INFLUENCE OF MAIZE GRAIN SUPPLEMENTATION ON CHEMICAL COMPOSITION OF MEAT CALVES

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Introduction

Veal meat production is economically important since calves represent about a quarter of the cattle slaughtered in Italy. Veal meat is appreciated for its pale colour and high tenderness, which is the result of a liquid diet, based on milk replacer with a restricted iron content and slaughter at an early age. In order to promote rumination, health and welfare of these animals, the 97/2/CE Directive (EU Council, 1997) set a minimum daily amount of fibrous feed to be provided to calves. Fibrous feed supplementation, however, could affect meat quality. The aim of the present study is to determine how breed type and feeding plan, characterized by a different maize grain supplementation, influences chemical composition of veal meat.

Materials and Methods

During the entire fattening period, thirty-two male calves, 16 Friesian (F) and 16 Crossbreed (C), were fed on commercial milk replacer (350 kg milk powder /calf), according to the standard feeding program, and maize silage (50 kg/calf). In addition, calves received an individual amount of 65 kg (T1 group; 8F+8C) or 100 kg (T2 group; 8F+8C) of maize grain.

Crossbreeds were from different breeds and were considered of average quality by the market.

The average age of the animals was 19 days at the start of the trial and the trial lasted 178 days.

After slaughtering, two samples of *longissimus thoracis et lumborum* were taken, between the 8th T.V. and 1st L. V., from the right and the left side of each carcass.

The meat samples were analysed for chemical composition water, protein and ether extract content according to AOAC procedures (AOAC, 1970), as well as haem iron content (µg/g muscle) according to Hudzik (1990).

Data were analysed by ANOVA, considering the breed type (2 levels) and the feeding plan (2 levels) as factors as well as their interaction.

Results and Discussion

The results of the chemical analysis are reported in Table 1.

Table 1: Chemical composition of *longissimus thoracis et lumborum* of calves.

	Water (%)			Protein (%)			Ether extract (%)			Fe (µg/g)		
	F	C	mean	F	C	mean	F	C	mean	F	C	mean
T1	75.55	76.24	75.89	21.40	21.19	21.29	1.56^{A}	1.09^{B}	1.32	4.35	3.93	4.14
T2	76.17	75.86	76.01	21.04	21.52	21.28	1.22^{B}	1.14^{B}	1.18	3.63	4.16	3.89
mean	75.86	76.05		21.22	21.35		1.39	1.12		3.98	4.04	

Means with different letters differ significantly (P<0.01)

For all the variables taken into account, the interaction breed type x feeding plan was statistically significant (P<0.05 for the ether extract; P<0.01 for the other variables).

The meat of Friesian calves, fed on T1 diet, had lower water content and higher protein, ether extract and haem iron content, while Crossbred calves showed the contrary.

Since ANOVA showed a significant effect of the breed type on the ether extract as well as the interaction breed type x feeding plan being significant, ANOVA was performed considering each factor separately (within each level of the other factor) in order to draw a conclusion on its main effects.

Consequently, the meat of Friesian calves, fed on T1 diet had a significant higher ether extract content (P<0.01) in comparison with both Crossbred or Friesian calves, fed onT2 diet.

In particular, it is important to point out that the increase of the ether extract of the meat of animals of the FT1 group compared to FT2 was equal to 28%.

Moreover, for calves fed the T2 diet, the ether extract content of Crossbred veal meat was not statistically different from that of Friesian calves.

Due to different experimental condition, it is not easy to compare the results of this study with others. However, in general, some authors (Cozzi *et al.*, 2001, Cozzi *et al.*, 2002 ; Xiccato *et al.*, 2001) reported that the use of fibrous feeds

(dried beet pulp, wheat straw and maize grain), in partial replacement or in addition to the milk diet, produced no differences or increased the ether extract content of the meat.

Conclusions

In this study, we must stress the importance of the feeding plan choice in relation to the breed type. Indeed a higher amount of maize grain in the diet did not modify the veal meat characteristics of Crossbreds, while it improved those of Friesians. In the latter breed type, this supplementation seems to have influenced the whole utilization of the diet to the extent that intramuscular fat deposition was limited. From a qualitative point of view, it must be borne in mind that the higher fat deposition of Friesians on the T1 diet could negatively influence both the visual meat appraisal, considering the importance at retail sale of packaged meat, and the nutritional characteristics since consumers prefer meat with a low fat content.

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References

AOAC (1970). Official methods of analysis (11th Ed.). Washington, DC, USA: Association of Official Analytical Chemist.

Council Directive 97/2/EC, (1997). Official Journal of the European Communities of the 28 January 1997, No. L 25/24.

Cozzi, G., Gottardo, F., Fregolent, G., Ravarotto, L., Segato, S., Dalle Zotte, A. (2001). The provision of solid feeds for veal calf welfare: effects on growth performance and meat quality. Proceedings of the ASPA XIV Congress. Firenze, 12-15 June.

Cozzi, G., Gottardo, F., Mattiello S., Canali, E., Scanziani, E., Verga, M., Andrighetto, I. (2002). The provision of solid feeds to veal calves: I. Growth performance, forestomach development, and carcass and meat quality. Journal of Animal Science, 80, 357-366.

Hudzik, E. (1990). Comparaison de la détermination du fer héminique dans les viandes crues par la méthode de Hornsey avec l'absorption d'extraits aqueux à 410 nm. Sciences des aliments, 10, 209-213.

Xiccato, G., Trocino, A., Queaque, P.I., Sartori, A., Carazzolo, A. (2001). Rearing veal calves with respect to animal welfare: effects of group housing and solid feed supplementation on growth performances and meat quality. Livestock Production Science, 75, 269-280.