

EFFECT OF DIFFERENT DIETS ON FATTY ACID PROFILE OF PODOLIAN YOUNG BULLS MEAT

G. Marsico*, M. Ragni, A. Vicenti, L. Melodia, C. Cocca, M. Perrucci

Department of Animal Production, Via G. Amendola 165/A – 70126 Bari, University of Bari, Italy

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Introduction

The extensive rearing system employed for Podolian cattle, a rustic breed of southern Italy, involved animal welfare, friendly production and the complete safety of products, according to the main EU rules purposes. Then, Podolian farming system differs or is even in absolute disagreement with the practices employed in intensive farming. These animals, in fact, are reared using a peculiar, traditional and sustainable system with no or a very low competition for food with human beings, which is also characterised by high levels of animal welfare (Napolitano et al., 2005).

Due to a farming system based on grazing green forages directly from pasture, the meat of Podolian bulls is characterised by a favourable content of polyunsaturated fatty acids highly compatible with nutrition and good health of consumers (Cifuni et al., 2004).

Consumption of food rich in $\omega 3$ fatty acid has a positive effect on human health, such as prevention of cardiovascular pathologies and auto-immune diseases.

Fatty acid composition of meat affects its nutritional value for human health.

The present study was planned in order to assess the effect of different diets on chemical composition and fatty acid profile of meat of Podolian young bulls reared on pasture in natural areas of southern Italy.

Material and Methods

The study was carried out on 18 Podolian young bulls as the following experimental design. Twelve young bulls were reared on grazing until the age of 8 months, then they were moved to a stall and divided into two homogeneous groups of six animals each. Then for 174 days they were fed on straw and commercial feeds containing, respectively, soybean s.e.(S) and field bean (*Vicia faba* var. *minor*, F) as alternative protein source. The third group of the 6 young bulls (P) were reared on natural pasture for further 104 days before moving to a stall where they fed on a diet containing field bean and straw for 70 days. Animals were slaughtered at 14 months of age; at slaughtering mean weight was 372 kg. Meat chemical composition was performed on *Longissimus lumborum* (Ll), according to ASPA (1996) methodologies. Fatty acid analysis was accomplished as extracted/metylated (Folch, 1957), using a gas chromatography technique (Chromopack CP9000) with a capillary 60 m sylca-glass column and cyanopropyle film at 100%, by measuring the percentages of fatty acids. The thrombogenicity and atherogenicity indexes (Ulbricht and Southgate, 1991) and PCL/PCE ratio (plasma cholesterol lowering/plasma cholesterol elevating; Reiser and Shorland, 1990) were also determined.

Data were processed using the GLM procedure of SAS statistical soft package (1999). Means were compared using Student's "t" test.

Results and Discussion

As for the chemical composition performed on *Longissimus lumborum*, there were statistical differences among the groups (Table 1). Moisture was lower in P group (73.08%) than F (74.96%; P<0.01) and S (74.20%; P<0.05). Moreover, young bulls which grazed for a longer period (P group) provided meat with a higher protein content (P<0.01) than S and F (22.98% vs 21.27% and 20.64%) and a lower fat fraction than S group (1.01% vs 1.53%; P<0.05).

Table 1. Chemical composition of *Longissimus lumborum* (%)

	Diet			SED
	F	S	P	F.D. = 15
Moisture	74.96A	74.20a	73.08Bb	0.791
Protein	20.64Bb	21.27Ba	22.98A	0.498
Ether extract	1.44	1.53a	1.01b	0.399
Ash	1.09Bc	1.39b	1.69Aa	0.183
N-free extract	1.86Aa	1.61Ab	1.23B	0.199

Different letters (A, B, a, b) within the same row indicate statistical difference: A, B: P<0.01; a, b: P<0.05.

Regarding saturated fatty acid percentages (SFA), no differences were observed among feeding treatments, even if C14:0 and C16:0 contents were higher in *F* group than *S* and *P* ones (Table 2). On the contrary, C18:0 fraction was lower in *F* than other groups ($P<0.01$), while no statistical difference was detected in MUFA (Mono Unsaturated Fatty Acids). The incidence of PUFA (Poly Unsaturated Fatty Acids) was higher in *P* (6.33%) than *S* (5.53%), thus showing significant differences ($P<0.05$) principally referable to $\omega 3$ -PUFA amount in meat of *P* group animals (1.26%) than *S* (0.80%; $P<0.01$) and *F* (0.93%; $P<0.05$) ones.

Table 2. Fatty acid profile and dietetic properties of *Longissimus lumborum* meat samples (%)

	Diet			SED
	<i>F</i>	<i>S</i>	<i>P</i>	F.D. = 15
C12:0	0.166	0.100	0.166	0.084
C14:0	3.50Aa	3.10B	3.17b	0.215
C16:0	27.13A	26.20	25.23B	0.920
C18:0	14.67B	16.06A	16.70A	0.920
SFA	47.10	46.90	47.13	1.113
MUFA	46.97	47.56	46.50	0.971
PUFA	5.93	5.53b	6.33a	0.688
$\omega 6$	5.00	4.73	5.07	0.483
$\omega 3$	0.93b	0.80B	1.26Aa	0.240
$\omega 6/\omega 3$	5.35a	6.11A	4.23Bb	0.887
A.I.	0.78a	0.72	0.71b	0.046
T.I.	1.56	1.57	1.50	0.088
PCL/PCE	0.96b	0.99	1.03a	0.058

Different letters (A, B, a, b) within the same row indicate statistical difference: A, B: $P<0.01$; a, b: $P<0.05$.

Other statistical differences were obtained for $\omega 6/\omega 3$ ratio, with values of *S* (6.11; $P<0.01$) and *F* (5.35; $P<0.05$) groups resulted dissimilar to the one calculated for *P* group (4.23).

The thrombogenicity and atherogenicity indexes and PCL/PCE ratio were better in *P* than in the others two groups, indicating that meat from *P* young bulls is more appropriate for human consumption in comparison with the other two groups, so as producing good consequences on human health.

Conclusions

Meat of *P* group young bulls showed a higher protein and a lower fat contents, in addition to a more balanced fatty acids profile, especially for the fatty acids that are important to improve the thrombogenicity and atherogenicity indexes as well as PCL/PCE ratio. In particular, with reference to $\omega 6/\omega 3$ ratio it was found in this group a value that resulted near to those recommended by the Human Nutrition Society (Carnovale e Marletta, 1997).

The reasons of these results could be detect in a longer grazing time that permitted a higher accumulation of $\omega 3$ fatty acids considering the slow turn over of lipids in animal (Anderson et al., 1972) and in a reduced period of fattening spent by *P* group in stall.

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