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***In Vivo* and *post-mortem* performances of Marchigiana and Romagnola Breeds**

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ABSTRACT: The aim of these studies was to evaluate the *in vivo* and *post-mortem* performances of Marchigiana and Romagnola cattle. The results provide updated information that suggest that the selection index of some parameters should be revised to improve the dressing, which is one of the limitations of these breeds.

Key words: Beef cattle, Marchigiana breed, Romagnola breed, Slaughter performance.

INTRODUCTION – Marchigiana and Romagnola are Italian White beef cattle protected by the White Cattle of Apennines PGI mark. In the past, subjects underwent morphological selection, while at present they undergo Performance test evaluation. Breeding and slaughtered performance data (Manfredini *et al.*, 1969, Falaschini and Trombetta, 1992, Falaschini *et al.*, 1995, 1997, Trombetta *et al.*, 1996) allowed to assess the evolution of the two breeds. The present study was devised to evaluate the performance and verify the results of selection activity.

MATERIAL AND METHODS – We used 216 bulls (108 Marchigiana and 108 Romagnola) from 44 and 51 farms, respectively, selected randomly from the market based on PGI certification. Animals were taken to the Municipal slaughterhouse of Senigallia, central Italy. Marchigiana subjects were delivered to the slaughterhouse just before the slaughtering while Romagnola bulls were delivered 24 h before slaughtering. Before stunning bulls were weighed; after slaughtering we collected the following data: weight of skin, head right hoof, right fore limb, right hind limb, full digestive tract, carcass, right side and girth of right fore limb. An expert classified the carcass for muscularity and fatness according to SEUROP grids. One and 24 h after slaughtering the pH was measured between the 8th and 9th rib of the right side. Data were subjected to ANOVA (JMP) analysis considering the breed effect. Parameters of 5/4 were analyzed by ANCOVA for net live weight. Carcass data were subjected to the χ^2 test. The equation of correlation between some parameters of 5/4 was also calculated.

Table 1. Some *in vivo* performance parameters ($\mu \pm se$).

	Marchigiana	Romagnola	p
Subjects #	108	108	---
Age at slaughter d	604.6 \pm 8.4	589.0 \pm 8.4	0.0205
Live weight kg	669.0 \pm 7.9	675.0 \pm 6.9	0.6084
Net live weight kg	598.0 \pm 8.6	614.0 \pm 8.6	0.1873
ADG kg	1.1 \pm 0.017	1.1 \pm 0.017	0.1153
ADG of carcass kg	0.705 \pm 0.01	0.704 \pm 0.01	0.9062

RESULTS AND CONCLUSIONS – Table 1 reports the *in vivo* performance of Marchigiana and Romagnola subjects. Statistical analysis did not show significant differences due to the breed effect; only age at slaughter was significantly different ($P=0.0205$), and lower for Romagnola. The study evidenced similar live weights and net live weights as well as similar values of age and average daily gains. For both Marchigiana and Romagnola, growth (ADG) was similar to that obtained by Falaschini *et al.* (1995); the average daily gain is the ratio of live weight to age at slaughter. The average daily gain of carcass (carcass weight/age at slaughter) was not significantly different either. However, for both breeds the study evidenced lower weights at slaughter than Falaschini *et al.* (1995, 1997), although in the present study the age at slaughter of Marchigiana bulls was at least 100 days lower.

Table 2 reports performances at slaughter; statistical analysis failed to show significant differences due to the breed effect; only the dressing of Romagnola cattle was significantly lower than the Marchigiana's. The dressing of Marchigiana bulls was similar to the value reported by Falaschini *et al.* (1997) for the offspring of bulls that had passed the performance test, while the Romagnola's dressing was lower than that reported by Falaschini *et al.* (1995) for subjects of the same breed.

The net dressing of Romagnola cattle was better than reported by Falaschini *et al.* (1995) for bulls of the same breed, whereas for Marchigiana subjects it was lower than the values described by Falaschini *et al.* (1997) for the offspring of tested and untested bulls, and by Falaschini *et al.* (1995) for the same breed.

pH₁ measured 1 h after slaughter was similar in both breeds; pH₂ (measured at 24 h) was significantly lower ($P=0.0364$) for Romagnola bulls; however, the pH values showed a regular trend of fall. The mean pH₂ was similar to those reported by Brugiapaglia *et al.* (2001) for Red Pied cattle and by Nanni Costa *et al.* (1995) for animals subjected to different transport times.

Table 2. Post-mortem performance ($\mu \pm se$).

	Marchigiana	Romagnola	p
Subjects #	108	108	---
Carcass weight kg	419.0 \pm 5.8	411.0 \pm 5.8	0.2546
Right side weight kg	209.0 \pm 2.7	205.0 \pm 2.7	0.3058
Dressing %	62.4 \pm 0.22	60.9 \pm 0.22	0.0001
Net dressing %	64.5 \pm 3.4	66.9 \pm 3.4	0.6288
pH ₁	6.41 \pm 0.03	6.45 \pm 0.03	0.3643
pH ₂	5.64 \pm 0.021	5.57 \pm 0.021	0.0364

In the table 3 we summarized the composition of 5/4, covaried on net live weight for all parameters; although the means were similar between breeds, there were significant differences with the exception of stomach fat. The absolute weight of the full digestive tract was greater for Marchigiana bulls. This can be explained by delivery of romagnola 24 h earlier to the slaughterhouse.

Table 3. 5/4 covaried on net live weight ($\mu \pm se$).

	Marchigiana	Romagnola	p
Subjects #	108	108	---
Right fore limb kg	1.48 \pm 0.015	1.57 \pm 0.015	0.0001
Right fore limb girth cm	19.2 \pm 0.09	19.5 \pm 0.09	0.0371
Right hind limb kg	1.9 \pm 0.022	1.9 \pm 0.022	0.0399
Full digestive tract kg	57.3 \pm 1.13	52.4 \pm 1.13	0.0026
Head kg	29.8 \pm 0.244	30.6 \pm 0.244	0.0225
Skin kg	65.0 \pm 0.855	73.6 \pm 0.855	0.0001
Hoof kg	1.6 \pm 0.021	1.7 \pm 0.021	0.0001
Stomach fat kg	4.5 \pm 0.199	4.9 \pm 0.199	0.2060

Some correlations were calculated for both breeds; the most significant regressions were:

Marchigiana: fore limb weight = $-0.6602 + 0.11125 * \text{fore limb girth}$ ($R^2 = 0.405$).

Romagnola: fore limb weight = $-0.2262 + 0.09258 * \text{fore limb girth}$ ($R^2 = 0.286$).

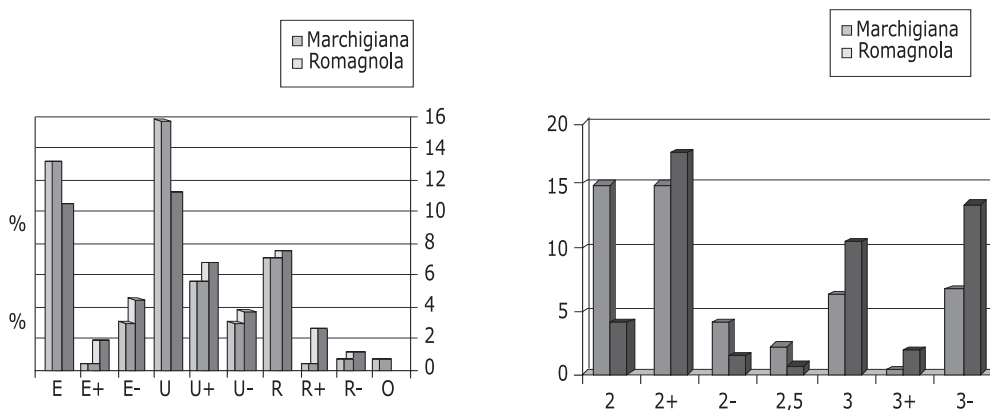
The data confirm that the weight of this “tare” can be calculated by measuring limb girth in order to obtain the weight of bone and to give an idea of carcass meat dressing.

The distribution of carcasses muscularity and fatness is reported in diagrams 1 and 2 in terms of the categories listed in the EC grids. The χ^2 test showed significant differences for both breeds. Marchigiana carcasses were most frequently assigned to category E and U, and Romagnola carcasses to categories U+, U- and R. The distribution of carcass fatness differed between breeds. The Marchigiana breed was assigned to a lower category (2, 2-) than Romagnola.

The results suggest the following considerations: selection carried out by the breeding centre achieved a favourable effect on the ADG on both breeds; the net dressing for Romagnola improved. The incidence of some 5/4 parameters is noteworthy, in particular the skin weight of Romagnola is still too heavy.

In conclusion both breeds are interesting for meat production, and it would be important to increase the numbers of heads of Marchigiana and Romagnola to achieve greater production.

Figure 1. Carcass evaluation according to SEUROP System. Figure 2. Carcass EUROP fatness.



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