FAT AND CHOLESTEROL CONTENT IN BOVINE AND PORK TISSUES

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Keywords: meat, fat, cholesterol, pigs, bovine

Introduction

Cholesterol is susceptible to oxidation, which results in formation of oxysterols. Apart from eggs, egg products, milk and diary products, meat fried in animal fat or vegetable oil may also be important source of oxysterols in human nutrition (Valenzuela *et al.*, 2003). Interest in oxysterols is growing due to their various biological effects as well as potential cytotoxic, mutagenic and carcinogenic effect of some oxysterols. Fat and cholesterol content in human nutrition is related to the level of cholesterol in serum, increase of which poses a risk for development of cardio-vascular diseases. Therefore, the aim of the task was to determine the differences in fat and cholesterol content in the selected identical groups of beef and pork muscles, with the special emphasis on the fatty tissues of these two species. It is often the case that not only the non-professionals, but also the medical experts (nutritionists) blame pork to be a rich source of cholesterol. These experiments represent an attempt to answer numerous medical recommendations that people with increased cholesterol level in serum have to exclude from their diet even lean pork meat and especially pork fat. We also included in our investigation beef as less anathemised food or low-risk meat for cardio vascular diseases.

Materials and Methods

Meat from five Swedish Landrace pigs were used for the experiment. The examined beef meat (China Meat Research Centre, 2000) originated from the crosses of Charolais and Domestic Spotted breeds. Fat content in the beef and pork samples was determined according to JUS ISO method (1992). Cholesterol content was determined according to the method from China meat research centre (2000).

Results and Discussion

Figure 1 shows comparison of fat content (%) and Figure 2 comparison of cholesterol content (mg/100g) in the examined pork and beef samples.

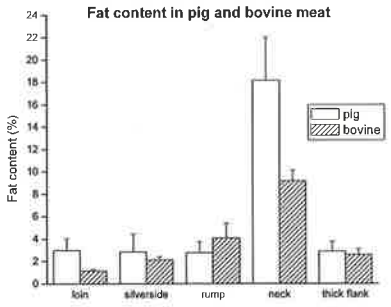

Figure 1.

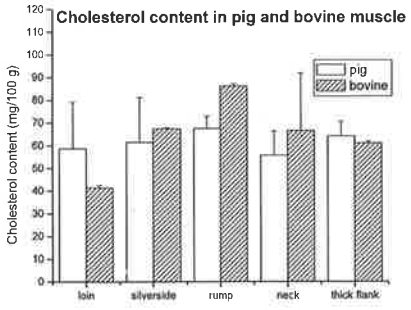

Figure 2.

Comparison of the mean values of fat content in the examined samples showed that the highest value was in pork neck (18.17±3.84%). Fat content in loin, silverside, rump and thick flank was similar and in all the examined samples was less than 3%. Both beef and pork had the highest fat content in neck muscles (9.16±0.97%). Fat content in beef rump (4.08±1.30%) was higher compared to pork rump (2.77±0.97%), while fat content in beef loin, silverside and thick flank was lower than 3% (similar to pork). Beef loin had lower fat content (1.15±0.15%) compared with pork loin (2.97±1.06%).

The highest cholesterol content was determined in pork rump (67.58±5.34 mg/100g), lower content was found in thick flank (64.18±6.40 mg/100g) and silverside (61.40±19.71 mg/100g) and the lowest content was found in loin (58.62±20.45 mg/100g) and neck (55.68±10.58 mg/100g). Comparison of the mean values of cholesterol content between beef and pork showed the highest cholesterol content in rump (in both beef and pork) and for the beef is 86.15±1.03 mg/100g. Relatively similar values of cholesterol were found in beef silverside (67.42±0.45 mg/100g), neck (66.57±25.41 mg/100g) and thick flank (61.04±0.78 mg/100g). The lowest cholesterol content was found in beef loin (41.42±0.78 mg/100g) compared to other anatomical regions of this species.

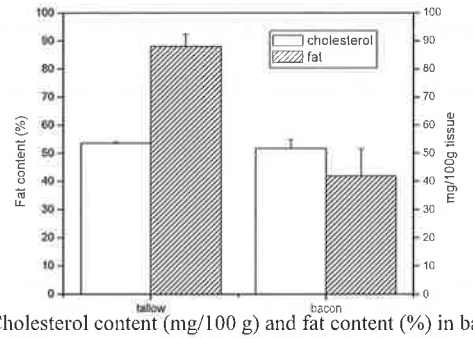

Figure 3: Cholesterol content (mg/100 g) and fat content (%) in bacon and tallow.

Figure 3 shows comparison between fat content (%) and cholesterol content (mg/100g) in the examined bacon and tallow samples. Comparison of the mean values of cholesterol content showed slightly higher cholesterol content in tallow (53.57±0.4 mg/100g) compared to Hamburg bacon (51.63 mg/100g), while fat content was more than 100% higher in tallow (88.00±4.36 mg/100g) compared to bacon (42.88±9.68 mg/100g). Our results point to the conclusion that beef and pork have similar cholesterol content. The literature data can not be used for direct comparison considering the differences in sampling procedure, applied analytical method of determination and different groups of muscles analyzed as well as lack of data considering nutrition of animals used in the experiments. The literature data (Souci *et al.*, 1981; Pearson and Dutson, 1990; Biro and Linder, 1995; Chan *et al.*, 1995; Honikel and Arneth, 1996; Zsarnoczay and Zelenak, 2003) in general showed that the cholesterol content in pork ranged between 48.60 and 94.00 mg/100g, and in beef, between 41.42 and 86.15mg/100g, what confirms our results. As for the fat content, comparison with the other authors' data (Souci *et al.*, 1994; Honikel, 1995; Elmadfa *et al.*, 2001; Piironen *et al.*, 2002; Zsarnoczay and Zelenak, 2003) shows that pork, even with the higher fat content compared to beef, like in neck, does not show increased cholesterol content.

Conclusions

- The examined samples of beef and pork (loin, silverside, rump, neck and thick flank) showed no significant difference in cholesterol content.
- There is also no significant difference in fat content, except for the analysed samples of neck (in both beef and pork). Determined fat content in neck was 18.17% and 9.16% for pork and beef, respectively.
- Results of the investigations of fat and cholesterol content in beef and pork fatty tissues showed similar values for cholesterol content in the analyzed samples of bacon and tallow. However, there is a significant difference in fat content (42.88% in Hamburg bacon and 88.00% in tallow).
- Considering the ratio of cholesterol in fat in all examined samples, thermally treated pork neck and tallow may represent a significant source of oxysterols, which is the subject of our further investigations.

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