Session 2 – "Traditional meat products and innovative trends"

Umami and koku peptides in traditional meat products presented by **Dr. Leticia Mora**, Spain

Traditional meat products are globally appreciated not only for cultural, ethical, and religious reasons, but also for their unique textural, gustatory, and olfactory characteristics. Taste compounds are linked to the degradation of proteins and the generation of hydrophilic metabolites. Koku is considered a complex taste sensation associated with mouthfulness, thickness, and continuity, and cannot be classified within the traditional five tastes. The unique sensory characteristics of traditional meat products depends on their characteristic processing techniques, including maturation, curing, drying, smoking, and several cooking methods. During these processes, enzymatic and chemical reactions such as proteolysis, lipolysis, and fermentation lead to the generation of small peptides and amino acids, crucial for taste development. Endogenous muscle enzymes as well as endogenous microbial and/or starter cultures are main responsible for the generation of these taste-related metabolites. Umami taste in meat products is primarily attributed to the amino acids glutamic acid (Glu) and aspartic acid (Asp), particularly in their sodium salt forms. Peptides containing Glu or Asp residues, such as α-glutamyl dipeptides, are key contributors to umami flavor. Monosodium glutamate is a well-known enhancer of umami and overall taste perception. Its combination with nucleotides like inosine monophosphate produces synergistic effects, enhancing saltiness and other taste perceptions. In products like Spanish dry-cured ham, small peptides containing Glu and Asp are naturally generated, increasing their amounts during the time of processing. In fermented foods, glutamate is naturally generated through the hydrolysis of glutamine by the enzyme glutaminase produced by *lactobacilli* microbial species. In parallel, koku-inducing peptides, specifically γ-glutamyl peptides, are synthesized via enzymatic activity, primarily through the action of the enzyme γ-glutamyl transferase (GGT), which is widely present in both bacteria and animals. GGT facilitates the transfer of γ-glutamyl groups to neutral amino acids or peptides, with glutamine, glutathione, and glutamic acid acting as donors. The generation of these peptides is influenced by substrate availability and the presence of hydrophobic free amino acids. Sensory studies have shown that koku is perceived through the activation of calcium-sensing receptors (CaSR), with γ-glutamyl peptides showing strong positive correlations with CaSR activation. In dry-cured ham, the concentration of γ-glutamyl peptides increases with the time of processing because they are less affected by peptidases whereas α-glutamyl peptides are degraded by peptidases to free amino acids. γ-glutamyl dipeptides has been described as a tool for masking the bitterness. In conclusion, umami and koku peptides naturally present in traditional meat products offer promising alternatives for reducing the use of additives in foods. Also, these peptides have been reported to exhibit functional bioactivities, including anti-inflammatory, antihypertensive, hypoglycemic, or antioxidant. The dual role of these peptides in taste enhancement and health promotion highlights their potential value in food industry. (L. Mora, F. Toldrá. 2025. Umami and koku peptides in traditional meat products. Meat Science 229, 109917)



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Leticia completed her PhD at the Universidad Politécnica of Valencia in 2010. Dr. Mora enjoyed a posdoctoral contract in Ashtown Food Research Centre, Teagasc (Dublin, Ireland) and later, a posdoctoral Marie Curie Intra-European Fellowship in Royal Holloway University of London (Egham, UK). Currently, Dr. Mora has a permanent position of Scientist in the Group of Food Proteins at the Institute of Agrochemistry and Food Technology belonging to the Spanish National Research Council (Valencia, Spain). She is involved as main researcher in several regional, national and international research projects, and has published more than 150 papers in peer-reviewed journals and 25 book chapters. Dr. Mora's main areas of experience are the isolation, identification, and sequence of naturally generated peptides in meat products, study of their bioactivity, taste, and quantitation, as well as the revalorization of meat industry-derived by-products through the generation of bioactive and taste-related ingredients produced from enzymatic hydrolysis with commercial enzymes.