CARCASS COMPOSITION AND COMMERCIAL CUTS OF YEARLINGS OF SEVERAL BEEF BREEDS WITH DIFFERENT BIOLOGICAL TYPES

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Background

Cattle carcasses with high conformation score are supposed to have larger muscle and lower fat and bone content than carcasses with worse morphology, at the same slaughter weight. This is why they are appreciated by butchers and consumers. Therefore the genetic selection programs in the last years have been founded in the improvement of carcass conformation. But some rustic breeds, raised in areas with limited available pasture, can not be replaced by meat purpose breeds because of their maladjustment to a hard environment.

Objective

Evaluating differences among breeds in dressing-out percentage and saleable meat yield is the main interest for many people in the meat industry. To know and measure these traits in carcasses of Spanish cattle breeds representing a width range of diverse biological types is the aim of this paper.

Material and methods

A total of 119 animals, yearling entire males, born at the end of winter, of the following Spanish breeds were used. They were grouped according to their double muscle condition, Asturiana de los Valles (AS), fast growth rate, Pirenaica (PI) and Rubia Gallega (RG), dual-purpose condition, Brown Swiss (BS), and rustic characteristics, Avileña (AV), Morucha (MO) and Retina (RE). All of them were reared with a concentrate diet from 7 month old until they were slaughtered at an average weight of 460 kg. These kind of carcasses belong to the yearling commercial category, *Añojo* in Spain. Meat sensory quality of these animals has been reported by Sañudo *et al.* (1997).

Conformation (EUROP) and fatness (1-5) scores according to the EUROP grading system were assessed at slaughter (Conformation: E+=15, E=14, E-=13, U+=12,..., P-=1; Fatness: very fat class 5+=15, ..., very lean class 1-=1).
Twenty four hours after slaughtering the left side of each carcass was divided into deboned and trimmed standardised commercial joint cuts. It was calculated: saleable meat as carcass percentage of fat-trimmed and deboned joints; fat trimmed and bone carcass percentages; the saleable meat/bone ratio (weight of saleable meat/weight of carcass bone); and commercial cuts as saleable meat percentage of fat- trimmed and deboned joints. The commercial joints were included as:
Extra category: Fillet/tenderloin.
1st: Loin, Thick flank, Topside, Silverside, Rumpsteck, Eye of round, Chuck, Shoulder and Chuck tenderloin.
2nd: Shank and Shin, and Blade.
3rd : Flank and Thin skirt, Flank steak, Neck, Short Ribs, Brisket and Trimmings.
Meat percentages of extra, first, second and third category related to the total saleable meat were calculated (Table 2). Data were analysed using GLM procedure within the SAS computer programme, means were compared using Duncan´s multiple range test.

Results and discussion

The average carcass weight of AS, RG, PI and BS bulls did not differ significantly although their dressing percentages were 64% on AS breed and 60% or higher on the others breeds (Table 1). However, in spite of the same slaughter weight, rustic breeds (MO, AV and RE) had the lowest carcass weight because of their lower dressing percentages (55.5 to 57.6%).
Superior conformation and saleable meat percentage of the AS and RG breeds were already showed by Vallejo (1971). Dressing percentage of RG breed (60.7%) was higher than in bulls of the same breed fed on a mixed diet and slaughtered at 400 kg live wight (Zae and Galvez, 1980) or 493 kg (Sánchez-García *et al.*, 1992), without increasing fat or bone percentages, confirming the late maturity of the breed.
AS, RG, PI and BS bulls showed better values than rustic breeds in muscularity, expressed as blockiness (≥2.3 kg/cm *vs.* ≤2.1 kg/cm) or conformation score(≥R+ *vs.* ≤R). Thus the best conformed carcasses corresponded to the leanest ones. Retail cuts categories (Table 2) revealed small, but statistically significant, differences among breeds in cuts of higher prices and saleable meat. Double muscled cattle and fast growth breeds had the highest saleable meat/bone ratio, drawing ahead the AS breed who showed the leanest carcass (7.1% fat), the lowest bone percentage (16%) and highest dressing percentage (64.1%).
On the other hand, rustic breeds carcasses (AV, MO and RE) showed the highest fat and bone percentages, reaching a 13.4 % fat, 19.8% bone and only a 3.4 saleable meat/bone ratio in the RE breed, agreing with the study of Cabrero (1991) about conformation grade and retail cuts of Spanish cattle.

Conclusions

Large differences in dressing percentage and carcass composition exist among these breeds with different biological types. Asturiana, as a double muscled cattle, together with Rubia Gallega and Pirenaica, as fast growth and well conformed cattle, are characterised for their high meat-yielding carcasses and high commercial cuts of high price percentage. Therefore these breeds could be used as a sire on crossbreeding production systems with rustic breeds in order to improve the value of the saleable meat production. On the other hand the rustic breeds yield carcasses with higher fat proportion, lower saleable meat and less percentage of first category commercial cuts that reduce their economic value.

Table 1. Characteristics of beef carcass of seven cattle breeds.

Breed	AS	PI	RG	BS	RE	AV	MO	s.e.	F
Number	18	18	18	17	18	18	12		
Carcass weight, kg	291.8^{a}	284.2^{ab}	286.0^{ab}	281.0^{abc}	256.0^{c}	261.0^{bc}	263.6^{bc}	6.72	***
Dressing percentage	64.1^{a}	61.7^{ab}	60.7^{b}	59.7^{bc}	55.5^{d}	57.8^{cd}	57.6^{cd}	0.64	***
Blockiness[z], kg/cm	2.4^{a}	2.3^{a}	2.3^{a}	2.3^{a}	2.0^{b}	2.0^{b}	2.1^{b}	0.04	***
Conformation score	11.4^{a} (U)	10.5^{ab} (U-)	9.2^{bc} (R+)	9.2^{bc} (R+)	8.1^{cd} (R)	7.7^{cd} (R)	6.9^{d} (R-)	0.39	***
Fatness score	4.8^{c} (2)	5.9^{bc} (2)	6.2^{b} (2+)	6.5^{b} (2+)	8.2^{a} (3)	7.0^{ab} (3-)	6.9^{ab} (3-)	0.34	***

Asturiana (AS), Avileña (AV), Brown Swiss (BS), Morucha (MO), Pirenaica (PI), Retina (RE) and Rubia Gallega (RG)

[z] Left side carcass weight (kg)/carcass length (cm).

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Table 2.Carcass composition and commercial joint cuts in the beef breed types, expressed as percentages of carcass weight or saleable meat respectively.

Breed	AS	PI	RG	BS	RE	AV	MO	s.e.	F
Fillet **Extra category**	2.13^{a}	2.06^{ab}	1.97^{b}	1.99^{ab}	1.82^{c}	2.08^{ab}	2.04^{ab}	0.037	***
Loin	9.61^{ab}	10.15^{a}	9.71^{ab}	10.01^{ab}	9.36^{b}	9.38^{b}	9.81^{ab}	0.175	**
Thick flank/Knuckle	4.23^{a}	4.02^{b}	4.09^{ab}	3.97^{b}	3.69^{c}	3.71^{c}	3.62^{c}	0.053	***
Topside	7.23^{a}	6.82^{b}	6.87^{ab}	6.53^{bc}	5.93^{d}	6.38^{c}	6.17^{cd}	0.099	***
Silverside	5.66^{a}	5.15^{b}	5.15^{b}	4.99^{bc}	4.48^{d}	4.72^{cd}	4.49^{d}	0.090	***
Rumpsteck full cut	3.89^{a}	3.76^{ab}	3.72^{ab}	3.63^{b}	3.19^{d}	3.41^{c}	3.26^{cd}	0.051	***
Eye of round	2.10^{a}	2.04^{a}	1.89^{b}	1.82^{bc}	1.54^{d}	1.71^{c}	1.69^{c}	0.037	***
Chuck	6.84^{a}	6.96^{a}	6.52^{ab}	6.24^{b}	6.03^{b}	7.12^{a}	6.90^{a}	0.151	***
Shoulder	4.99^{a}	4.57^{ab}	4.96^{a}	4.63^{ab}	4.11^{b}	4.52^{ab}	4.11^{b}	0.150	***
Chuck tenderloin	1.05^{a}	1.02^{ab}	1.03^{a}	1.05^{a}	0.95^{b}	1.03^{a}	0.98^{b}	0.019	***
First category	45.6^{a}	44.5^{ab}	43.9^{ab}	42.9^{bc}	39.3^{e}	42.0^{cd}	41.0^{d}	0.47	***
Blade	0.76^{a}	0.67^{c}	0.68^{bc}	0.72^{abc}	0.66^{c}	0.75^{ab}	0.70^{abc}	0.017	***
Shank and Shin	6.15^{ab}	6.30^{a}	6.18^{ab}	5.94^{abc}	5.52^{c}	5.57^{c}	5.64^{bc}	0.136	***
Second Category	6.9^{a}	7.0^{a}	6.8^{ab}	6.6^{abc}	6.2^{c}	6.3^{bc}	6.3^{bc}	0.14	***
Flank and Thin skirt	4.13^{a}	4.15^{a}	3.80^{ab}	3.48^{b}	3.16^{b}	3.50^{b}	3.33^{b}	0.158	***
Skirt/Flank steak	0.65^{a}	0.62^{ab}	0.58^{bc}	0.60^{abc}	0.53^{c}	0.57^{bc}	0.55^{c}	0.017	***
Neck	2.17^{abc}	2.41^{ab}	2.06^{bc}	2.01^{c}	1.63^{d}	2.50^{a}	2.15^{abc}	0.092	***
Short Ribs	4.17	4.17	3.09	4.45	4.01	3.76	4.73	0.340	ns
Brisket	1.88^{a}	1.58^{b}	1.51^{b}	1.61^{ab}	1.49^{b}	1.48^{b}	1.34^{b}	0.076	***
Trimming	9.28	8.68	9.23	8.17	8.68	8.84	7.95	0.300	ns
Third category	22.3^{a}	21.6^{ab}	20.3^{c}	20.3^{c}	19.5^{c}	20.6^{bc}	20.0^{c}	0.31	***
Saleable meat in carcass %	76.9^{a}	75.1^{ab}	73.0^{bc}	71.8^{cd}	66.8^{e}	71.0^{cd}	69.5^{d}	0.64	***
Fat in carcass %	7.1^{d}	8.4^{cd}	8.8^{cd}	9.0^{bcd}	13.4^{a}	10.5^{bc}	10.9^{b}	0.52	***
Bone in carcass %	16.0^{d}	16.4^{d}	18.1^{c}	19.1^{abc}	19.8^{a}	18.4^{bc}	19.6^{ab}	0.33	***
Saleable meat /bone ratio	4.8^{a}	4.6^{a}	4.1^{b}	3.8^{bcd}	3.4^{d}	3.9^{bc}	3.6^{cd}	0.11	***

Means in the same raw with different superscripts differ significantly ($P \leq 0.01$).

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