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Kinetics of Gluten Aggregation - an Indicator of Refrigerated Dough Quality

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Abstract:

Four flours with different protein contents were selected for the study based on their differences in gluten aggregation time. GlutoPeak analysis revealed that Flours 1 and 2 had shorter gluten aggregation times (51 & 40.5 s, respectively) than Flours 3 and 4 (144 & 130.2 s, respectively). Further, doughs were prepared by mixing flours with 2% salt and 0.4% yeast using Farinograph at constant water absorption of 56.5% for all the flours to their optimum consistency (560-565 BU). Doughs were kept under refrigerated storage conditions for 24h. Flours 1 and 2 with shorter aggregation times showed increased Farinographic consistency, from 561 BU (for both of doughs) to 730 and 761 BU respectively after 24 h while for flour 3, it increased only from 565-620 BU. In contrast, Flour 4 showed a reduction in consistency from 560-478 BU. Also, flour 4 had reduced extensibility after refrigerated storage while the other three flours exhibited increased extensibility on Extensograph. Interestingly, Flour 1 had the lowest protein (9.8 %) and Flour 4 had the highest protein content (12.9 %) but both the flours exhibited similar ($p>0.05$) torque (~ 45 BE). On the other hand, Flour 2 had lower protein (11 %) content than Flour 3 (11.7 %) still it showed almost 10 BU higher torque than Flour 3 (51.58 BE). Perhaps, the interactive forces like hydrophobicity and disulfide linkages responsible for the formation of gluten network, were weaker in flours showing longer aggregation times despite of their

higher protein contents. This is the first study reporting that gluten aggregation time could be a valuable parameter for prediction of refrigerated dough quality. Further studies with the extended refrigeration storage periods are underway to establish the correlation of gluten aggregation time with the quality of baked products prepared with refrigerated doughs and the phenomena leading to this behavior.

Keywords: GlutoPeak, Gluten aggregation time, Refrigeration, Farinograph, Extensograph, Dough quality.

