

Traditionally, dietary proteins have been considered as a source of amino acids which most important physiological function is participation in the biosynthesis of cell components, enzymes, hormones and neurotransmitters. Therefore, the nutritional value of proteins is determined basing on their amino acid composition. However, reports from a few recent decades indicate that a complementary criterion, allowing a more complete view of the proteins biological value should also take into the account their usefulness as a source of biologically active peptides. Release of these molecules from the protein structure occurs e.g. during food digestion in the alimentary tract, enzymatic hydrolysis *in vitro*, and as a result of food processing such as fermentation or ripening. The bioactive peptides can regulate numerous physiological processes of the body via e.g., lowering blood sugar levels and reducing blood pressure, as well as antithrombotic, antimicrobial or antioxidative properties. Most of them is completely side-effect free.

Majority of the reported biopeptides have been derived from food proteins. However, these molecules can also be obtained from different precursors e.g. protein-rich waste by-products generated by agriculture and food processing. Among these, chicken feathers, which constitute up to 10% of the weight of an adult chicken, and which global production exceeds 40 million tons per year, are particularly promising. The main component of feathers (approx. 90%) is keratin. This protein is an attractive raw material for the production of bioactive peptides because it contains a lot of hydrophobic amino acids, just like majority of the most active biopeptides.

Enhancement of bioactivity, stability and bioavailability of peptides can be achieved through Maillard reaction. The use of this modification is industrially viable. This reaction takes place between reducing sugars and proteins or peptides, and as a result the product acquires a brownish colour. This process occurs naturally in foods, and is responsible for, among others, the formation of chemical compounds that shape the flavour and taste of the final products subjected to thermal treatment. The feather keratin-derived peptides are attractive substrates for the Maillard reaction due to the high content of cysteine, which can react with sugars to form products with pleasant, meat-like aroma.

The aim of the project will be to investigate the usefulness of chicken feathers as a cheap raw material for the preparation of bioactive peptides and Maillard reaction products. Previous studies indicated that the chicken feather keratin is a potential source of peptides exhibiting antidiabetic, antihypertensive, antioxidant and antimicrobial activity. However, these reports are scanty and in most cases methods that do not allow high repeatability or process control, and sometimes result in degradation of the obtained peptides or excessive consumption of the raw material were used.

The project will involve the isolation of soluble keratin from chicken feathers, its enzymatic hydrolysis and subsequent Maillard reaction. Biological, functional and structural properties, as well as potential toxicity of the resulting hydrolysates, peptides and Maillard reaction products will be determined. The studies will allow for preliminary determination, whether the obtained preparations could be used as active ingredients in functional foods, dietary supplements or even pharmaceuticals useful in the treatment of metabolic diseases.