,23	N.S.
Characteristical flavour	67,92 ± 8,25	71,67 ± 10,91	N.S.
Blood flavour	55,06 ± 8,71	58,17 ± 11,37	N.S.
Liver flavorur	35,69 ± 12,08	37,92 ± 8,76	N.S.
Fat flavour	45,26 ± 9,26	50,04 ± 10,83	N.S.
Residual flavour	60,33 ± 8,14	63,54 ± 10,10	*
Initial juiciness	76,01 ± 13,00	65,50 ± 14,71	N.S.
Continued juiciness	60,79 ± 9,56	57,81 ± 14,02	N.S.
Hardness	53,46 ± 17,87	70,74 ± 17,24	N.S.
Cohesiveness	54,31 ± 20,22	71,26 ± 20,33	N.S.
Flourness	66,59 ± 20,13	52,62 ± 13,49	N.S.
Facility to swallow	61,51 ± 14,76	57,76 ± 18,52	N.S.
Greasiness	51,87 ± 7,64	53,45 ± 6,93	+

N.S.: No significative. **: Significative difference (p<0,05).

Pertinent literature

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