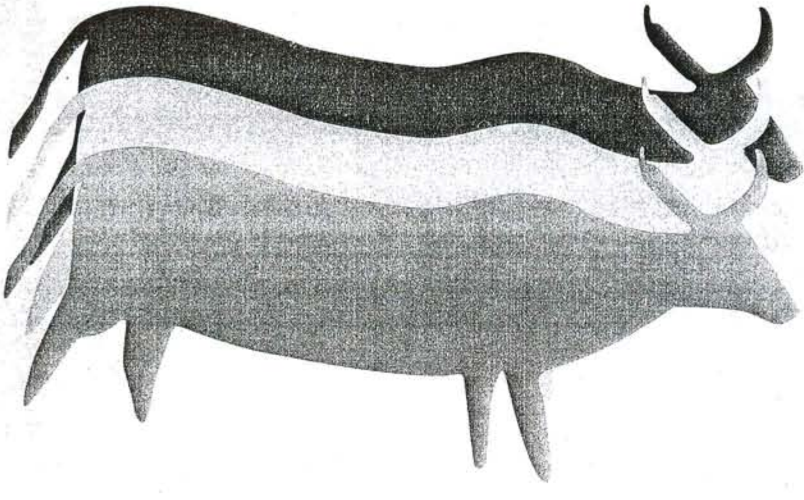
ICOMST 2008

54th INTERNATIONAL CONGRESS OF MEAT SCIENCE & TECHNOLOGY 2008



10-15 August | Cape Town | South Africa

54th INTERNATIONAL CONFERENCE ON MEAT SCIENCE AND TECHNOLOGY

10-15 August 2008, CAPE TOWN, SOUTH AFRICA

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On behalf of the scientific and organising committees of the 54th International Congress of Meat Science and Technology (ICoMST) I am delighted to present this Book of Abstracts that supplements the Special Issue of Meat Science containing the invited speaker manuscripts for the Congress held in Cape Town, South Africa from 10 to 15 August 2008. Included in this Book of Abstracts are the abstracts of the invited papers, whilst the full papers that, due to their nature, were not published in Meat Science Journal, are included on the CD.

This congress has been the focal point for discussion of scientific, technical and economic developments in meat science for more than fifty years. This event, with the theme "The Role of Science in the Growing Demand for Red Meat", is an international forum for the exchange of scientific information, technology and experiences between academic and industry researchers. With the ever increasing demand for improved quality in production and processing, and the resulting impact thereof on human consumption, this event was designed as an ideal platform for participants not only to focus on research priorities but also to gain insight into the challenges of the meat industry and how these are addressed through innovations developed by scientists. It is also an opportunity for scientists from different levels of expertise to network and cooperate between the scientific disciplines of the world meat industry.

The themes addressed in nine sessions throughout the 2008 conference covered animal welfare and animal stress challenges; food safety and human nutrition challenges; meat packaging, processing and value adding; challenges in the practical use of genetics; challenges in exploiting non-conventional animal products; manipulation of muscle structure and biochemistry to produce quality meat; techniques and models to predict and manipulate meat quality; meat research challenges and project up-dates; challenges in meeting consumer and industry demands. It will be noted that an emphasis has also been placed on the role/contribution that Africa can make to global meat production.

Within this conference, 24 invited papers will be read as well as 40 short presentations, the latter having being chosen from the abstracts of the posters by the scientific committee. In total, 261 posters will be presented.

As of going to print, 239 delegates from 40 countries have registered, thus ensuring that a quality interaction of an international stature will occur.

Appreciation is expressed to all the scientific authors of the papers as well as the posters for the quality of their attributions. The help of the scientific committee in ensuring that we have a quality congress is highly appreciated.

ICoMST Congress Chairperson: Prof Louw Hoffman Tel + 27 21 808 4747 lch@sun.ac.za

Lipids and glutathione-dependent enzymes in the pig neck

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Abstract

A pig neck is meat predominantly used for barbecues and the amount of lipids and cholesterol in relation to the activities of lipid peroxide reducing enzymes is important also for the prevention of oxysterol formation during a thermal preparation. We examined lipid peroxide reducing enzymes activities in the pig neck as well as the amount of lipids and cholesterol. We found high activity of both selenium-dependent glutathione peroxidase (GSH-Px; EC 1.11.1.9) and glutathione reductase (GR; EC 1.6.4.2) enzymes in the pig neck as well as high content of lipids and cholesterol. Our results are discussed in relation to the balance between synthesis, oxidation, and intracellular transport of fatty acids in muscles as the main factor responsible for muscle lipid content variations in animals undergoing a normal growth.

Introduction

In meat-producing animals a sensory quality of meat may benefit from moderately higher lipid content in muscles than the average level encountered nowadays in pigs. Prevention of lipid peroxidation may be of the utmost importance for the quality of such meat (Fernandez *et al.*, 1999). Pork neck is consisted of several muscles with tipically red fibers that have expressed intensive oxidative metabolism. Organism deposits a large amount of fat in this area, especially intramuscular fats, which contribute to desirable sensory properties such as softness and tenderness. Lipid peroxides are a substrate for the selenium-dependent glutathione peroxidase (GSH-Px; EC 1.11.1.9). Glutathione reductase (GR; EC 1.6.4.2) catalyses the reduction of oxidised glutathione (GSSG) back into reduced glutathione (GSH), the latter being the co-substrate of GSH-Px (Nikolic *et al.*, 2006).

The aim of this work was to determine lipid peroxide reducing enzymes activities (GSH-Px and GR) in the pig neck as well as the amount of lipids and cholesterol. Our results are discussed in relation to the balance between synthesis, oxidation, and intracellular transport of fatty acids in muscles as the main factor responsible for muscle lipid content variations in animals undergoing a normal growth.

Materials and methods

Meat samples were taken from five pigs (Swedish Landrace, fed for 145 -160 days, being slaughtered at body mass of 95-115 kg). Male pigs were in the period foreseen for castration, i.e. two weeks after farrowing. All pigs were fed with feed mixture (up to 3 kg daily), composition of which is shown in Table 1. An average carcass yield was 80%. Pig neck was then cut into small pieces, frozen in liquid nitrogen, and stored at −75 °C before biochemical analyses. Frozen muscle tissues (approximately 10 g) were homogenized in chloroform/methanol buffer (2:1 v/v) for the estimation of fat content, using the total lipid extraction procedure outlined by JUS ISO method (1992). Cholesterol content was determined according to the method from China meat research centre (2000). Meat glutahione dependent enzyme activities were determined using a Shimatzu UV-160 spectrophotometer, according to the methods described by Nikolić *et al.*, (2006). The data are presented as mean ± standard deviation (SD). Statistical significance was established by protocols as described in Hinkle *et al.* (1994).

Results and discussion

The mean value of lipid content in the examined samples of pig neck (Figure 1) in comparasion with fat content in the examined samples with selected groups of muscles (loin, silverside, rump and thick flank) showed that the highest value was in pig neck, while fat content in loin, silverside, rump and thick flank was similar (less than 3%).

The mean value of cholesterol content in the examined samples of pig neck (Figure 1) in comparation with mean values of cholesterol content in other examined pork muscles (loin (58.62±20.45mg/100g), silverside (61.40±19.71mg/100g, rump (67.58±5.34mg/100g) and thick flank (64.18±6.40 mg/100g) showed that the lowest cholesterol content was found in pig neck (Turubatović *et al.*, 2006).

Table 1. Feed composition for pigs

	Pre-starter	Starter	Grower	Finisher I (25-60 kg)	Finisher II (60-100 kg)
Dry maize, grain	52.60	57.25	62.90	21.19	12.55
Maize silage, grain	-	-	-	30.00	37.00
Feed meal	-	3.00	3.0	5.00	10.00
Wheat	-	3.00	4.0	20.00	22.00
Succrose	4.00	-	-	-	-
Soybean meal	20.60	16.40	19.3	12.50	11.50
Sunflower meal	-	2.50	3.5	5.50	3.50
Fish meal	5.00	4.50	4.0	2.50	-
Soybean groats	10.00	10.00	-	-	-
Premix (Prasilac)	5.00	-	-	-	-
Calcium carbonate	0.60	0.70	0.8	0.70	0.90
Dicalcium phosphate	1.20	1.20	1.0	0.90	0.80
Sodium chloride	0.10	0.10	0.2	0.31	0.40
Premix (vitamin-mineral)	0.50	1.00	1.0	1.00	1.00
Lysine	-	0.10	0.05	0.15	0.10
Minazel (Adsorbent)	0.40	0.25	0.25	0.25	0.25
Total	100.00 kg	100.00 kg	100.00 kg	100.00 kg	100.00 kg

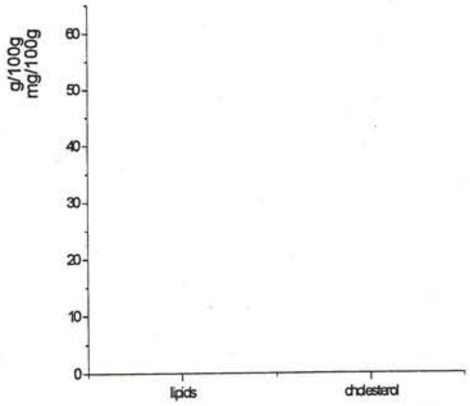

Figure 1. Lipids and cholesterol in pig neck (all data are presented as mean±SD).

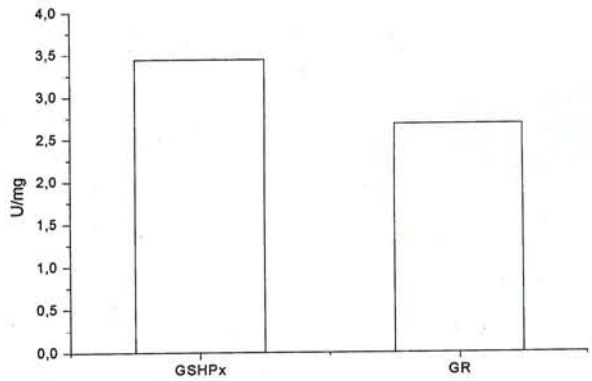

Figure 2. Glutathione dependent enzymes in pig neck (all data are presented as mean ±SD).

The activity of glutahione dependent enzymes GSH-Px and GR is presented on Figure 2. Our previously examination of the muscle anti-oxidant defence enzymes in pigs (Turubatović *et al.*, 2007) showed similar activity of mitochondrial MnSOD and CAT in neck, loin and thick flank of pigs, while determined lower CuZnSOD in pig muscles in comparison to bovine muscles may indicate conditions for possible higher oxysterol formation in pig meat during a thermal preparation. Skeletal muscles are composed of myofibres with different contractile and metabolic properties. There is no strict association between the relative proportions of oxidative fibres in the muscles and their respective total fat content (Larzul *et al.*, 1997), which mainly results from the fact that intramuscular fat content consists not only of lipids within muscle fibres, but also of fat deposited in adipocytes located along fibre fasciculi. The balance between synthesis, oxidation, and intracellular transport of fatty acids in muscles, rather than the regulation of a single metabolic pathway was recently assigned as the main factor responsible for muscle lipid content variations in rabbits undergoing a normal growth (Gondret *et al.*, 2004). Both enzymes (GSH-Px and GR) depend of NADPH for their activities.The main supplier of NADPH in is malic enzyme (Mourot & Kouba, 1998) and reduced activities of NADPH producing enzymes have been eviously shown in the white longissimus muscle at least after feed restriction in pigs.

Conclusions

We found high activity of the both (GSH-Px and GR) enzymes in the pig neck as well as high content of lipids and cholesterol. Balanced activity of GSH-Px and GR and lipid and cholesterol content in pig neck favorise this type of meat for a thermal preparation such as barbacue.

Acknowledgements

This work was supported by The Ministry of Science and Environmental Protection of the Republic of Serbia, Grant No BTN -351001B.

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LIPIDS AND GLUTATHIONE-DEPENDENT ENZYMES IN THE PIG NECK

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Keywords: *pig, neck, GSH – Px, GR, lipids*

1. ABSTRACT

A pig neck is meat predominantly used for barbecues and the amount of lipids and cholesterol in relation to the activities of lipid peroxide reducing enzymes is important also for the prevention of oxysterol formation during a thermal preparation. We examined lipid peroxide reducing enzymes activities in the pig neck as well as the amount of lipids and cholesterol. We found high activity of both selenium-dependent glutathione peroxidase (GSH-Px; EC 1.11.1.9) and glutathione reductase (GR; EC 1.6.4.2) enzymes in the pig neck as well as high content of lipids and cholesterol.

2. INTRODUCTION

Pork neck is consisted of several muscles with typically red fibers that have expressed intensive oxidative metabolism. Organism deposits a large amount of fat in this area, especially intramuscular fats, which ontribute to desirable sensory properties such as softness and tenderness. Lipid peroxides are a substrate for the selenium-dependent glutathione peroxidase (GSH-Px; EC 1.11.1.9). Glutathione reductase (GR; EC 1.6.4.2) catalyses the reduction of oxidised glutathione (GSSG) back into reduced glutathione (GSH), the latter being the co-substrate of GSH-Px (Nikolic *et al.*, 2006).

The aim of this work was to determine lipid peroxide reducing enzymes activities (GSH-Px and GR) in the pig neck as well as the amount of lipids and cholesterol. Our results are discussed in relation to the balance between synthesis, oxidation, and intracellular transport of fatty acids in muscles as the main factor responsible for muscle lipid content variations in animals undergoing a normal growth.

3. MATERIALS AND METHODS

Meat samples were taken from five pigs (Swedish Landrace, fed for 145 -160 days, being slaughtered at body mass of 95-115 kg). Male pigs were in the period foreseen for castration, i.e. two weeks after farrowing. All pigs were fed with feed mixture (up to 3 kg daily), composition of which is shown in Table 1.

Fat content was determined according by JUS ISO method (1992) and cholesterol content was determined according to the method from China meat research centre (2000). Meat glutathione dependent enzyme activities were determined using a Shimatzu UV-160 spectrophotometer, according to the methods described by Nikolić *et al.*, (2006).

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Soybean groats	10.00	10.00	-	-	-
Premix (Prasilac)	5.00	-	-	-	-
Calcium carbonate	0.60	0.70	0.8	0.70	0.90
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Premix (vitamin-mineral)	0.50	1.00	1.0	1.00	1.00
Lysine	-	0.10	0.05	0.15	0.10
Minazel (Adsorbent)	0.40	0.25	0.25	0.25	0.25
Total	100.00 kg	100.00 kg	100.00 kg	100.00 kg	100.00 kg

4. RESULTS

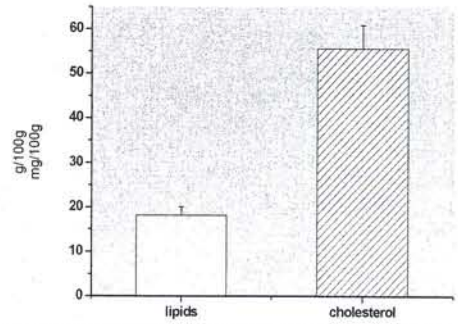

Figure 1. Lipids and cholesterol in pig neck ($\overline{X} \pm$ SD)

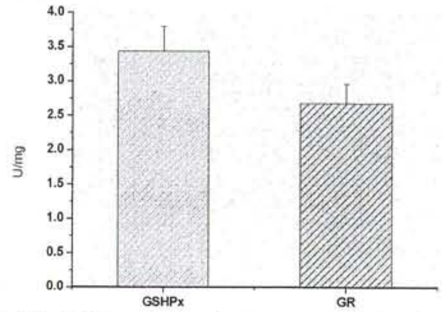

Figure 2. Glutathione dependent enzymes in in pig neck ($\overline{X} \pm$ SD)

5. CONCLUSIONS

We found high activity of the both (GSH-Px and GR) enzymes in the pig neck as well as high content of lipids and cholesterol. Balanced activity of GSH-Px and GR and lipid and cholesterol content in pig neck favour this type of meat for a thermal preparation such as barbecue.

ACKNOWLEDGMENTS

This work was supported by The Ministry of Science and Environmental Protection of the Republic of Serbia, Grant No BTN-351001B.

6. REFERENCES

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