MEAT QUALITY OF ITALIAN SIMMENTAL YOUNG BULLS AS AFFECTED BY THE GENES FREQUENCY OF MONTBÉLIARDE ORIGIN

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Background

Italian Simmental (IS) is the most common dual-purpose breed in Italy. In the '90s, when high amounts of capital were invested for the transformation from tie-standing to loose housing stable, the farmers strongly stated their will for the improvement of milk production, udder conformation and milk flow rate. The National Breeders' Association conceded a controlled introduction of the best Montbéliarde (Mb) bulls, the French strain of Simmental breed (Besozzi, 1996), which had been continuously improved for milk production. At present, the frequency of genes of Mb origin in the IS population is important and, in 1999, it exceeded the quota of 40% in the proved young bulls from the national genetic centre (ANAPRI, 2003) reaching the top of a rapid increment (figure 1). This probably modified both milk and carcass-and-meat quality, in comparison with qualities recorded before the '90s, when the less milk-producing and better shaped Simmental Bavarian strain was strongly prevailing (Bonsembiante et al., 1988; Gigli and Romiti, 1989).

Objectives

The aim of the research is the evaluation of carcass and meat quality traits of IS young bulls, and their relationship with the degree of inclusion of genes of Mb origin.

Methods

The research was carried out on 104 young bulls of IS breed, belonging to five strains differing in the percentage of genes of Mb origin: 0% (traditional strain: ISt; 22 animals), 12.5 to 25% (IS25m; 21), 50% (IS50m; 22), 75% (IS75m; 23), and 87.5 to 100% (Mb strain: ISm; 16). The animals were chosen among the bulls subjected to performance test at the IS National Association Genetic Centre, reared on slatted floor multiple boxes and destined to slaughtering. The young bulls were slaughtered at the age of 16-20 months, at homogeneous live weight (676 kg; std 47.7 kg).

Young bulls' live weight, somatic measures and morphological evaluation were recorded. Carcass weight, measures, fatness and conformation (SEUROP classification) were recorded 24 hours after slaughtering. Meat pH and colour (L*, a*, b*) were evaluated on m. longissimus dorsi samples. Other sections of m. l. dorsi were used to provide samples for: proximate analysis; total and soluble collagen; water loss (in water bath at 75°C) and shear force (Warner-Bratzler shearing device on Instron testing machine; ASPA, 1996).

Data were subjected to analysis of variance or covariance using a one-way factorial design, in order to examine the effects of the strain, whose levels were compared by orthogonal polynomial contrasts, using the SPSS 7.5.21 package for Windows (SPSS Inc., Chicago, USA). The comparison between the proportion of carcasses of various quality was carried out by a chi-square test of independence.

Results and Discussion

The five young bulls strains showed similar daily gains (on average: 1250 g/d) and carcass weights, which averaged 383.5 kg (s.e. 30.32 kg), with a mean dressing percentage equal to 56.7% (s.e. 2.00 %). The carcass conformation scores decreased linearly as the frequency of Mb genes increased (figure 2), while the fatness scores kept a steady-state leaning across the experimental groups (average score 2.6, on a five points scale).

The linear trend of the carcass length, estimated at a constant weight, showed an opposite slope in comparison to the conformation one, so that the less scored ISm strain bulls had the longest carcass (ISm 140.9 cm vs ISt 138.5 cm).

Table 1. pH, colour and cooking losses of meat (m. *l. dorsi*).

Strain	pH	Colour			Cooking losses (%)
		L*	a*	b*	
ISt	5.48	41.1	22.4	4.74	31.1
IS25m	5.52	40.3	23.3	5.46	30.8
IS50m	5.53	41.0	23.5	5.69	29.5
IS75m	5.50	40.0	23.9	5.77	30.9
ISm	5.50	39.6	23.2	5.56	30.3
mean	5.51	40.5	23.2	5.43	30.5
s.e.	0.090	2.58	1.89	1.251	3.98
P linear contrast	ns	0.08	ns	0.04	ns

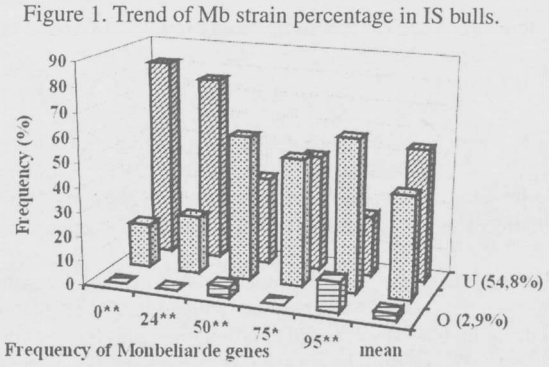
The ultimate pH did not vary between strains and its values fell within the normal pH range accepted for commercial meats (table 1). Meat colour was slightly affected by genotype, showing a tendency to become progressively darker, a deeper red and yellow, with the increase of the proportion of genes of Mb origin.

Table 2. Meat collagen composition and hardness (m. *l. dorsi*).

Strain	Total collagen (mg/g meat)	Insoluble collagen (mg/g meat)	Insolubility (%)	WB shear force (N)
ISt	4.76	3.62	76.8	46.1
IS25m	4.78	3.66	76.6	52.5
IS50m	5.26	4.13	79.0	54.5
IS75m	5.23	4.09	78.6	57.6
ISm	5.17	4.14	81.1	61.4
mean	5.03	3.91	78.2	54.1
s.e.	1.039	0.778	7.45	15.03
P linear contrast	ns	0.01	0.06	0.002

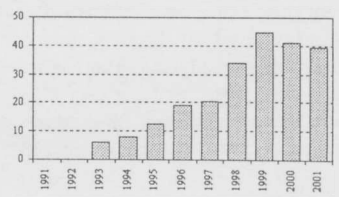
Meat proximate composition changed little with genotype while both, the absolute and relative insoluble collagen content, increased with the frequency of Mb genes (table 2). In the same way, even the toughness of cooked meat increased as the frequency of French ascendance increased.

Figure 1. Trend of Mb strain percentage in IS bulls.



* diffrence from the mean P<0.05 - ** difference from the mean P<0.01

Figure 2. Carcass conformation scores.



Conclusions

The inclusion of Mb genes in the IS population has significant effects on carcass and meat traits that should be taken into consideration in the breeding programmes of the dual purpose Italian breed.

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