

TOTAL LIPIDS AND TOTAL CHOLESTEROL IN CARNALENTEJANA-PDO, A PORTUGUESE BEEF WITH PROTECTED DENOMINATION OF ORIGIN

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Background

There is evidence that limitations in fat and cholesterol intakes seem to decrease the risk for obesity and hypercholesterolemia, which are conditions that predispose to various chronic cardiovascular diseases. In light of these implications, World Health Organisation (WHO) and other international institutions recommend that fat should be provided between 15 and 30% of diet energy and cholesterol intake should not exceed 300 mg per day (Prates e Mateus, 2002).

By another way, meats with Protected Denomination of Origin (PDO) are traditional meats that are supposed to have unique characteristics linked to the local production systems and animal breeds. Carnalentejana-PDO is a Portuguese meat obtained from Alentejana breed bulls, produced in an extensive regimen in whole Alentejo and some councils within the district of Setúbal (south of Portugal).

Objectives

The aim of this work was to determine the contents of total lipids and total cholesterol in traditional Carnalentejana-PDO meat obtained from bovines slaughtered in early Autumn season (the least abundant pasture).

Methods

Meat samples were taken, in early Autumn season, from the ribeye (T1-T3) and loin (L1-L3) portions of *longissimus dorsi* and from the distal region of *semitendinosus* of bulls (20 ± 4 months, 350 ± 90 kg), 2-3 days after slaughter (+1°C), and stored at -80°C until analysis.

Total lipids were extracted from meat (dry matter) by ultrasonication, using methylene-chloride (4:1 v/v) (3) and *n*-hexane (1), as was previously described in Fritsche *et al.* (2000). Lipid contents of the test samples were calculated, in duplicate, by weighting the residues obtained after solvents evaporation under a stream of nitrogen.

Total cholesterol was extracted from meat (dry matter), after saponification with saturated methanolic KOH, not using 1 extraction with cyclohexane, as described in Naeemi *et al.* (1995), but using 3 extractions with the same solvent (recoveries higher than 94%). Cholesterol was separated and quantified by normal phase HPLC (column Zorbax Rx-Sil, 4.6 mm ID 250 mm, 5 μm particle size, Chrompack, Bridgewater, NJ, USA), using an HPLC system (HP 1100 Series, Hewlett-Packard, Palo Alto, CA, USA) equipped with autosampler and diode array detector adjusted at 206 nm, with a solvent (3% isopropanol in *n*-hexane) flow rate of 1 ml/min and injection volumes of 30 μl (figure 1). Total cholesterol contents in meat was calculated, in duplicate, based on the external standard technique, from a standard curve for peak area vs. concentration.

The contents of total lipids and total cholesterol in meat (mean of *r* replicates) were analysed by ANOVA single factor at a significance level of 5% (H_0 ; $p < 0.05$).

Results and discussion

Table 1 and figure 2 depict the contents of total lipids in Carnalentejana-PDO for different muscles. These values of intramuscular lipids are much lower than those reviewed by Chizzolini *et al.* (1999) for beef (6.3% in *longissimus dorsi* and 3.9% in *semitendinosus*). The data suggest that this meat may be considered lean meat (Food Advisory Committee, 1990; less than 5% of fat) with levels of intramuscular fat high enough to assure its sensorial quality. By another way, total lipids contents from *semitendinosus* muscle was significantly lower (H_0 ; $p < 0.05$) than those obtained from *longissimus dorsi* muscle (T1-T3 and L1-L3 regions). It is well known that intramuscular lipids deposition is under control of the genetic background of the animal breed.

Total cholesterol contents in Carnalentejana-PDO, expressed as mg / g meat and mg / g lipids, are presented on table 1 and figures 3 and 4. These values are similar to those reviewed by Chizzolini *et al.* (1999) for beef. Significant differences (H_0 ; $p < 0.05$) were observed for total cholesterol contents among muscles, having *longissimus dorsi* (T1-T3) the higher values, followed by *longissimus dorsi* (L1-L3) and *semitendinosus*. According to Chizzolini *et al.* (1999), the most likely reason for some of the differences observed in meat cholesterol contents among different muscles of the same animal species might be differences in fibre type.

Conclusions

Meat from traditional Carnalentejana-PDO obtained from bulls slaughtered in early Autumn season, with the least abundant pasture, seems to be a tastefully lean meat with cholesterol levels similar to that described in the literature.

References

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Table 1. Contents (mean ± standard deviation) of total lipids and total cholesterol in Carnalentejana-PDO beef, for different muscles, obtained from bovines slaughtered in early Autumn season.

	<i>Longissimus dorsi</i> , T1-T3 (r=15)	<i>Longissimus dorsi</i> , L1-L3 (r=15)	<i>Semitendinosus</i> , distal (r=15)
Contents of total lipids (mg / g meat)	20.95 ± 9.706 ^{a*}	18.89 ± 7.612 ^a	12.78 ± 4.140 ^b
Contents of total cholesterol (mg / g meat)	0.483 ± 0.0313 ^a	0.447 ± 0.0296 ^b	0.416 ± 0.0190 ^c
Specific contents of total cholesterol (mg / g lipids)	28.85 ± 13.822 ^a	29.96 ± 12.830 ^a	42.13 ± 18.332 ^b

* Means with the same superscript, within the same row, are not significantly different (H_0 ; $p > 0.05$).

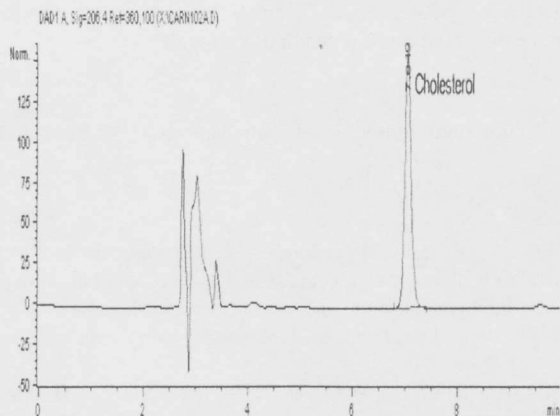


Figure 1. Typical HPLC chromatogram of cholesterol in a meat sample, detected at 206 nm.

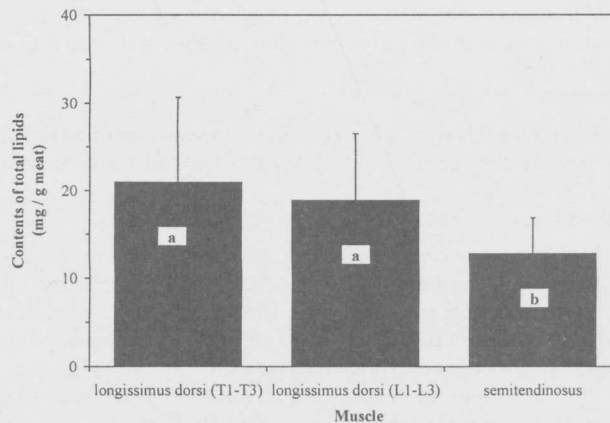


Figure 2. Contents of total lipids in Carnalentejana-PDO beef (r=15). Different letters means $p < 0.05$ for H_0 .

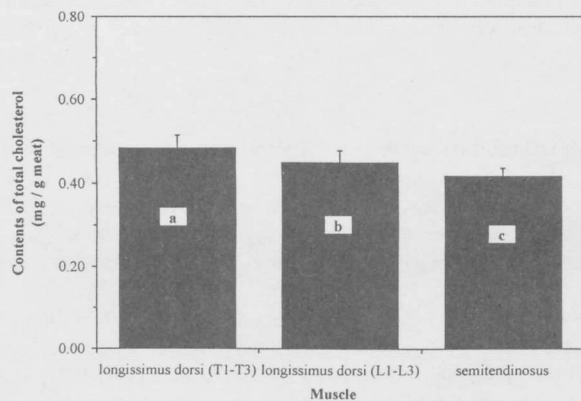


Figure 3. Contents of total cholesterol in Carnalentejana-PDO beef (r=15). Different letters means $p < 0.05$ for H_0 .

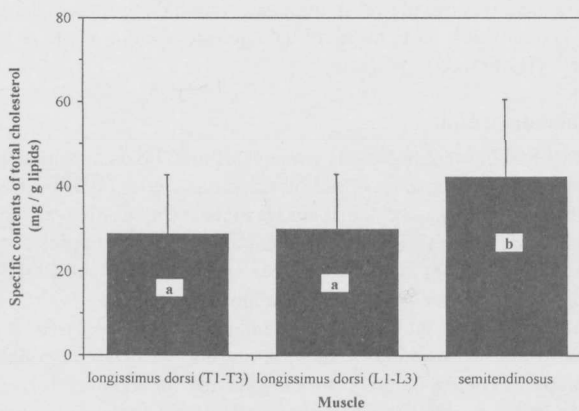


Figure 4. Specific contents of total cholesterol in Carnalentejana-PDO beef (r=15). Different letters means $p < 0.05$ for H_0 .