Understanding grain quality preferences in SE Asian markets

Using choice modelling to understand our markets

Chris Carter
Roslyn Jettner, Larisa Cato, Ken Quail, Jordan Louviere

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Understanding grain quality preferences in SE Asian markets

Using choice modelling to understand our markets

Chris Carter
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AEGIC is an initiative of the Western Australian state government and the Grains Research and Development Corporation.
### What is functionality vs quality?

<table>
<thead>
<tr>
<th>Quality</th>
<th>Wheat/flour functionality attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract specifications</td>
<td>Protein</td>
</tr>
<tr>
<td>Price</td>
<td>Dough extensibility</td>
</tr>
<tr>
<td>Falling number</td>
<td>Noodle Colour</td>
</tr>
<tr>
<td>Moisture content</td>
<td>Ash content</td>
</tr>
<tr>
<td>Hectolitre weight</td>
<td>Dough strength</td>
</tr>
<tr>
<td></td>
<td>Loaf volume</td>
</tr>
</tbody>
</table>
QUALITY IN THE VALUE CHAIN

Wheat breeder

Wheat grower

Exporter

Flour Mill

Processors

Consumer
Aims:

To inform wheat breeders of the value attributed to quality traits by our major markets

To inform wheat varietal guidelines to meet future market requirements
SE ASIA – IMPORTANT MARKETS

Major markets for Australian Wheat 2012/13
Total $6.739 billion 21,218,000 tonne

$ = AUD

INDONESIA $1.39 billion 4,420,000 tonne
IRAN $424 million 1,292,000 tonne
IRAQ $580 million 1,770,000 tonne
MALAYSIA $270 million 854,000 tonne
PHILIPPINES $279 million 979,000 tonne
SOUTH KOREA $449 million 1,490,000 tonne
VIETNAM $442 million 1,287,000 tonne
JAPAN $388 million 1,173,000 tonne
CHINA $357 million 1,236,000 tonne
OTHER COUNTRIES $2.19 billion 6,717,000 tonne

TOP 10 EXPORT COUNTRIES
Five-year average (2009-2013 CY)
Quality & Functionality requirements of 3 wheat markets in SEA

- Developing: Indonesia
- Mature: Malaysia & Singapore
- Growth potential: Philippines

Bread

Noodles
Method: 3 Part Process

Executive interviews

Best Worst Scaling

Discrete Choice Experiments
Part 1 – Executive Interviews
Part 2 – Best Worst Scaling
Best/worst survey design

Spreadsheet based survey tool

<table>
<thead>
<tr>
<th></th>
<th>Procurement</th>
<th>Technical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Attributes</td>
<td>31</td>
<td>25</td>
</tr>
<tr>
<td>Sets</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>Attributes per set</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Economic Attributes (2)

Wheat Quality Attributes (7)

Flour Quality Attributes (12)

Wet noodle end-product Attributes (6)

or

Bread end-product attributes (5)

Technical support Attributes (3 or 4)
Example

Wheat selected for: Pandesal and Sandwich bread

Set 1 of 31

<table>
<thead>
<tr>
<th>Most Important</th>
<th>Least Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Dough stability time</td>
<td>□</td>
</tr>
<tr>
<td>□ Wheat ash</td>
<td>□</td>
</tr>
<tr>
<td>□ Quality inspection service and chemical/mycotoxin testing</td>
<td>□</td>
</tr>
<tr>
<td>□ Country of origin</td>
<td>□</td>
</tr>
<tr>
<td>□ Wet gluten content</td>
<td>□</td>
</tr>
<tr>
<td>□ Flour ash</td>
<td>□</td>
</tr>
</tbody>
</table>

Submit

Go to Set 1 - Next Most and Least Important

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Ranking: Factor scores

- High $R^2$ with the Ordinal Regression model $\sim 0.98$

![Graph showing factor scores vs OrdReg5 and OrdReg3](image_url)
Rankings of Attributes.

Preliminary Results

Malaysia: Bread: Technical

Loaf volume
Dough and fermentation tolerance
Water absorption
Dough strength
Protein content of wheat
Dough stability time
Dough development time
Wet gluten content
Milling yield
Uniformity of wheat shipment
Wheat falling number
Price
Dough extensibility
Test weight
Bread crumb softness
Crumb resilience
Screenings / unmillable material
Wheat grade
Quality inspection service and chemical/mycotoxin testing
Bread crumb colour
Availability of technical support and training
Flour ash
Availability of seasonal crop quality report
Moisture content of wheat
Availability of on-farm quality assurance program
Starch viscosity
Wheat ash
Flour colour - L*
Country of origin
Flour colour - b*
Grain colour (white vs red)
Stage 3 of Study
Discrete choice experiments
Experiment design

25 sets
3 Parcels in each set
6 attributes
5 levels for each attribute
2 countries completed
### Discrete Choice Experiments

#### Example

**Wheat selected for SANDWICH BREAD and PANDESAL**

### Set 1

<table>
<thead>
<tr>
<th>Wheat and Flour Characteristics</th>
<th>Parcel A</th>
<th>Parcel B</th>
<th>Parcel C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dough resistance to extension</td>
<td>800 BU</td>
<td>500 BU</td>
<td>400 BU</td>
</tr>
<tr>
<td>Water absorption</td>
<td>60%</td>
<td>62%</td>
<td>68%</td>
</tr>
<tr>
<td>Wet gluten</td>
<td>40%</td>
<td>31%</td>
<td>28%</td>
</tr>
<tr>
<td>Milling Yield</td>
<td>-2%</td>
<td>-1%</td>
<td>2%</td>
</tr>
<tr>
<td>Dough development time</td>
<td>4 min</td>
<td>13 min</td>
<td>16 min</td>
</tr>
<tr>
<td>Price (FOB $USD)</td>
<td>$273</td>
<td>$264</td>
<td>$237</td>
</tr>
</tbody>
</table>

**I would MOST prefer**
- Parcel A
- Parcel B
- Parcel C

**I would LEAST Prefer**
- Parcel A
- Parcel B
- Parcel C

Submit

Go to Set 2
What we’ve learned so far

Preliminary results
• Functionality traits ranked as high in all surveys
• Significant differences in purchaser and technical preferences
  – Potential for technical support and promotion of Australian grain quality
• Significant clustering of responses, not aligned to companies, little difference between countries

Process
• Good buy in to process
• Don’t do more than two surveys a day
Thankyou!

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