

Overall and Local Bread Expansion, Mechanical Properties, and Molecular Structure During Bread Baking: Effect of Emulsifying Starches

In order to determine the relationship between molecular structure of wheat bread dough, its mechanical properties, total and local bread expansion during baking and final bread quality, different methods (rheological, nuclear magnetic resonance, magnetic resonance imaging and general bread characterisation) were employed. The study was extended on wheat dough with starch modified by octenyl succinic anhydride (OSA) in order to generalise the results. The interest of investigating multi-scale changes occurring in dough at different phases of baking process by considering overall results was demonstrated. It was found that OSA starch improved the baking performance during the first phase of baking. This feature was due to a higher absorption of water by OSA starch granules occurring at temperatures below that of starch gelatinization, as confirmed by NMR, and consecutive higher resistance to deformation for OSA dough in this temperature range (20'60 °C). This was explained by a delayed collapse of cell walls in the bottom of the OSA dough. In the second phase of baking (60'80 °C), the mechanism of shrinkage reduced the volume gained by OSA dough during the first phase of baking due to higher rigidity of OSA dough and its higher resistance to deformation. MRI monitoring of the inflation during baking made it possible to distinguish the qualities and defaults coming from the addition of OSA starch as well as to suggest the possible mechanisms at the origin of such dough behaviour. © 2016 Springer Science+Business Media New York

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