

1. Changes and redistribution of structural groups in dough and bread with rice flour and phospholipids

Anastasiia Shevchenko, Vira Drobot, Svitlana Litvynchuk
National University of Food Technologies, Kyiv, Ukraine

Introduction. In recent years, considerable attention has been paid to the problem of rapid growth of diseases of the gastrointestinal tract, such as inflammatory bowel disease (IBD). For the prevention of these diseases, the determining factor is nutrition and diet therapy. In the diet of patients with IBD, it is necessary to reduce the use of fiber while increasing the use of phospholipids.

Materials and methods. When conducting research, rice flour was added to the recipe of wheat bread as a source with a reduced content of dietary fiber, and sunflower lecithin. Their joint influence on the redistribution of functional groups during conformational transformations in dough semi-finished products and finished products was determined by the method of infrared spectroscopy in the near-infrared region. Samples of dough and bread were prepared with the replacement of 10% of wheat flour with rice flour and with the addition of lecithin (3% by weight of flour). Sample with lecithin was a control sample.

Results. It was established that functional groups O-H, N-H, S-H are present in the studied samples (Fig. 1). The highest extremum for all samples is observed at a wavelength of 2100 nm (it corresponds to the second overtone of N-H deformation vibrations), which indicates the redistribution of gluten proteins. For bread samples, the value of the spectral index at this wavelength is the highest and is almost the same 0.6627. This can be explained by the significant influence of high temperatures on the change in protein structure during bread baking.

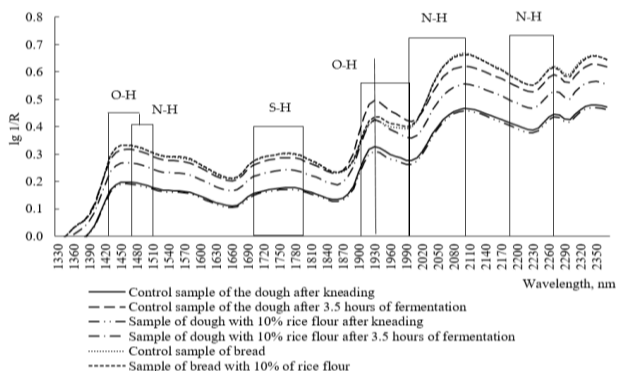


Fig.1. Changes and redistribution of structural groups in dough and bread

The dough samples during the fermentation process also undergo changes in the protein structure compared to the samples immediately after kneading, which is especially noticeable in the sample with the replacement of part of the wheat flour with rice flour. The spectral index in the entire range of wavelengths is lower than for the control sample. This is due to the influence of the components of this raw material on gluten and the distribution of moisture in the dough, as evidenced by the extremes at the wavelengths that characterize O-H groups.

Conclusions. Replacing part of the wheat flour with rice flour affects the redistribution of hydroxyl O-H groups and amino groups N-H in dough and bread, which, against the background of the deterioration of gluten quality, contributes to the increase of water-soluble substances and easier assimilation of products.