

Wheat bread is for many people one of the basic ingredients of the diet. However, consumers increasingly pay attention to its quality, from which ingredients it was made and how it was produced. This is due to the growing awareness of the impact of food on human health.

Supplementing bread with compounds that can have a beneficial effect on health is a good way to diversify the diet and enrich it. The compounds that have many health-promoting properties and at the same time can serve as bread supplements are fibre preparations. They contain both polysaccharides and polyphenolic compounds, such as flavonoids, anthocyanins and phenolic acids. These compounds have strong antioxidant properties, i.e. they are able to neutralize the effects of stress in the body, as well as have anticoagulant, anti-inflammatory and anticancer effects. They can also help in the prevention of civilization diseases.

As a result of washing out of starch and other water-soluble ingredients from wheat dough, we obtain gluten. It is a visco-elastic mass composed of two types of proteins: gliadin and glutenins. These proteins, as a result of kneading the dough, combine with each other by means of hydrogen bonds and disulphide bridges forming a gluten network. The proper structure of this network is necessary to obtain bread of appropriate quality and structure. However, the use of various types of bread dough additives may disrupt the formation of a gluten network characterized by adequate mechanical properties, and thus, affect the deterioration of the quality of the bread.

The positive effect of bread supplementation on phenolic compounds is confirmed by literature. It turns out, that bread enriched with various types of polyphenols is characterized by higher antioxidant properties compared to unfortified bread. It can therefore be concluded that polyphenols react with gluten proteins and may change their structure and, at the same time, significantly affect the sensory and rheological properties of bread.

The aim of the proposed research will be to study the influence of selected phenolic compounds (quercetin, naringenin, hesperitin) and their glycosides (rutin, naringin, hesperidin) on the structure of gluten proteins in a model bread dough. The experiment will consist in creating a model flour consisting of starch and gluten, to which selected phenolic compounds will be added at concentrations of 0.05%, 0.1%, 0.2%. The model flour will be used to eliminate the influence of the remaining ingredients present in the flour (dietary fiber, lipids) on the results of the tests. The ingredients used will be kneaded and then the gluten will be removed. Using infrared spectroscopy and Raman spectroscopy, which provide insight into the structure of gluten proteins, changes in their structure will be investigated as a result of supplementation of the dough with selected polyphenols. The antioxidant properties of selected polyphenols and their glycosides will also be examined after being added to the model dough.

Understanding the mechanisms of interaction of phenolic compounds with individual bread dough ingredients may enable the creation of an appropriate technology for making bread, which will be characterized by pro-health properties and at the same time will have the appearance, taste and smell desired by consumers.