

Hen egg is a source of many valuable nutrients, which is why it is valued in human nutrition around the world. It's an ingredient of many different food products and popular dishes. Eggs are egg cells of birds that enable the development of an embryo, for which they are the only source of nutrients, i.e. high-quality proteins, fats, micro- and macroelements and vitamins. These ingredients are also necessary for proper human development. FAO / WHO (Food and Agriculture Organization of the United Nations / World Health Organization) considers hen egg protein an international standard of protein supplied to humans due to its valuable amino acid composition.

Eggs are now considered to be fully natural, excellent food and are mostly consumed after minor processing. Due to their health-promoting properties discovered in recent years, they have been considered nutraceuticals of both functional and nutritional importance. Now because of their rich composition, i.e. the content of lysozyme (antibacterial protein), lecithin (an important phospholipid that builds every cell), retinol (vitamin A),  $\alpha$ -tocopherol (vitamin E) and immunoglobulins (antibodies), official statements on the food which should be avoided do not mention eggs.

In fact, it is recommended to consume eggs in reasonable quantities. Ingredients contained in eggs are now believed to have many new functions that were not mentioned before. We are talking about antimicrobial, anticancer properties and those supporting the immune system or preventing hypertension. Unfortunately, this valuable product is in the second place on the list of 8 major food allergens. In many countries, eggs cause the most common allergies in children - data from 2013 suggest that as many as 4% of children are allergic to eggs.

According to WHO/IUIS (The International Union of Immunological Societies) 18 allergenic fractions of the whole egg have been recognized so far. Major egg allergens such as ovalbumin, ovomucin, ovomucoid or lysozyme are found in egg protein. The yolk contains  $\alpha$ -livetin, globulines and lipoproteins. Ovomucoid is considered to be the dominant allergen. Patients diagnosed with hen egg allergy, are usually allergic to other egg proteins as well, due to the high similarity of protein fractions. Antibodies in the serum of people who are allergic to hen egg proteins strongly react with turkey meat proteins. Therefore, precise diagnosis of allergies prevents the necessity to use a very restrictive diet which is not always necessary, while maintaining the patient's comfort of life.

Literature data indicate the effect which hen nutrition has on the composition of laid eggs. Research involving the addition of appropriate components to feed for laying hens unequivocally indicated a modification of the fatty acid composition in the egg. It is popular today to enrich eggs by modifying feed for chickens, e.g. with vitamins (A, D, E, K, B12), microelements (iodine, selenium), n-3 polyene fatty acids (e.g. DHA), and even with caffeine. Therefore, the question arises whether a change in the diet of laying hens can induce the change in the protein, peptide and amino acid composition of the proteins which are already known, and thus whether it can affect the immunoreactivity or allergenicity of eggs? Can such changes be caused by adding valuable papilionaceous plants (soy and lupine) to their feed, which – per se - are allergens for humans?

The scientific aim of the project is to detect potential differences in immunoreactivity, protein, peptide and amino acid composition of eggs obtained from rosa laying hens fed with feeds containing different amounts of papilionaceous seeds. As part of the project, the laying hens will be fed with feeds containing soybean meal or ground lupine seeds. In eggs obtained from these hens, the content of individual protein and peptide fractions of egg protein and egg yolk will be analyzed. Subsequently, protein and peptide fractions for which qualitative differences will be demonstrated, will be tested for their immunoreactivity with the use of commercially available antibodies and / or sera from patients allergic to egg proteins. This will allow an initial estimate of the clinical significance of the differences. In the next stage of our research, interesting protein / peptide fractions will be subjected to separation and analysis using LPLC chromatography and molecular bioanalyzer. The above research is innovative, will allow recognition of the possibility of modifying the protein or peptide composition in eggs depending on the addition of papilionaceous plant seeds, which may potentially contribute to reducing the occurrence of allergies to hen egg proteins.