

EFFECT OF SLAUGHTER WEIGHT ON CARCASS COMPOSITION AND COMMERCIAL CUTS OF YEARLINGS OF SEVEN BEEF BREEDS

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Background

Carcass characteristics and beef meat quality mainly depends in a first step on the involved breed or genotype and on the slaughter weight. In most countries beef meat has two commercial categories: calves or light carcasses (130 kg in EU-15; Eurostat, 1999) and heavy carcasses (312 kg in EU-15).

Differences between conformation scores appear related to variations in carcass composition, especially muscle and bone contents and therefore reflected in distinct muscle/bone ratio. During the last years, consumers and retailers have demanded for leaner meat accepting to pay more for muscled carcasses. Owing that, the specific type of conformation of each genotype or breed has the main importance for producers, although not necessarily a good conformation is related to a better carcass composition.

Objective

To evaluate how carcass weight affects the dressing-out percentage and saleable meat yield in different biological type breeds, at two commercial categories, is the aim of this study.

Material and methods

A total of 108 animals, males, 56 of them slaughtered at light weight (322 kg average live weight) and 52 at heavy weight (542 kg average) from Spanish beef breeds were used. They can be grouped according to their biological type as large framed-late maturing meat purpose: Asturiana (AS); Rubia Gallega (RG) and Pirenaica (PI); intermediate framed-intermediate maturing: Avileña (AV), Morucha (MO), Retinta (RE); and intermediate framed-intermediate maturing dual-purpose type: Brown Swiss (BS).

All of them were reared with a concentrate diet from 7 months old until they were slaughtered. Animals slaughtered at 322 kg produced light carcasses inside the commercial category of "ternera" (veal), while when slaughtered at heavier weight they belonged to the category of "Añojo" (yearling).

Carcass conformation and fatness score were assessed according to the EUROP grading system: Conformation: E= excellent, profiles superconvex; U= very good; R= good, profiles straight; O= fair; P= poor, profiles very concave; Fatness: 5=very high; 4=high; 3=average; 2=slight; 1=low, (Anonymous, 1991).

Twenty-four hours after slaughtering the left side of each carcass was divided into cuts, which were deboned and trimmed into standardised commercial joints. Saleable meat (weight of fat-trimmed and deboned joints) as percentage of carcass weight; meat/bone ratio as weight of saleable meat/bone; and high-priced cuts comprising the following: Fillet/Tenderloin, Loin; Thick flank, Topside, Silverside, Rump steak full cut, Eye of round, Chuck, Shoulder and Chuck tenderloin were assessed.

Blockiness was calculated as left side carcass weight (kg)/carcass length (cm).

Data were analysed using GLM procedure with the SAS computer programme (2000). Means were compared using Duncan's multiple range test.

Results and discussion

Results of the present study showed that AS and RG breeds had higher dressing percentage (>66% AS, >63.8% RG) than other breeds at both carcass weights. These results agree with Clinquart et al (1998) who reported for double-muscle bulls slaughtered at 582 kg a dressing percentage average of 66.5%, with a 62.5% to 70.3% interval. However, AV, MO and RE breeds had a lower dressing percentage on both slaughter weights than other breeds. Nevertheless, intermediate mature-intermediate frame breeds showed that as carcass weight increased their dressing percentage accretion had a higher rate than muscled breed ones, probably because of their relatively superior fatness deposition rate.

Differences in dressing among breeds fit with the difference in blockiness, eye muscle area and carcass composition, because bulls with the highest value for dressing had the highest meat percentage and the lowest percentage for fat and bone, which agree with other results on several breeds of different growth types (Camfield et al., 1999). As slaughter weight increased muscled breeds tended to a better conformation score (U to E) while keeping the fat note (1) or slightly increasing it. However, intermediate frame-intermediate maturing breeds scarcely improve their conformation but increased one point their fattening note.

In the AS and RG breeds as slaughter weight increased the proportion of bone decreased and the proportion of fat, saleable meat and high priced cuts increased. However, in intermediate mature breeds the percentage of saleable meat and the percentage of high priced cuts decreased.

Large differences in dressing percentage and carcass composition exist among these breeds with different biological types. Asturiana, as a double-muscled breed, together with Rubia Gallega and Pirenaica, as fast growth and well conformed breeds, are characterised for their high meat-yielding carcasses and high percentage of commercial cuts of high price. Relative ranking of breeds observed in

Table 1. Least squares means for carcass traits adjusted to a carcass weight for light beef carcass of seven cattle breeds.

Breed	AS	RG	PI	BS	AV	MO	RE	SE	Sig
Number	7	8	8	8	7	8	8		
Carcass weight, kg	207.1 ^b	250.4 ^a	177.4 ^{bc}	178.0 ^{bc}	167.5 ^c	161.1 ^c	164.5 ^c	7.73	***
Carcass grade score ¹	U (1)	U (1)	R (2)	R (2)	O (2)	O (2)	O (2)	-	-
Dressing percentage	66.0 ^a	63.8 ^a	59.7 ^b	57.4 ^b	56.1 ^{bc}	55.8 ^c	54.0 ^c	0.65	***
Blockiness ² , kg/cm	1.82 ^a	1.78 ^{ab}	1.75 ^b	1.73 ^b	1.68 ^c	1.67 ^c	1.64 ^c	0.01	***
Saleable meat, % carcass	80.2 ^a	78.3 ^a	73.5 ^b	72.2 ^b	69.2 ^c	69.1 ^c	68.3 ^c	0.71	***
Fat, % carcass	3.7 ^c	3.5 ^c	7.5 ^b	6.8 ^b	10.3 ^a	11.0 ^a	10.0 ^a	0.43	***
Bone, % carcass	16.0 ^c	18.2 ^b	18.9 ^b	20.9 ^{ab}	20.4 ^{ab}	19.8 ^b	21.6 ^a	0.47	***
Saleable meat /bone ratio	5.1 ^a	4.4 ^b	3.9 ^c	3.5 ^d	3.4 ^d	3.5 ^d	3.1 ^d	0.15	***
High priced cuts, % saleable	63.9	64.1	64.1	63.8	63.5	62.5	63.5	0.33	NS
Eye muscle area, cm ²	88.5 ^a	88.4 ^a	76.5 ^b	70.0 ^c	63.8 ^c	60.5 ^c	60.7 ^c	8.4	***

Table 2. Least squares means for carcass traits adjusted to a carcass weight for heavy beef carcass of seven cattle breeds.

Breed	AS	RG	PI	BS	AV	MO	RE	SE	Sig
Number	6	7	7	8	8	8	8		
Carcass weight, kg	350.3 ^{ab}	355.2 ^a	327.5 ^{abc}	319.5 ^{abc}	312.4 ^{abc}	308.0 ^{bc}	302.1 ^c	10.42	***
Carcass grade score ¹	E (1)	E (1)	U (2)	R (2)	R (3)	O (3)	O (3)	-	-
Dressing percentage	66.6 ^a	64.9 ^a	61.8 ^b	60.4 ^{bc}	58.8 ^{cd}	59.0 ^{cd}	57.0 ^d	0.54	***
Blockiness ² , kg/cm	2.77 ^a	2.74 ^a	2.65 ^b	2.62 ^b	2.49 ^c	2.51 ^c	2.43 ^c	0.02	***
Saleable meat, % carcass	80.7 ^a	80.1 ^a	73.2 ^b	73.0 ^b	69.1 ^c	69.0 ^c	67.6 ^c	0.70	***
Fat, % carcass	4.2 ^c	4.8 ^c	10.5 ^b	9.6 ^b	13.4 ^a	13.6 ^a	14.0 ^a	0.58	***
Bone, % carcass	15.1 ^c	15.1 ^c	16.3 ^b	17.4 ^b	17.5 ^a	17.4 ^{ab}	18.4 ^a	0.42	***
Saleable meat /bone ratio	5.4 ^a	5.4 ^a	4.5 ^{ab}	4.2 ^{ab}	4.0 ^b	4.0 ^b	3.7 ^b	0.15	***
High priced cuts, % saleable	65.1 ^a	64.7 ^a	62.5 ^b	62.4 ^b	61.9 ^b	61.8 ^b	61.4 ^b	0.42	***
Eye muscle area, cm ²	121.1 ^a	123.7 ^a	102.7 ^b	104.7 ^b	84.6 ^c	90.8 ^c	85.0 ^c	11.6	***

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

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

¹ Conformation (fatness); ² Left side carcass weight (kg)/carcass length (cm).

this study for carcass characteristics agrees with previous works with bulls of same breeds slaughtered at intermediate weight (Albertí et al., 1998).

Some meat quality traits of these breeds are reported by Macie et al. (2000).

Conclusions

Breeds that exhibit muscled carcass as AS and RG breeds had the highest dressing percentage, good conformation and high lean meat yield. These breeds can be used to produce higher proportions of lean meat of higher price.

These data indicate that variation exists in carcass traits among genetic groups of breeds and that carcass trait differences were greater at heavier carcass weight. Muscled breeds as AS and RG could be slaughtered at whatever weight, inside the studied interval, in order to obtain a high percentage of cuts of high economic value. However for the intermediate mature breeds studied, the light slaughter weight seems preferable since the quickly increase of fat and decrease or maintain of saleable meat percentage and high priced cuts limit its economic retail value.

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