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Evaluation of Effect of Salt on the Bread Dough Fermentation Analysis of Dough Expansion and Gas Retention Capacity by Electrical Impedance Spectroscopy

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Summary

Salt added to bread dough affects the rheological properties of dough and the biological activity of yeast; Salt strengthens gluten properties of dough and inhibits protease activity, and controls yeast metabolism.

Straight dough at 0, 1, 2, 4% sodium chloride concentration (on the flour basis, w/w) were used for the fermentation experiments. As the salt concentration increased 0 to 4%, the gas production volume decreased and the maximum gas production rate also fell. The occurrence time of the maximum rate was more delayed at higher concentration of salt. The increase in the salt concentration caused lower volume expansion of dough and the gaseous release time was also more delayed. The time variance in dough expansion volume was similar to that of the gas production till the gaseous release. The electrical impedance parameter (resistance) of dough showed a time-variance correlated with that of the volume expansion. The addition of salt limited the shrinkage of dough volume by the gaseous release and the resistance showed a similar time-variance to that of dough volume expansion. Therefore, impedance measurement could detect the gaseous release and estimate the volume expansion at different salt concentration. Gluten in doughs at 0% and 4% NaCl concentration decreased steadily with the development of the dough fermentation. The relationship between salt concentration and gluten content in dough was complicated and could not be revealed in the range of this experiment conditions.