HARNESSING INDUSTRIAL BIOTECHNOLOGY TO MEET AQUACULTURE FEED NEEDS

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Aquaculture feeds: a multibillion dollar industry

≥39 MMT/yr

≥$30B/yr

Source: thiswallpaper.com
Source: resilience.org
Source: pneutroilsystems.com.com

http://www.dfo-mpo.gc.ca/aquaculture/photos_e.htm
Market segments

Source: Tacon & Metian, 2015
Market areas

Sources: Alltech, 2016; Amcharts.com
Market trends

TerraVia and Bunge Launch AlgaPrime DHA for the Specialty Feed Ingredients Market

Cargill Buys Norwegian Fish-Feed Producer EWOS for $1.5 billion

DSM, Evonik form omega-3 joint venture

Partners will build $200 million plant in U.S. to meet demand in fish and pet foods

Investors back KnipBio's alternative fish feed protein

Mitsubishi commits to Norway's PM

Heliae and Syndel announce partnership to produce Nymega™ DHA Aquaculture Feed Ingredient

Cooke Aquaculture buys U.S. salmon producer Icicle Seafoods

Aquaculture Feed Innovator Calysta Mitsui ComPLEtes $40m Series D With T..
Industrial biotechnologies and aquaculture feeds

➢ Since 1940s: brewer’s yeast;

➢ Present: yeast, bacteria and microalgae;

➢ Future opportunities:
  o Growing demands for proteins and amino acids, DHA and EPA, exogenous enzymes;
  o Functional ingredients
Nutritious;
Affordable;
Available;
Sustainable;
Functional:
- Enhance feed efficiency;
- Address specific market demands;
- Contribute to pellet quality;
- Etc.
Ingredient development and commercialization

- Market price estimation
- Nutritional value assessment
- Regulatory
- Marketing

Two years ≥ $150K
Aquaculture feed market = growing opportunity for industrial biotechnologies;

From ideation to market = *time* and $ 

Future needs:

- Alternative proteins
- Specialty feed ingredients
  - e.g. DHA & EPA, immunostimulants, antioxidants
THANK YOU!

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## Market size

<table>
<thead>
<tr>
<th>Per year</th>
<th>World</th>
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<tbody>
<tr>
<td>Volume (MMT)</td>
<td>≥35</td>
</tr>
<tr>
<td>Value (Billion $)</td>
<td>≥30</td>
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<tr>
<td>Fishmeal (MMT)</td>
<td>~3.3</td>
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<tr>
<td>Value (Billion $)</td>
<td>~4.5</td>
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<tr>
<td>Fish oil (MMT)</td>
<td>~0.7</td>
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<tr>
<td>Value (Billion $)</td>
<td>~1.0</td>
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