COMPARATIVE STUDY OF THE MUSCLE ANTI-OXIDANT DEFENCE ENZYMES IN PIGS AND BULLS

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Abstract: Pigs and bulls have different lipid metabolism, different fatty acid profiles and different erythrocyte anti-oxidant defence compositions, but have similar content of cholesterol in meat. Results of the comparative study of mitochondrial antioxidative defence systems-manganese containing superoxide dismutase (Mn SOD) and Cu,Zn-superoxide dismutase (SOD) and citosolyc antioxidative defence enzymes-catalase (CAT), selenium-dependent glutathione peroxidase (GSH-Px) and glutathione reductase (GR) in the selected identical groups of beef and pork muscles shown that there were no significant differences in Mn SOD activity between all samples nor between two examined species. CuZn-SOD activity was higher in beef neck when compared to pork neck together with higher activity CAT and GSH-Px. Only in beef neck, CAT activity was higher compared to pork neck and other examined samples of bulls and pigs. Results that we obtained were compared with our previous findings in erythrocytes of same species and discussed in accordance with fat and cholesterol content in muscles of same species especially due to possible role of these factors during meat thermal preparation.

Keywords: anti-oxidant defence, muscles, pigs, bulls

2. INTRODUCTION

An imbalance between oxidative stress and the cell's anti-oxidant defence system may have adverse effects on cell membranes through the indiscriminate oxidation of susceptible molecules such as polyunsaturated fatty acids (PUFAs), the main substrates for lipid peroxidation. Some investigators have suggested that the alteration in the SOD/GSH-Px + CAT ratio correlate well with increases in lipid damage. The aim of the task was the comparative study on specific mitochondrial antioxidative defence systems (mitochondrial SOD) and citosolyc antioxidative defence enzymes (CAT, GSH-Px and GR) in the selected identical groups of beef and pork muscles (thick flank, loin and neck).

3. METHODS

Meat samples were from ten pigs (Swedish Landrace) and ten young bulls (from crosses between Charolais and Domestic Spotted breeds).

Meat anti-oxidant enzyme activities were determined using a Shimatzu UV-160 spectrophotometer, according to the methods described by Nikolić et al.(BBRC,2006).

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4. RESULTS

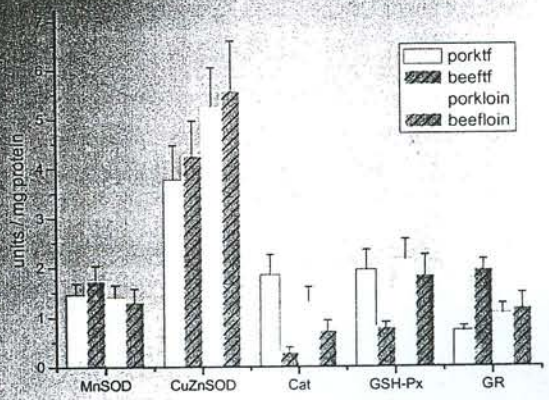

Figure 1: Antioxidative defence enzymes in pig and beef thick flank and loin. All data are presented as main±SD.

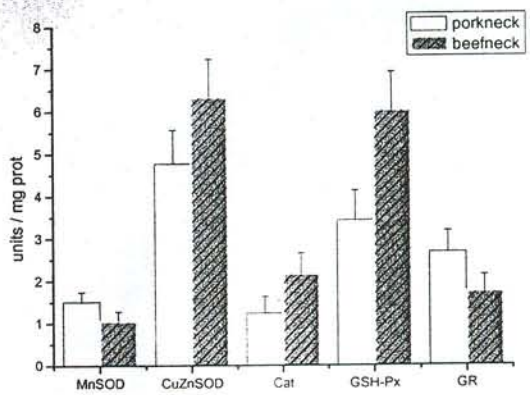

Figure 2: Antioxidative defence enzymes in pig and beef neck. All data are presented as mean±SD.

5. CONCLUSIONS

We found similar activity of mitochondrial MnSOD in neck, loin and thick flank of pigs and bulls.

In the present study lower CuZnSOD in pig muscles in comparison to bovine muscles may indicate conditions for possible higher oxysterol formation in pig meat during thermal preparation.

The highest CAT activity was found in beef neck and was significantly higher in compared with other examined beef meat, thick flank and loin. This higher CAT activity suggests an increase in H_2O_2 generation in beef neck.

CAT activity in all examined samples of pork meat was similar.