SELENIUM CONTENT IN SUCKLING LAMB MEAT OF CARCASSES FROM THE PROTECTED GEOGRAPHICAL INDICATION "LECHAZO DE CASTILLA Y LEÓN".

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Background

The region of "Castilla y León" (Spain) has generally represented a source of consistently high quality suckling lamb meat. The EU has granted this product a Protected Geographical Indication (PGI): "Lechazo de Castilla y León". This PGI includes lamb carcasses of up to 35 days, weighting from 4.5 to 7 kg. Those lambs belong to the local breeds of sheep Churra, Castellana and Ojalada, and are reared and slaughtered according to the corresponding regulations, i.e. lambs had to be raised exclusively on ewe milk.

In that region where the semi extensive sheep grazing is predominant, feedstuffs are considered to be low in selenium, and so would be ewes milk. This fact is mainly associated to enzootic muscular dystrophy, or stiff lamb disease. In order to prevent this disease, most of the farmers provide selenium or selenium-vitamin E preparations for newborn lambs, or occasionally for ewes, by injection or via oral, which would account for an increase of Se level in lamb meat.

It is known that Se is an essential trace mineral of fundamental importance to human health which presents a small safety ranges between deficient and toxic intakes. The lower limit of needed intake was estimated to be closed to 40 µg/day (WHO, 1996; FAO/WHO, 2001) and the maximum safe dietary intake has been prudently restricted to 400-500 µg/day (Rayman, 2000; FAO/WHO, 2001). In this connection, a deficiency of Se has been clearly associated to cardiomyopathy risk and other mood states.

The intake of Se by humans varies considerably among regions. In different European countries the mean intakes by non-vegetarian adults varies between 18 to 110 µg/day (Rayman, 2000; Scientific Committee on Food of the European Commission, 2000), which are considered low compared with that in other regions, and in some cases sub optimal with respect to disease risk.

Se is supplied by different foods and consumed in various chemical forms –salts and organic bound–, being most of them easily absorbed from the gastrointestinal tract. Se content of the principal food groups and individual foods has presented a wide range (FAO/WHO, 2001; Murphy and Cashman, 2001), in which red meat was located in an intermediate position. Meat was reported to contain amounts between 10 and 360 µg of Se per kg of meat in an international compilation (Reilly, 1996, cited by FAO/WHO, 2001) and the mean values were of about 100 µg per kg (Higgs, 2000).

Objectives

The objective of this work consisted of presenting the levels Se level of the edible portion of suckling lamb carcasses from the PGI "Lechazo de Castilla y León" with the aim of contributing to the typification of this quality product and the knowledge of its nutritive value.

Methods

Each of a total of 77 half-carcasses of suckling lambs which were labelled and protected by the EU PGI "Lechazo de Castilla y Leon", and with a weigh after removing the omentum and the tail, between 1972 and 3179 g, were hand-deboned. Then, separable lean and subcutaneous and intramuscular fat depots were obtained, mixed and homogenised. This mixture was considered as the edible portion.

Aliquots of 1 g of the edible portion were digested with 10mL of concentrated HNO_3 in tightly closed screw cap glass tubes for 12 to 18 h at room temperature and 4 h at 90ºC. Next, the mineralised solutions were evaporated almost to dryness. After that, 2mL of HCl 1:1 (v/v) and four standard additions of 0.00 to 0.060 µg of Se were added to the respective evaporated solutions from the same sample. Then, Se was reduced to Se (IV) by placing the solutions, in closed screw cap glass tubes, in a water boiling bath for 10 min, and finally, the solutions were diluted to 10mL with HCl 2% (v/v) (Díaz-Alarcón *et al.*, 1994).

The Se content was determined by hydride generation atomic absorption spectrometry (Perkin Elmer Model Zeeman Atomic Absorption Spectrometer 4100ZL). Ar was used as carrier gas and the equipment was operated under the conditions recommended by the manufacturer.

Statistical analysis were carried out by a 2-way ANOVA design, comparing the Se content between breeds and sex.

Results and discussion

The Se content and the number of half carcases analysed are shown in the table 1. Data have been separated by the factors of sex and breed, although neither of both showed significant differences. Results showed that suckling lamb meat from the PGI provided about 80 µg per kg of meat, which is near the mean values of meat –i.e. 100 µg kg^{-1} (Higgs, 2000). Thus, the Se content of 100 g of PGI suckling lamb meat is approximately 20% the recommended daily requirement.

Particular data about Se content of suckling lamb meat were not found in the literature. However, different levels of Se in raw lamb or mutton meat have been reported by other authors. Murphy and Cashman (2001) found concentrations between 71 and 109 µg kg^{-1} in Ireland, which were similar to the amounts of Se found in the PGI suckling lamb meat. Eurola *et al.* (1991) found 104-124 µg kg^{-1} in Finland, where selenate-supplemented fertilisers are commonly used. Also, as was reviewed by Díaz-Alarcón *et al.* (1996), amounts 40-50 µg kg^{-1} were found in lamb meat from Spain, which were lower than those observed in the PGI suckling lamb meat. It seems possible that the administration of Se or Se-vitamin E to newborns, or eventually to ewes, might result in significantly higher Se content in the suckling lamb meat than if Se was not been provided.

Conclusions

It appears that Se contain of the PGI suckling lamb meat is near the mean Se content in meat.

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Pertinent literature

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Table 1.- Se content (μg kg^{-1}) of suckling lamb meat from PGI "Lechazo de Castilla y León" and number of carcasses analysed.

Sex/Breed	Churra	Castellana	Ojalada	Total
Male	77 ± 31 (n=24)	89 ± 35 (n=13)	67 ± 16 (n=7)	79 ± 30 (n=44)
Female	76 ± 20 (n=18)	79 ± 30 (n=7)	64 ± 10 (n=8)	74 ± 22 (n=33)
Total	77 ± 26 (n=42)	86 ± 33 (n=20)	66 ± 13 (n=15)	77 ± 27 (n=77)