FARINOGRAPHIC AND ALVEOGRAPHIC PROPERTIES OF WHEAT FLOUR INCORPORATED WITH BUCKWHEAT FLOUR (Fagopyrum esculentum Moench)

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Abstract

Buckwheat (Fagopyrum esculentum Moench) is a pseudocereal that has been highlighted in global research for its rich nutritional composition. This study had as objective to investigate the farinographic and alveographic properties of wheat flour (WF) with the incorporation of 30 and 45% whole grain buckwheat flour (WGBF). The following parameters were evaluated: water absorption (WA), arrival time (AT), dough development time (DDT), stability (S), resistance to extension (P), extensibility (L) and flour strength (W). Differences were observed in farinographic and alveographic behavior with the addition of WGBF. However, it can be predicted that the incorporation of 30 and 45% of WGBF is possible without causing major damages to parameters such as WA and P, expanding the possibility of the production of breads with the addition of buckwheat flour.

Key words: buckwheat; farinograph; alveograph.

Introduction

Buckwheat (Fagopyrum esculentum Moench) is a pseudocereal that has no gluten and contains a variety of nutrients and phenolic compound, the consumption of which is associated with a lower risk of diseases1. The incorporation of raw materials without gluten in breadmaking products alters dough characteristics, usually causing great effects on rheological properties. The farinograph and the alveograph are two devices widely used to assess the behavior of flours.

This study had as objective to investigate the farinographic and alveographic properties of WF with the incorporation of 30 and 45% WGBF.

Results and Discussion

Table 1 shows the farinographic properties of WF and of blends with 30 and 45% WGBF. The samples had 2.39 ± 0.15% (WF) and 24.43 ± 0.91% (WGBF) total dietary fiber contents.

Table 1. Farinographic properties of WF and of the blends with 30 and 45% WGBF.

<table>
<thead>
<tr>
<th>Blends</th>
<th>WA (%)</th>
<th>AT (min)</th>
<th>DDT (min)</th>
<th>S (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% WF</td>
<td>58.30±0.57a</td>
<td>1.20±0.07bc</td>
<td>11.80±0.35a</td>
<td>16.17±0.87a</td>
</tr>
<tr>
<td>30% WGBF</td>
<td>56.93±0.21a</td>
<td>1.30±0.17b</td>
<td>7.07±0.59b</td>
<td>9.93±0.21b</td>
</tr>
<tr>
<td>45% WGBF</td>
<td>57.03±0.15a</td>
<td>4.73±0.13a</td>
<td>7.37±0.76b</td>
<td>8.93±0.25b</td>
</tr>
</tbody>
</table>

Table 2 shows the alveographic properties.

Relative to P, it was observed that the incorporation of 30% WGBF increased the value of this parameter; and that for L, the value decreased in relation to 100% WF. This behavior was expected, since WGBF has a high fiber content, generating a firm dough with greater resistance to extension (elasticity), but without extensibility, easily breaking5.

Table 2. Alveographic properties of WF and of the blends with 30 and 45% of WGBF.

<table>
<thead>
<tr>
<th>Blends</th>
<th>P (mm)</th>
<th>L (mm)</th>
<th>W (x10^-4 J)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% WF</td>
<td>100.77±5.13b</td>
<td>61.00±2.65a</td>
<td>271.07±24.95a</td>
</tr>
<tr>
<td>30% WGBF</td>
<td>128.22±14.84a</td>
<td>24.33±3.21b</td>
<td>133.29±2.17b</td>
</tr>
<tr>
<td>45% WGBF</td>
<td>115.70±13.89c</td>
<td>17.77±1.34d</td>
<td>n.d.</td>
</tr>
</tbody>
</table>

The analysis of the blend with 45% WGBF could not be accomplished by having parameters that were not read by the equipment due to the strength of fibers in the sample.

Conclusions

With the results of the analyses it can be concluded that the evaluation of farinographic and alveographic properties proved to be important for predicting the behavior of blends, being interesting processing bread with the addition of 30 and 45% of FSG, because of its nutritional benefits.

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