Toasting as a tool to improve the functional properties of fababean protein concentrate

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Background
• Production of soy protein concentrate (SPC) includes wet fractionation and therefore a drying/heating step
• Fababean protein and starch can be separated with dry fractionation that lacks drying steps/heat treatment
• This results in different functional properties of the protein fraction, which causes them to be more suitable for many applications but less suitable for structuring processes/structured food products.

Objective
• Compare the functional properties of fababean protein concentrate and soy protein concentrate
• Determine if a dry heat treatment of dry separated fababean protein concentrate (FPC) alters the functional properties

Results

Table 1. Average peak temperature and enthalpy of protein denaturation of toasted and untoasted FPC. Values obtained using the TA Instruments software TRIOS. Toasting at 150°C shifted the peak to a lower temperature and reduced the enthalpy to a third of the value of untoasted FPC.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Tp / °C</th>
<th>ΔH/°C</th>
<th>ΔH/°g^-1</th>
<th>Tp/-/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPC000</td>
<td>93.18</td>
<td>0.2</td>
<td>0.92</td>
<td>0.05</td>
</tr>
<tr>
<td>FPC100</td>
<td>93.62</td>
<td>0.53</td>
<td>0.96</td>
<td>0.03</td>
</tr>
<tr>
<td>FPC150</td>
<td>88.8</td>
<td>0.55</td>
<td>0.32</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Table 2. Water holding capacity of the overall powder (A) and insoluble fraction (B) of toasted and untoasted FPC as well as commercial SPC. WHC of FPC powder toasted at 100°C did not show any significant difference from untoasted FPC powder. FPC powder toasted at 150°C showed a WHC between untoasted FPC and commercial SPC. The WHC of the insoluble fraction of FPC increased less after toasting at 150°C.

Conclusions
• Toasting at 150°C caused partial denaturation and aggregation of protein
• Solubility of FPC decreased after toasting
• Functional properties of FPC were modified towards SPC:
  • WHC increased
  • Initial complex modulus increased

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