Evaluation of salt reduction effect on dough mixing properties by doughLAB and bread quality

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1. INTRODUCTION

Salt reduction in bakery products as a part of daily diet is a critical concern in order to decrease daily sodium intake and consequently prevent cardiovascular disease incidence.

Reformulation of bread with focus on the reduction of salt and minimizing changes in quality of the final product will improve health outcomes of bread consumers but can pose serious challenges for bakers as a result of changes in dough mixing properties and bread quality.

The main objective of this study: Evaluation of the reduced salt content (25%, 50%, 75% reduction) effect on dough rheological properties as well as final bread quality of three Australian commercial flours, using the doughLAB.

2. METHODS AND MATERIALS

Dough and bread samples were prepared in duplicate based on the commercial formulation (Table 1).

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Percentage (%)</th>
</tr>
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<tbody>
<tr>
<td>Flour</td>
<td>100</td>
</tr>
<tr>
<td>Salt</td>
<td>2</td>
</tr>
<tr>
<td>Sugar</td>
<td>5</td>
</tr>
<tr>
<td>Yeast</td>
<td>1.5</td>
</tr>
<tr>
<td>Fat (shortening)</td>
<td>4</td>
</tr>
<tr>
<td>Water</td>
<td>(water absorption of flour% - 4%) x flour weight (g)/100 + Added water (ml)</td>
</tr>
</tbody>
</table>

Dough properties analysis

For evaluation of the mixing quality and properties of doughs, doughLAB (Perten Instruments, Sweden) was used to assess dough quality characteristics based on standard AACCI Method 54–70.01 (High-Speed Mixing Rheology of Wheat Flour Using the doughLAB).

Bread quality analysis

Bread Volume by Bread volume analyser (BVM) based on standard AACCI Method 10–14.01

Crumb structure by texture analyser TA-XT2Plus (Stable Micro Systems, UK) based on standard AACCI Method 74–09.01

3. RESULTS AND DISCUSSION

- Dough Characteristic: doughLAB curves for flour A and B illustrated a significant (p<0.01) increase in total energy and development peak of dough by reduction of salt. Similar observations were earlier reported by Farahnaky & Hill (2007) and McCann & Day (2013).

- The departure time of dough (DoughLab) was reduced by salt reduction which was indicated in lower salt concentration, dough strength was decreased. Also, differences were seen among various wheat flours. Dough stability was influenced by salt quantity, with 50% salt reduction producing the most stable dough.

- Other dough characteristics, significant change was not observed and various levels of salt (25%, 50%, 75% reduction) were almost similar in water absorption, development time and arrival time.

4. CONCLUSIONS

Overall, the results of the study showed salt reduction had largely insignificant effect on bread topographic and textural characteristic which possess minimum technological and quality variations compared to breads with standard recipe. However, doughLAB data regarding dough rheology revealed that the results were dependent on the quality characteristics of the flour tested.

Recommendation

Extensive research should be conducted to minimize the effect of flour composition on results. Sensory evaluation is required to evaluate and analyse consumer responses to new bread formulations with reduced salt for a comprehensive conclusion.

References


Acknowledgement