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Effects of NaCl on Dough Fermentation

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Summary

In bread making, the presence of salt in the fermentation process is of great importance. A few interesting findings have suggested that salt greatly influences the success or failure of the baked bread. However, the effects of salt on the dough fermentation process and its mechanism of action are unknown. The relationships between salt and the bread's flavor and texture in the baking process are also yet to be established. Therefore, we conducted a thorough investigation of these issues from various angles. The dough expansion rate with no salt reached a maximum of 18% in the 50 min dough fermentation time. In contrast, dough with 2.0% salt reached an expansion rate of 96% in 30 minutes of fermentation. Furthermore, the maximum dough expansion rate with 8.0% salt was 58% in 20 min. Lipid peroxidation catalyzed by baker's yeast was observed in the dough fermentation process following the addition of salt. Although the baker's yeast catalyzed lipid peroxidation salt triggered the reaction. The hydroperoxide produced in the induced lipid peroxidation reaction was found to play an unspecified role in the expansion phenomenon of dough. Based on these findings, we examined how salt is associated with the dough fermentation phenomenon. We hypothesized that the presence of salt would induce the following two chemical phenomena: 1) Salt enhances cross-linkages between gliadin and glutelin, which in turn leads to increased gluten content. 2) While baker's yeast catalyzes lipid peroxidation, salt potentiates this reaction. We speculated that hydroperoxide, produced in lipid peroxidation, would accelerate the dough fermentation process, thereby resulting in a higher dough expansion rate. A sensory test of the dough samples after baking showed the highest overall rating of 4.17 in the bread made of dough with 2.0% salt. On the other hand, the bread made from dough with no salt had the lowest overall rating of 0.58. The bread made of dough with 8.0% salt had an overall rating of 2.89. This rating may have been the result of a strong salty taste. These results revealed some new findings in the biochemical effects of salt in bread making, which could break new ground in the bread-making industry.