Creating a new market opportunity for whisky by-products: challenges and opportunities

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16th March 2016
IBD Asia Pacific Conference, Sydney.
Outline

• Global challenges.
• The challenge: aquaculture.
• The challenge: Scotch malt whisky.
• A circular bio-economy solution.
• Opportunities in the Asia-Pacific region.
GLOBAL CHALLENGES
Global food demand

- 2050 – 9.7 billion people.
- 2100 – 11.2 billion people.
- 70% more food than produced in 2005.

Source: GDJ from www.openClipart.org
Sustainability

• Food production today.
  – 30% of all land.
  – 70% of freshwater.
  – 20% of all energy production.

By NASA/Apollo 17 crew; taken by either Harrison Schmitt or Ron Evans [Public domain], via Wikimedia Commons
Circular bio-economy

Source: www.biovale.org
THE CHALLENGE: AQUACULTURE
Aquaculture growth

Source: EWOS
UK protein demand for aquafeed

Source: Marine Harvest 2014
Alternatives to fishmeal

- Novel protein sources
- Fish trimmings
- Animal by-products
- Vegetable, bean and nut meals
- Vegetable and bean meal concentrates
THE CHALLENGE: DISTILLING MALT WHISKY
The Scotch Whisky Industry

- £3.3 billion a year value
- >10,000 jobs in Scotland
- 115 distilleries
- Producing 225M Lpa malt whisky

Source: SingleMaltsDirect.com
Malt whisky production

Source: Scotch Whisky industry Review, 2014
Malt whisky production

Malting | Mashing | Fermentation | Distillation | Warehousing and Maturation

Source: IBD Asia Pacific Section (http://www.ibdasiapac.com.au/distilling/)
By-products

Inputs
- Milled malt
- Water
- Yeast

Mashing → Fermentation → Wash still → Spirit still → New make spirit

Outputs
- Draff
- Carbon dioxide
- Pot ale
- Spent lees
Current options for pot ale

- Feed applications
  - Pot ale syrup
  - Dark grains
- Conversion to fuel
- Waste treatment plants
A CIRCULAR BIO-ECONOMY SOLUTION
# Pot ale composition

<table>
<thead>
<tr>
<th>Component</th>
<th>Pot Ale</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>3 – 4</td>
</tr>
<tr>
<td>Dry Matter (%)</td>
<td>4 – 5</td>
</tr>
<tr>
<td>Crude Protein (%DM)</td>
<td>30 – 40</td>
</tr>
<tr>
<td>Carbohydrate (soluble, %DM)</td>
<td>30 – 50</td>
</tr>
<tr>
<td>Polyphenol (soluble, %DM)</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Total P (%DM)</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Phytate (%DM)</td>
<td>1</td>
</tr>
<tr>
<td>Ca (% DM)</td>
<td>0.1 – 0.2</td>
</tr>
<tr>
<td>Cu (mg/kg DM)</td>
<td>10 – 200</td>
</tr>
<tr>
<td>COD range</td>
<td>38 - 62</td>
</tr>
<tr>
<td>BOD range</td>
<td>27 -31</td>
</tr>
</tbody>
</table>
Horizon Proteins process
Separation process features

• Low cost
• Low energy
• Selective
• Food grade material
• Mild conditions
• Adaptable
• Scalable

Picture courtesy of Horizon Proteins
Process testing

- Summer 2015
- Glendullan distillery in Speyside (Diageo)
- Integrated into existing distillery architecture
- Protein rich liquid product

Source: Theorb at en.wikipedia [Public domain], via Wikimedia Commons
Success!

Picture courtesy of Horizon Proteins
Final product
Project outcomes

• Process is scalable
• No apparent process issues
• Compatible with distillery plant
• Able to process output from a small to medium distillery
OPPORTUNITIES IN THE ASIA-PACIFIC REGION
Australia: Tasmania

- Australia, 50 distilleries.
- Whisky industry in growth.
- Global recognition for quality.
- Aware of the need to be sustainable.
- Majority of Australian salmonid production.
Japan

• 9 whisky distilleries
• 89 million litres in 2013
• One of the world’s largest whisky producers
• Significant industry based around marine protein sources
Summary

- Aquaculture is needed to meet global protein demand.
- Farming of salmon in growth in Scotland and around the world.
- Pot ale potentially underutilised and a good source of protein.
- Potential protein for aquafeed.
- Process is scalable.
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ANY QUESTIONS?

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