

EFFECTS OF DIFFERENT DIET AND AGEING TIME ON MEAT PHYSICAL QUALITY TRAITS OF PODOLIAN YOUNG BULLS

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Introduction

Podolian cattle represent a typical breed widespread in the marginal areas of the South of Italy, where they are usually reared according to an extensive farming system, because of its adaptability to the difficult environmental conditions. Grazing system is a real practice due to lower feeding and management costs for this breed; moreover, using of protein sources alternative to soybean such as field bean (*Vicia faba* var. *minor*), greatly cultivated in southern Italy, can provide good performance and meat quality of young bulls, also guaranteeing a GMO-free feeding, in line with the organic farming system. Meat quality is one the most important aspects that the consumers appreciate, so a lot of studies are focussed to establish how to enhance physical traits of meat (Monson et al., 2004; Sañudo et al., 2004). Meat colour and tenderness frequently depend on feeding strategy (Realini et al., 2004), but also on genotype, even if the ageing time may play an important role to improve muscle tenderness as found by several authors (Acciaioli et al., 1995; Campo et al., 1999).

The aim of this study was to evaluate using of field bean in comparison with soybean meal for feeding podolian young bulls and, at the same time, to investigate the effect on meat quality of two different rearing systems, the first with a long-lasting time at pasture and a reduced fattening period, while the other with a shorter time at pasture and a long fattening period, as well as to assess the influence of ageing time on meat tenderness.

Materials and Methods

The experiment was carried out on eighteen podolian young bulls. At the age of 8 months, twelve calves were transferred from pasture to a stable. Then they were divided into two homogeneous groups of six subjects each and fed *ad libitum* for 174 days on straw and a concentrate pelleted diet containing either soybean meal s.e. (*S* group) or field bean (*F* group). The third group (*P* group) grazed on pasture for other 104 days, after that they were kept indoor for 70 days and fed a diet containing field bean and straw.

All animals (372 kg average live weight) were slaughtered when they were about 14 months old. From each half carcass, chilled at 4°C, samples of *Longissimus lumborum* (*Ll*) and *Semitendinosus* (*St*) muscles were isolated from the respective cuts. The colour indexes (L*, a*, b*) were assessed only on the *Ll* muscle after 3 days from the slaughter, using the HunterLab system (Colourmeter Miniscan XE, D65/10). From each muscle and following 3, 8 and 15 days of ageing time, an inch of diameter samples were taken and subjected to the shear force (kg/cm²) according to the Warner Bratzler Shear device system by an Instron 5544 instrument (ASPA, 1996). Data were processed for variance using the GLM of SAS (1999) and means were compared by the “t” test of Student. As for shear force, the model considered diet, ageing time and their interaction as main effects.

Results and Discussion

With regard to the colour parameters measured on the *Ll* muscle (Tab. 1) significant differences were found only for the Lightness after 3 days from the slaughter. In fact, the meat of the *P* group resulted significantly darker (36.73; P<0.05) than the *F* and *S* ones (40.70 and 41.83) which showed values comparable between them. These differences were probably to attribute to the longer period of grazing on pasture performed by the *P* animals as compared to *F* and *S* ones, but not to feeding treatment in the stall. In fact, although fed on different protein sources, the latest two groups showed meat with similar values of Lightness, while it was observed a significant difference of L* between *F* and *P* bulls that received the same protein source (field bean), but subsequent to different periods at pasture. Such result was in accordance with several authors (Yang et al., 2002; Realini et al., 2004) that noticed darker meat in forage-fed animals than in concentrate-fed ones. Lightness index of meat could be influenced by both higher content of myoglobin originated by to greater activity of the muscular system (Varnan and Sutherland, 1995) and accumulation of plant pigments in muscle fibres (Sanz Egaña, 1967).

In general, as for the shear force on the m. *Ll* (Tab. 2) no particular differences ascribable to the different diets and times of grazing on pasture were showed, as found by Realini et al., 2004, even if significant differences were displayed between *F* and *S* diets (2.73 vs 1.86; P<0.05) after 15 days of ageing time (Fig. 1).

However, ageing time positively influenced the tenderization of meat (Tab. 2) as discovered by other authors (Cifuni et al., 2004; Marino et al., 2006), resulting especially important at the beginning of ageing process, as obtained by Acciaioli et al. (1995) for the Chianina cattle rustic breed.

Analogous results were found for the *St* muscle when it was considered the effect of ageing time (Tab. 2) and in general the effect of diet (Fig. 2), even if, in this last case, differences were detected between the *F* and *P* groups following 15 days of ageing time (4.11 vs 5.09; $P<0.05$).

Table 1. Meat colour of the *Ll* muscle after 3 days

	Diet			SED
	<i>F</i>	<i>S</i>	<i>P</i>	F.D.=15
L*-Lightness	40.70a	41.83a	36.73b	3.045
a*-redness	15.37	14.06	15.24	1.326
b*-yellowness	13.10	12.61	11.40	1.760

Different letters (a, b) near values within a row indicate significant differences among diets: $P<0.05$

Table 2. Shear force (kg/cm^2) in relation to different diet and ageing time in the *Ll* and *St* muscles

	Diet			Ageing time			S.E.D.
	<i>F</i>	<i>S</i>	<i>P</i>	3 d	8 d	15 d	F.D.=45
<i>Ll</i>	2.83	2.82	2.59	3.36A	2.63B	2.26B	0.610
<i>St</i>	5.23	4.99	5.39	6.08A	5.03Ba	4.50Bb	0.798

Different letters (A, B, a, b) near values within a row indicate significant differences among diets: A, B: $P<0.0.1$; a, b: $P<0.05$.

Figure 1. Shear force in *Ll*

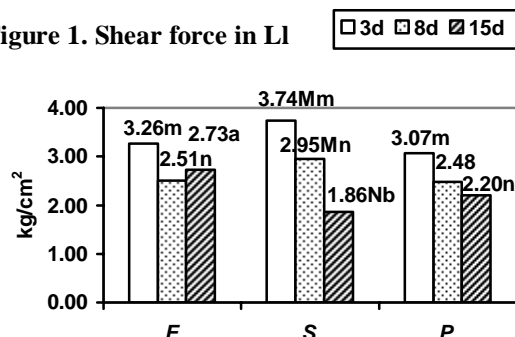
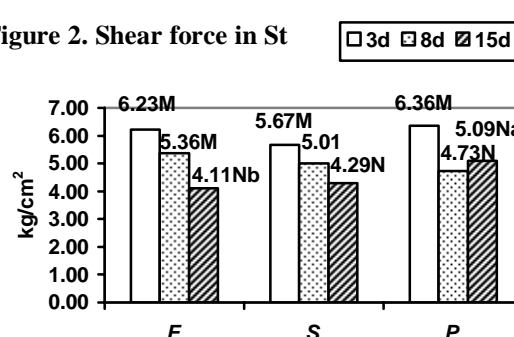


Figure 2. Shear force in *St*



Means with different letters (a, b) upon the bars with the same colour indicate significant differences among diets: a, b: $P<0.05$. Means with different letters (M, N, m, n) upon the bars within each diet group indicate significant differences among ageing times: M, N: $P<0.01$; m, n: $P<0.05$.

Conclusions

The findings of this study prove that the effects of grazing on pasture may persist after 70 days of fattening in the stall. Such assertion is a consequence of the darker *Ll* muscle assessed in *P* young bulls than the others. Ageing time is confirmed to be a valid procedure to make tender the meats, more effective above all in the rustic breeds.

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