The benefits of Australian wheat in Chinese white noodles and baozi (steamed buns)

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AEGIC Grains Research Scientist

An AEGIC and Chinese Academy of State Administration of Grain (ASAG) collaboration
ASAG: Prof Sun Hui
AEGIC: Dr Ken Quail and Barry Cox
The Australian Export Grains Innovation Centre (AEGIC)...

... seeks to understand and support the quality requirements of our valued customers and end-users by:

- Understanding the changing needs of end-users and;
- Providing novel solutions to meet these needs through:
  - Market insight
  - Innovation and
  - Applied technology
Outline

- Snapshot of Chinese wheat market
- Objective
- Methods
- Findings on flour blending study – white noodles & baozi (steamed buns)
- Australian-Chinese Wheat Flour Blending Workshop
Snapshot of Chinese wheat market

- China produces:
  - 125 - 130 million tonnes of wheat (5 year average)

- Wheat importation in China:
  - ~3 million tonnes (averaged 2011 - 15)
  - About 40% of the imported wheat is from Australia

Sources: FAOSTAT, ABS, Trade Map

Source of pictures: http://m.o2123.com/21-0-501609-1.html
Wheat flour usage in China

- Noodles: 30%
- Steamed buns/baozi: 30%
- Western style breads, cakes, dumpling skins etc.: 40%

Source: Quail et al, 2011, What the world wants from Australian wheat
Objective

- Build on the AEGIC and Chinese Academy of State Administration of Grain (ASAG) understanding of the performance of Chinese and Australian wheat flour and their blends in producing white noodles and Chinese northern style steamed buns with fillings (baozi) through a small scale study.
# Samples

Wheat from Eastern and Western Australia  
(Note: laboratory milled at 70% extraction rates)  
- AH, APW, ASW

<table>
<thead>
<tr>
<th>Product</th>
<th>Flour samples</th>
<th>Abbrev.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noodles</td>
<td>Chinese low extraction noodle flour</td>
<td>CN Noodle</td>
<td>~45% extraction, commercially milled, from Hebei</td>
</tr>
<tr>
<td></td>
<td>Chinese general purpose flour</td>
<td>CN General</td>
<td>~70% extraction, commercially milled, from Shandong</td>
</tr>
<tr>
<td>Baozi</td>
<td>Chinese baozi flour</td>
<td>CN Baozi</td>
<td>Low extraction, commercially milled flour</td>
</tr>
</tbody>
</table>
Wheat growing area in China

Samples grown at strong gluten wheat zone in reaches of Yellow, Huai, and Hai Rivers

Methods: Noodles and Baozi

Noodle formulation and processing schematic

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flour</td>
<td>100</td>
</tr>
<tr>
<td>Water</td>
<td>32</td>
</tr>
</tbody>
</table>

Dough mixing → Sheeting → Resting 1hr → Sheeting and cutting → Fresh noodles → Drying @ 42-43°C, 75% RH overnight → Gua mian (dry noodles)

Formulation and processing method of Chinese northern style baozi

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flour</td>
<td>100</td>
</tr>
<tr>
<td>Water</td>
<td>Vary*</td>
</tr>
<tr>
<td>Instant yeast</td>
<td>1</td>
</tr>
</tbody>
</table>

Dough mixing for 1.5min → Further dough kneading by hands → Dividing → Sheeting, insert filling and wrapping → Fermentation at 30°C, 85RH for 30min → Steaming for 20 min

*According to Farinograph water absorption
Results: noodles
Blending Chinese wheat with AH and APW improves whiteness/brightness of noodles

<table>
<thead>
<tr>
<th></th>
<th>0.5h Raw</th>
<th>24h Raw</th>
<th>Cooked</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN General</td>
<td>Minolta L* value (whiteness)</td>
<td>Minolta L* value (whiteness)</td>
<td>Minolta L* value (whiteness)</td>
</tr>
<tr>
<td>AH W (50:50)</td>
<td>85</td>
<td>78</td>
<td>78</td>
</tr>
<tr>
<td>AH E (50:50)</td>
<td>84</td>
<td>77</td>
<td>76</td>
</tr>
<tr>
<td>APW W (50:50)</td>
<td>84</td>
<td>76</td>
<td>76</td>
</tr>
<tr>
<td>APW E (50:50)</td>
<td>84</td>
<td>76</td>
<td>76</td>
</tr>
<tr>
<td>CN General</td>
<td>84</td>
<td>76</td>
<td>76</td>
</tr>
</tbody>
</table>
Blending of CN General with AH improves elasticity, surface smoothness and colour of cooked noodles.
The colour of cooked noodles made from AH and APW:
- better than that of CN General flour
- is comparable to that of CN Noodle flour
Dried noodles (Gua mian 挂面)

- Noodles made from APW and AH, laboratory milled at 70% extraction rates, have similar brightness or slightly lower brightness to those of CN Noodle flour, commercially milled at 45% extraction rates.
Blending of CN Noodle flour with APW improves elasticity & surface smoothness.
Australian-Chinese Wheat Flour Blending Workshop

- Date: 29.06.2016 (Wednesday)
- Location: ASAG, Beijing
- 5 x Chinese flour companies (combined daily wheat processing capacity of around 13,000 t)
  - Supplied flour samples for trial
  - 9 representatives (R&D, QC department, Chairman & Vice President)
Sensory taste testing of fresh noodles

<table>
<thead>
<tr>
<th>No</th>
<th>Sample</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>APW E</td>
<td>Lab milled at 70% ext.</td>
</tr>
<tr>
<td>2</td>
<td>CN Noodle</td>
<td>Commercially milled from wheat from Hebei @ ~45% ext.</td>
</tr>
<tr>
<td>3</td>
<td>CN Noodle:APW E (50:50)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CN General</td>
<td>Commercially milled from wheat from Shandong @ ~70% ext.</td>
</tr>
<tr>
<td>5</td>
<td>CN General:APW E (50:50)</td>
<td></td>
</tr>
</tbody>
</table>

- Noodle samples prepared for sensory taste tasting at the Workshop
Technical data of noodle samples

<table>
<thead>
<tr>
<th>Sample</th>
<th>Protein (%)</th>
<th>Moisture (%)</th>
<th>Ash (%)</th>
<th>Starch damage (%)</th>
<th>Wet Gluten (%)</th>
<th>Gluten Index (%)</th>
<th>Water absorption</th>
<th>Develop time (min)</th>
<th>Stability time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>APW E</td>
<td>10</td>
<td>14.1</td>
<td>0.43</td>
<td>6.9</td>
<td>21.8</td>
<td>97.2</td>
<td>60.4</td>
<td>4.4</td>
<td>9.5</td>
</tr>
<tr>
<td>CN Noodle</td>
<td>n/a</td>
<td>13.8</td>
<td>0.49</td>
<td>n/a</td>
<td>33.4</td>
<td>62</td>
<td>62</td>
<td>3.6</td>
<td>3.8</td>
</tr>
<tr>
<td>CN General</td>
<td>n/a</td>
<td>13.5</td>
<td>0.58</td>
<td>n/a</td>
<td>29.7</td>
<td>70</td>
<td>60.2</td>
<td>4</td>
<td>4.9</td>
</tr>
</tbody>
</table>

- **APW E**
  - Lower wet gluten content
  - Higher gluten index and stability time
Participants are getting noodle samples for sensory testing.

Noodle samples served on a plate for comparison.

Q&A and discussion sessions at the Workshop.
Question: Which one is the best in colour?
Answer: 3, (2/3), 2, 2, 1, (1/2), 3, (1/2/3)

Numbers in a same bracket indicates they were rated equally best

#1 – APW E
#2 – CN Noodle
#3 – APW E:CN Noodle (50:50)

- The best colour → CN Noodle – whitest due to its low extraction rate
- APW E → highly regarded for its creaminess, glossiness & translucency
- Colour is the most important characteristic considered by Chinese consumers as commented by the participants
Question: Which one is the best in overall sensory mouthfeel?
Answer: 1, 2, (1/2), 1, 1, (2/3), 1, 3

Numbers in a same bracket indicates they were rated equally best

1 – APW E
2 – CN Noodle
3 – APW E:CN Noodle (50:50)

- The best mouthfeel → APW E
  - has good surface smoothness & elasticity
- CN Noodle → good firmness (bite)
At the workshop:
Northern Chinese style Baozi (包子) making
## Samples

<table>
<thead>
<tr>
<th>No</th>
<th>Sample</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ASW W</td>
<td>Laboratory milled at 70% extraction rates</td>
</tr>
<tr>
<td>2</td>
<td>CN Baozi</td>
<td>Commercially milled at low extraction rates flour for baozi without additives</td>
</tr>
</tbody>
</table>

- Samples for baozi making at the Workshop.
Technical data of samples for baozi

<table>
<thead>
<tr>
<th>Sample</th>
<th>Protein (%)</th>
<th>Moisture (%)</th>
<th>Ash (%)</th>
<th>Starch damage (%)</th>
<th>Wet Gluten (%)</th>
<th>Gluten Index (%)</th>
<th>Water absorption (%)</th>
<th>Development time (min)</th>
<th>Stability time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASW W</td>
<td>7.5</td>
<td>13.5</td>
<td>0.4</td>
<td>5.9</td>
<td>18.4</td>
<td>98.6</td>
<td>57.3</td>
<td>2.1</td>
<td>9.2</td>
</tr>
<tr>
<td>Chinese Baozi</td>
<td>n/a</td>
<td>13.5</td>
<td>0.54</td>
<td>n/a</td>
<td>30</td>
<td>81.4</td>
<td>61.9</td>
<td>3</td>
<td>4.9</td>
</tr>
</tbody>
</table>

- ASW W has
  - lower wet gluten content
  - higher gluten index and stability time
Sensory evaluation of baozi

- Chinese Baozi flour
  - good whiteness & brightness desirable for Chinese northern style baozi.

- ASW W
  - even better brightness with extra appreciable creaminess and glossiness.
  - dough was a lot less sticky, better handling property.

- Both texture were rated highly, texture is less important than appearance.
Conclusions

• Blending of Australian Premium White (APW) and Australian Hard (AH) wheat with Chinese general purpose flour (CN General)
  • improves noodle colour – creaminess, whiteness and brightness & texture – elasticity & surface smoothness.

• APW can be blended with Chinese noodle flour (CN Noodle)
  • to improve noodle sensory texture properties - elasticity and surface smoothness.

• ASW
  • made baozi with desirable creaminess and glossiness.
Acknowledgements

• We thank Chinese flour manufacturers for providing flour samples and their participations at the Workshop, and Australian grain handling companies for providing samples (below listed companies are in alphabetical order)

<table>
<thead>
<tr>
<th>Companies in China</th>
<th>Companies in Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beijing Guchuan Food Co., Ltd.*</td>
<td>CBH</td>
</tr>
<tr>
<td>COFCO</td>
<td>Emerald Grain</td>
</tr>
<tr>
<td>Dachan Liangyou Food Co., Ltd.</td>
<td>GrainCorp</td>
</tr>
<tr>
<td>Hebei Jinshahe Group</td>
<td></td>
</tr>
<tr>
<td>Shan Dong LongFeng Flour Co., Ltd.</td>
<td></td>
</tr>
</tbody>
</table>

*Special thanks to Ms Ying ZHANG for processing baozi at the Workshop.

• Mr Sidi HUANG
• ASAG Cereal Chemistry & Grain Quality Group, special thanks to Ms Guiying ZHOU and Ms Liu CHANG
• AEGIC Grain Processing Lab (Perth and Sydney)
Notes:

- The scope of this study is limited to the samples accessible for this study.
- It is the best intention of the workshop to use samples most relevant to real life situation. Therefore, the different Australian wheat class samples from both east and west coast were sampled from major grain handling companies in Australia. While Chinese flour samples were sampled directly from the Chinese flour manufacturers who attended the workshop, and, the flour samples were known to be without additives.
- Due to the time constraints and limited resources, only selected samples were trialed and demonstrated at the workshop.
Thank you