

**MASTER THESIS OFFER
UNIVERSITY OF GENT (BELGIUM)**

MASTER COURSES: STAN, STAG (BAL) – B2 English

LOCAL SUPERVISOR: Prof. ANTONELLA DALLE ZOTTE (Dept. MAPS)

HOST CO-SUPERVISOR(S): indicated below at each topic

Master thesis topics for IUPFOOD and NRD - S. De Smet 2014

1.

Title: Meat and colorectal cancer - effect of protective compounds

Keywords: meat products, digestion, oxidation, antioxidants

Description: There are epidemiological indications that a high consumption of red meat and meat products is associated with an increased risk for colorectal cancer. However, the causal mechanisms are not well established. The most likely hypothesis today is that haem induces the formation of lipid oxidation products and N-nitroso compounds during digestion in the gut. The objective of this Master thesis is to perform in vitro simulations of the digestion of meats and meat products differing in composition and processing characteristics, and to determine lipid and protein oxidation products on these samples. Antioxidants will be added to these incubations to examine if these compounds might offer protection. On the digests of these incubations, toxicity tests will also be performed. This work is in collaboration with several other partners at Ghent University. Depending on the interest of the student, the focus can be more on the chemical-analytical or on the cell biological work.

Promoter(s): [Prof. dr. ir. Stefaan De Smet](#) (BW13), Room: Melle or at the faculty A2.030 (tel. 09 264 90 03 or 09 264 61 82)

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Language master dissertation text: English

Confidential: No

This topic is open for several students (max. 3).

2.

Title: Interaction between protein and lipid oxidation in fermented meat products

Key words: fermented sausage, protein oxidation, lipid oxidation

Description: The conversion of muscle to meat is characterized by a loss of the antioxidant defence system. This implies an oxidative degradation of lipids and proteins compromising the quality of meat and meat products. In dry fermented sausages, changes caused by protein and lipid oxidation result in the development of undesired compounds. These give rise to off-flavours and impaired nutritional value. While lipid oxidation has been studied for decades, interest in protein oxidation is more recent and the interactions between them are still unclear. It seems that lipid oxidation precedes protein oxidation but the coupling is not clarified. Moreover, aldehydic products resulting from lipid oxidation can react with amino groups of proteins giving rise to Schiff bases. The aim of this study is to clarify if oxidized lipids can trigger protein oxidation and elucidate a possible formation of Schiff bases in dry fermented sausages. Fermented sausage will be mimicked using a model where pork lean meat and backfat will be minced and mixed together with curing agents. Pork backfat will be previously oxidized to different degrees. Sausage models will be prepared with different amounts of fats. Lipid oxidation will be assessed measuring the amount of oxidation products (mainly MDA

and hexanal) by HPLC analysis. Protein oxidation will be analysed by carbonyl content (derivatization with DNPH) and loss of thiol groups (derivatization with DTNB). Schiff bases will be analysed by fluorescence measurement (this technique has to be implemented).

Promoter(s): [Prof. dr. ir. Stefaan De Smet](#) (BW13), Room: Melle or at the faculty A2.030 (tel. 09 264 90 03 or 09 264 61 82)

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Language master dissertation text: English

Confidential: No

3.

Title: Role of nitrite and vitamin C on protein oxidation in fermented sausage

Key words: fermented sausage, nitrite, oxidation

Description: Dry fermented sausages are minced meat products characterized by the addition of curing salts. Sodium nitrite is normally used in these products in order to fix a desirable red colour, develop a cured meat flavour, control the growth of undesired bacteria and prevent lipid oxidation. The chemical conversion of nitrite to nitric oxide is catalysed by sodium ascorbate. This curing agent is normally added in cured meat products and is also important for its ability to inhibit nitrosamine formation and for its antioxidant activity. The role of these curing salts in meat products has been studied for decades but their effect on protein oxidation has not been fully understood yet. The aim of this study is to investigate the role of sodium nitrate and sodium ascorbate in relation to protein oxidation during ripening of fermented sausages. Fermented sausage will be mimicked using a model where pork lean meat will be minced and mixed together with curing agents. Different amounts of sodium nitrate and sodium ascorbate will be used. Protein oxidation will be analysed by carbonyl content (derivatization with DNPH) and loss of thiol groups (derivatization with DTNB). Lipid oxidation will be assessed measuring the amount of oxidation products (mainly MDA and hexanal) by HPLC analysis.

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Language master dissertation text: English

Confidential: No

4.

Title: Effect of medium chain fatty acids in the diet of piglets and broilers on gut physiology

Key words: piglets, broilers, gut function, antimicrobial additives

Description: Medium chain fatty acids are interesting feed additives for their antimicrobial activity and for their positive effects on gut morphology and physiology, thereby potentially improving animal performances. In collaboration with a company, the objective of this master thesis is to test the efficacy of new derivatives of medium chain fatty acids in *in vivo* trials with weaned piglets and growing broilers. The practical work will consist of assisting in the animal experiments, and performing laboratory analytical tasks.

Promoter(s): [Prof. dr. ir. Stefaan De Smet](#) (BW13), Room: Melle or at the faculty A2.030 (tel. 09 264 90 03 or 09 264 61 82)

Tutor(s): to be appointed later (), Room: Melle (tel. 09 264 90 01)

Language master dissertation text: English

Confidential: Yes (in collaboration with a company)