The Chancellor of Ghent University has the honour of inviting you to attend the public defense of the doctoral dissertation of

Tine Rysman

Title of the doctoral dissertation:

Protein oxidation in meat products:
Effects of apple phenolics during storage and digestion

The public defense will take place on 27 September 2017 at 16:00 in the Academieraadzaal (Hall of the Academic Board), room A 0.030 at Campus Coupure, Coupure 653, 9000 Ghent.

There will be a contiguous reception to which you are heartily invited. Please confirm your attendance before 22 September to: tine_rysm@byahoo.com or 0473/23.54.79

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Abstract of the doctoral research

Protein oxidation in meat can be detrimental for meat quality, because it can affect technological, sensory or nutritional properties. Furthermore, oxidation might affect protein digestibility because of changes in protease accessibility or recognition sites. The aim of this PhD research was to clarify the underlying mechanisms of protein oxidation during storage and digestion of meat and meat products, and the potential inhibition thereof by apple phenolics.

Oxidation of the thiol group of cysteine was investigated in ground beef stored in high-oxygen modified atmosphere packaging. A new method for the quantification of free and total thiols revealed that thiol loss was only partly reversible, suggesting the formation of other thiol oxidation products than reversible disulfides.

The effects of apple phenolics on the carbonylation pathway (oxidation of lysine, arginine and proline) were studied during in vitro metal-catalyzed oxidation of myofibrillar proteins. Three pure phenolic compounds (chlorogenic acid, (-)-epicatechin and phloridzin) as well as an apple peel extract were able to inhibit protein carbonylation, depending on the concentration and chemical composition of the phenolic compounds.

Thiol oxidation, carbonylation and hydroxylation (oxidation of phenylalanine) were investigated during storage and subsequent in vitro digestion of beef and pork patties. Chilled illuminated storage caused significant oxidative degradation, which was continued during digestion. The effects were more abundant in beef patties. Proteolysis measurement revealed that protein oxidation decreased digestibility.

In emulsion-type sausages containing freeze dried apple pomace, results for protein oxidation measurement after storage and in vitro digestion suggested the presence of protein-phenol interactions, which decreased protein digestibility.

Protein oxidation in meat and meat products is a complex and dynamic phenomenon which should be evaluated by means of at least two markers, since no single protein oxidation marker is all inclusive. Measurement of free and total thiols can be useful in the development of strategies to avoid or repair thiol oxidation. Apple phenolics were able to inhibit protein carbonylation in a model system, however in emulsion-type sausages there appeared to be interfering protein-phenol interactions, impeding the evaluation of protein oxidation. Further research should elucidate the exact nature and dose-dependency of such interactions, before optimizing (extracts of) apple by-products as a source of natural antioxidants in meat products.

Brief Curriculum Vitae

Tine Rysman was born in Kortrijk on 4 July 1986. She obtained her high school degree in Science-Mathematics at Instituut Heilige Kindsche Ardooie in 2004, and her Master degree in Applied Bioengineering: Food-industry in Ghent in 2010. After gaining work experience in food quality and applied food research, she started her PhD at Flanders research institute for agriculture, fisheries and food (ILVO) in 2012.

During her PhD study, Tine did internships at University of Extremadura (Spain) and University of Copenhagen (Denmark). She presented her work at national and international symposia and conferences, and is author and co-author of several international peer-reviewed publications.