MEAT QUALITY OF THREE ITALIAN BREED YOUNG BULLS

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Background

The Italian local breeds are reared on small and medium-scale farms that play an important role in the economic valorisation of the hills ad mountain areas of the country. The farming system in which they produce represents a livestock farming model which is suitable to the present needs to safeguard the territory, to protect consumer's health and to preserve the historical heritage as well as the food specificity (Gigli et al., 1997).
More recently, the use of local cattle breeds for meat production has shown an increased interest.
Some of the local breeds have "Herdbooks" and their products are protected by the European quality mark, like the Chianina breeds (Filippini, Mengoli, 2000); other breeds are in danger of extinction, like the Mucca Pisana (Secchiari et al., 1996), and the Maremmana breeds for its traditional rusticity (Gigli et al., 1997; Giorgetti et al., 1996) usually used as crossbreed (Gigli et al., 1998).
These breeds occupy a particularly privileged position in the scale of preferences in certain segments of consumers.

Objective

The present trial is part of a wider research work aiming to increase the economic value of the Italian White Breeds reared in different Central Regions of Italy, It is carried out by three research departments and includes Chianina, Mucca Pisana and Maremmana breeds. The aim of this study was to compare meat quality of these Italian typical breeds.

Methods

The experiment was carried out on 28 young bulls of three breeds: 10 Chianina, 8 Mucca Pisana and 10 crossbreed with Maremmana maternal breed.
The animals were slaughtered at 604 kg of live weight on average.
At dissection (after 8 days of ageing at about +2°C) *longissimus thoracis* samples on 11°-12° rib were drawn.
On each sample (according to the methodology of ASPA Commission, 1997), the following parameters for physical characteristics were performed:
1) Colour (lightness, red index, yellow index, chrome and hue) with Minolta CR 300, using CIELAB method with C illuminant on fresh air exposed slices for one hour;
2) Drip loss with gravimetric method on raw meat preserved at 4°C for 48 and Cooking loss in water bath at 75°C for 50'using vacuum-packed samples in polyethylene bag;
3) Warner Bratzler Share force using INSTRON 1011 apparatus, on four carrots (2.5 cm long and 1 inch diameter) both raw and cooked meat.
Moreover, two samples for each animal were homogenised, the first for dry matter determination at 65°C and the second for total and insoluble collagen analysis obtained multiplying factor 7.52 by hydroxiprolin content (Hill, 1966.). On lyophilised samples, fat, extracted with petroleum ether in Soxhlet apparatus and ash at 540°C were determined (AOAC, 1990), and crude protein for difference was obtained.
The data were analysed with variance analysis, using GLM procedure of SAS package (SAS, 1985).

Results and discussion

The physical quality of longissimus thoracis (table 1) was different in the considered Italian breeds. The water loss was similar in raw meat for all animals (1.56%) but in the cooking loss the Mucca Pisana breed showed a higher value (+ 3%) than the others and Maremmana crossbred had the lowest water loss percentage (25.59% vs 28.29%).
The colour was different in Mucca Pisana breed, although the significant differences resulted only in Hue parameter (+4%). The meat of this breed was less bright (39.58 vs 40.50) and more dark compared to the others two breeds. Generally the three breeds showed a good meat colour, except for lightness, if compared with the data reported for Chianina breed in Funghi et al. (1994), and for Mucca Pisana in Secchiari et al. (1996), while the Maremmana breed was also lighter compared to the data reported in Gigli et al. (2000). As confirmed by Secchiari et al. (1996), the Mucca Pisana breed was harder in cooked meat if compared to the other breeds (10.55 kg vs 8.61 kg for Chianina and vs 9.14 kg for Maremmana crossbred).
The highest pH value of Mucca Pisana than other breeds confirmed its poorer physical quality.
However this breed showed the best chemical characteristics among three breeds (table 2), particularly for fat percentage (-50%), confirming that fat is significantly affected by the breed. The meat of Maremmana crossbred was fatter and showed higher quantity of total

and insoluble collagen than the other breeds, confirming the rusticity of these animals, while the Chianina breed showed the lowest value of total collagen because of the late maturity of the animals.

As shown in table 2 no significant differences resulted in dry matter , ash and protein content among the breeds (24.61%, 1.08%, and 22.11% respectively on average).

Meat characteristics of Italian breeds appear very good, their production is very typical and specific and satisfy consumer request as tenderness and light (particularly for Chianina breed) and lower fat (for Mucca Pisana breed).

Further studies are need in order to increase the knowledge of these genotypes and to verify the specificity of typical Italian animal products.

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Table 1 - Physical quality on longissimus thoracis

		Water loss %		Color			Hardness kg	
	PH	Drip loss	Cooking loss	Lightness	Chrome	Hue	Raw	cooked
Chianina	5.56b	1.61	27.15 ab	40.92	21.89	25.50 ab	12.57	8.61 b
Pisana	5.67a	1.65	29.43 a	39.58	23.11	26.30 a	12.82	10.55 a
Maremmana	5.54b	1.43	25.59 b	40.09	22.52	25.03 b	11.80	9.14 ab
Means	5.59	1.56	27.39	40.20	22.51	25.61	12.40	9.43
RMSE	0.059	0.514	3.935	2.220	1.651	1.343	2.418	1.956

Note: different letters mean significant difference ($P<0.05$)

Table 2 - Chemical quality on longissimus thoracis

	Dray matter %	Total fat %	Ash %	Crude protein %	Total collagen mg/100g	Insoluble coll. mg/100g	% insoluble coll. on total
Chianina	24.80	1.74a	1.07	21.98	2.84 b	2.00 b	70.98
Pisana	24.35	1.07b	1.09	22.19	3.35 ab	2.33 ab	69.80
Maremmana	24.68	1.45a	1.08	22.15	3.50 a	2.50 a	71.86
Means	24.61	1.42	1.08	22.11	3.232	2.27	70.96
RMSE	0.984	0.388	0.096	0.912	0.645	0.548	11.81

Note: See table 1