SESSION 3: CHEMISTRY BEHIND FUNCTIONAL ANIMAL PRODUCTS

ORAL PRESENTATIONS

O21

Meat Products as Functional Foods. A Paradox?

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Key words: meat, functional foods, functional ingredients, health and wellness

The emergence of so-called functional foods can today be found in almost every sector of the food industry. Yet, the meat industry seems to be one of the last arenas to embrace the concept of these "foods for health." Perhaps this stems from the fact that meat and meat products possess a marked content of fat, saturated fatty acids, cholesterol, and salt (*NB*, all are deemed as risk factors toward the development of cardiovascular diseases), or because of regulatory restrictions placed upon the additives allowed in fresh and processed meat products. Hence, many challenges are put forward to the meat processor at overcoming these perceived negative health attributes.

Meat and meat products can be modified by including functional ingredients/bioactives considered beneficial (*e.g.*, fruit or cereal fiber {both soluble and insoluble}, phytochemicals, natural antioxidants, vegetal proteins, MUFAs, and PUFAs) or by eliminating/reducing those components considered detrimental to health. When strategies such as fortifying meat with functional ingredients are employed, this can present issues to the processor at maintaining flavor, texture, and shelf-life stability of products, which the consumer has come to expect. So the question becomes, "have new products been fabricated to provide healthy alternatives to traditional meat products or have they simply been rebranded as a marketing aid to capitalize on the functional food revolution?" This presentation will explore the constraints faced by the meat industry at trying to generate functional meat products and then ask the question if a functional meat product truly exists.

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Quantification of Phenolic Compounds in Smoked Meat Products Using Different Glow Smoke Conditions

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Key words: phenolic substances, Frankfurter-type sausages, wiener, smoking conditions, glow smoke, beech wood, Antonacopoulos, Clevenger

The aim of the research project "Minimisation of PAH contents in meat products by optimisation of the conditions of conventional smoking" is not only to reduce undesirable PAH compounds but also to ensure desirable substances such as phenolic compounds. These substances are important to conservation and flavour of smoked meat products. Within the group of phenolic substances, five dominating substances (guaiacol, 4-methylguaiacol, syringol, eugenol, and trans-isoeugenol) are of special interest. For smoking experiments, different glow smoke conditions were applied. These different parameters (smoke density, ventilator velocity, wood moisture) showed an influence on the contents of the analysed phenolic compounds. With increasing smoke generation temperature, the proportion of syringol increased, and the proportion of trans-isoeugenol decreased.

The contents of phenolic compounds in Frankfurter-type sausages were determined by gas chromatography coupled with a mass-selective detector after trimethylsilylation.

For sample preparation, 1 g of homogenised smoked sausage was filled into an insert for an Antonacopoulos apparatus, and the volatile phenolic compounds were isolated by steam distillation. The distillate (300 mL) was extracted with diethyl ether and dried over Na_2SO_4. After evaporation of the solvent, the residue was dissolved in ethyl acetate and cleaned on a silica cartridge. The disadvantage of this procedure is the high consumption of diethyl ether (300 mL).

In order to improve sample preparation, a method using a Clevenger apparatus was developed. With this, the sample was filled into a flask, and 5 mL of organic solvent (density < 1 g/mL) were filled into the Clevenger apparatus. Simultaneous distillation and extraction were performed for three hours. The extract was cleaned on a silica cartridge.

Both analytical extraction methods showed satisfactory recoveries of phenolic substances in smoked sausages. The improved method using a Clevenger apparatus reduced solvent consumption from 300 mL to 5 mL and made it possible to save time.

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Emulsion-Based Meat Products as a Tool for Functional Food

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Key words: meat emulsion, nutrient carriers, nutritional potential

A meat emulsion consists of particles of fibrous meat, including connective tissue and muscle fibers, dispersed with particles of solid fat in a fat-in-water emulsion. From a nutritional standpoint, meat emulsions are considered as a source of protein but with a potentially high lipid content. However, the solid structure of meat emulsions makes them well-adapted as a support for incorporating molecules and nutrients of nutritional interest. Indeed, the fat globule content in the protein-water matrix can be flexibly rearranged, as long as it stays within limits imposed by the sensory properties of the meat emulsion (flavor, texture,...). One of the main levers of action for improving meat emulsions is the raw lipid materials selection process, including replacing saturated fatty acids by unsaturated omega-3 fatty acids or by employing chemical or enzymatic processes (interesterification). It is equally possible to incorporate vegetable oils coupled with thickening agents and/or antioxidants to counter potential oxidative damage. As a measure to counterbalance the loss of flavor tied to the inclusion of nutritionally-valuable but highly-reactive compounds, nutrient carriers (such as carotenoids or lutein) are proposed as a solution for enriching meat emulsions while preserving their nutritional potential. This solution would set technologists the major challenge of ensuring that the vectored carrier molecules are first homogeneously dispersed before then being released from the food matrix at the ideal time (intestinal barrier).

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Characterisation of Conditions Affecting Stability of Oligo-Peptide Derivatives of Potential Health--Preserving Effect

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Key words: small molecular weight peptides

Small molecular weight peptides represent an important family of compounds that play significant role in physiological and biochemical processes as well as in clinical and food research. Beyond the functional properties (antioxidant, antimicrobial activity) of these compounds they can contribute to the development of characteristic flavors such as sweetness and bitterness in various types of food. Several publications have dealt with the separation, detection and identification of these compounds, however the published methods carry difficulties in terms of the quantitative analysis, the sensitivity and reproducibility have been proven to be poor mainly because several amino acid moieties have low UV-absorbing properties.

Our intention was to develop a reliable and sensitive chromatographic method to detect di-, and tripeptides (Aspartame, L-carnosine, L-glutation, Alanyl-glutamine and gamma-glutein) in raw and processed food materials. A HPLC-method was developed to analyze peptide containing complex food samples and raw materials. The detection of free peptides was carried out using evaporative light scattering (ELS) detection, UV detection was accomplished by pre-column derivatization with danzyl-chloride.

Pea, rice and garlic samples have been selected for the study, the extraction procedure was optimized with different solvents: phosphoric-acid, hydrochloric-acid, acetic-acid, ethanol and water, the peptide content was analyzed with the newly developed technique. Antioxidant activity (FRAP) was observed only for the sulphur containing derivatives (gamma-glutein, L-glutation). Garlic extracts have shown the highest antioxidant activity (46 ppm in ascorbic acid equivalents), pea samples have exhibited lower activity (23 ppm) and the lowest activity has been measured for rice samples (19 ppm). The peptide content was varied in the 10-100 ppm region for all derivatives in the examined plant parts. The stability of the sulphur containing derivatives has been found to be low, the stability of these compounds was increased by applying different agents and protection ways such as antioxidants and transition metals and transformation to derivatives.

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