CARCASS CONFORMATION AND MEAT QUALITY IN HEAVY LAMBS

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Background

In the EU, carcass classification of heavy lambs, weighing more than 13 kg, is based on the evaluation of conformation (E.U.R.O.P. classification, 5 classes: from E= "excellent", to P= "bad" conformation) and fatness score (5 classes: from 1 = too lean, to 5 = too fat) (EEC n° 461/93). The Italian lamb production is based prevalently on light lambs (carcass weight ≤13 kg), while heavy lambs production is not frequent and derives from animals slaughtered at 100 days of age, at an average weight of 30-35 kg: these carcasses are generally classified in "R" and "O" conformation classes with a similar fatness score. Carcass classification is interesting for the categorization of lamb carcasses into commercial type but, nevertheless, consumers decide to purchase meat first of all in base on the perception of quality, i.e. in terms of dietetic, organoleptic and tecnological quality (Jeremiah, 1998); at the moment, the relationship between heavy lambs carcass classification and meat quality has not been totally determined (Jeremiah et al., 1972; Jeremiah, 1998; Preziuso et al., 1997).

Objectives

The main goal of this study is to increase our knowledge on this subject matter, evaluating the relationship between heavy lambs carcass conformation and several physical-chemical characteristics of derived meat.

Methods

Fifty-four male lamb carcasses, weighing >13 kg, had been refrigerated for 24h at 4°C in a commercial EU licensed abbattoir and were classified according to the EU carcass classification system in base of conformation and fatness score. Several linear measurements were taken on all carcasses (ASPA, 1991): body length, pelvis width, chest width, chest depth, half-carcass length and pelvic limb length; carcass evaluation was supplemented by calculation of carcass compactness (carcass weight/half carcass length*100) and pelvic limb compactness (pelvic limb weight/pelvic limb length*100) (Sarti et al., 1991). Loins and rigth pelvic limbs were removed and their incidence on half-carcass weight was calculated. The muscle *longissimus lumborum* was excised from each right loin and analysed instrumentally in order to asses meat quality, as follows:

- meat colour, using a Minolta CR300 colourmeter (Illuminant D65), calibrated against a standard white tile in the CIEL*a*b* system, which measures the values of coordinates lightness (L*), redness (a*), yellowness (b*), saturation (C*) and hue (H*) (Renerre, 1982), by making three readings for each sample consisting of a 2.5-cm thick slice of meat covered with a polyethilene film and refrigerated for 45 min at 4°C.
- water holding capacity, determined using two different methods: *filter paper press method* (Grau and Hamm, 1957) expressed as the ratio M/T where M is the area (cm^2) of the meat and T is the total area (cm^2) (Hofman et al., 1982; Destefanis et al., 1991) and *cooking loss* on a meat sample cooked on a metal tray in an oven at 180°C to an internal temperature of 75°C.
- chemical composition, determining dry matter, ether extract, ash and crude protein for difference (AOAC, 1990).

For the statistical analysis, carcasses were divided in two groups in base of their conformation (R and O) and data were submitted to a variance analysis (SAS, 1994). Since fatness score was similar, carcasses were not divided in groups on the base of this parameter.

Results and discussion

Carcass characteristics are reported in Table 1; carcass weight is significantly heavier (P≤0.05) in group "R" while fatness score is similar. "R" carcasses have a different morphology than "O" carcasses, as confirmed by higer dimensions (body lenght and pelvis width) and by better pelvic limb compactness and carcass compactness (P≤0.05). Pelvic limb and loin percentages are similar between groups in agreement with a previous work on this argument (Preziuso et al., 1997).

The physical characteristics of the meat as evaluated on muscle *longissimus lumborum* are reported in Table 2; meat colour, one of the most important parameters of consumers choice (Miltenbourg et al., 1992; Sañudo et al., 1996; Warris, 2000) is not influenced by carcass conformation in agreement with previous findings (Preziuso et al., 1997). Even the water holding capacity on raw meat expressed as M/T ratio is similar between "R" and "O" groups, while cooking loss percentage is significantly higer for the meat derived from "R" carcasses: in general, meat cooking losses are associated with fatness but, in our case, fatness differences between groups are small and, therefore, the relationship between fat and cooking losses is insignificant (Sañudo et al., 2000); higer cooking loss found in group "R" is probably due to the fact that this parameter tends to increase with the increase in carcass weight (Kemp et al., 1976; Russo et al., 2000).

There are no statistical differences for the chemical composition of meat derived from different carcasses (Table 3). It is also interesting to note that the analysed meat is particularly lean, even if heavy lambs are generally considered quite fat.

In conclusion, from this trial, it seems that the classification of heavy lamb carcasses in base of conformation is not able to give full information about the quality of meat, but only about its quantity. Nevertheless the research should be completed by the study of the relations between meat quality and conformation of carcass classified in the classes "E", "U" and "P".

Pertinent literature

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Table 1. Carcass characteristics

		R	O
N°		23	31
Carcass weight	"	15.61 [a]	14.26 [b]
Fatness score		3-	2+
Body lenght	cm	66.46 [a]	63.68 [b]
Pelvis width	"	22.07 [a]	19.79 [b]
Chest width	"	21.32	20.65
Chest depth	"	19.17	19.26
Half-carcass length	"	60.58	59.86
Pelvic limb length	"	36.22	35.58
Carcass compactness		25.74 [a]	23.82 [b]
Pelvic limb compactness		6.73 [a]	6.28 [b]
Pelvic Limb	%	31.26	31.30
Loin	"	11.87	12.00

(Different superscripts, within a row, stand for significant differences, P≤0.05)

Table 2. Meat quality on *longissimus lumborum* muscle

		R	O
N°		23	31
Meat colour:			
L*		42.60	42.29
a*		17.38	17.06
b*		6.21	5.99
C*		18.47	18.10
H*		19.47	19.13
Water holding capacity:			
M/T		0.47	0.46
Cooking loss	%	22.85 [a]	20.03 [b]

(Different superscripts, within a row, stand for significant differences, P≤0.05)

Table 3. Chemical composition of *longissimus lumborum* muscle

		R	O
N°		23	31
Dry matter	%	24,33	24,45
Ether extract	"	2,80	2,54
Crude protein	"	20,45	20,80
Ash	"	1,08	1,11