Hydration and rheological properties of dietary fibre supplements of bread

One of the most important factors determining the rheological behaviour of bread dough during mixing, fermentation and baking is the degree of hydration of its basic components, in particular starch, gluten and dietary fibre supplement. The phenomenon of water migration between these components of the dough during the mixing has not been studied so far. The majority of fibre preparations used are markedly higher in hydration capacity (water absorption) in relation to the native flour components. For this reason, they may contribute to the partial dehydration of starch and gluten. The dehydration of gluten seems to be particularly unfavourable, because may modify the structure of gluten proteins and cause deterioration of viscoelastic properties of the gluten network maintaining the desired consistency of the dough.

The primary goal of the proposed research will be to determine the rate and extent of changes in the hydration of the bread dough components as a function of the mixing time. The standard centrifuge methods (AACC 56-11-02) as well as the new rheological method developed at the Institute of Agrophysics of the Polish Academy of Sciences will be used to monitor the changes in hydration of mono-, di- and tri-components dough. The technological effects of water redistribution between the dough components will be determined using standard tests: farinograph (ICC 115/1) and extensograph tests (ICC 114/1).

Proposed research will allow to broaden knowledge about the course of hydration and dehydration processes of starch and gluten in the presence of fibre supplements in two-component and multi-component systems. In addition, on their basis, the role of dietary fibre in the redistribution of water between native dough components and the importance of this phenomenon in modelling the quality of pro-health bread will be known.

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Candidate profile:

- Graduate in natural sciences (physics, chemistry, food technology and related).
- Knowledge of English on the communicative level.
- Knowledge of MS Office and Statistica.
- Knowledge of rheology of wheat bread dough and farinograph techniques - welcome.