Celebrating 20 years of the Global Aquaculture Alliance

2017 DUBLIN, IRELAND
Some guys just get better with age

Forum will discuss new organisation

DURING the Seattle show, the World Aquaculture Society is planning a forum to discuss the development of an independent aquaculture industry organisation.

“As the industry continues to grow worldwide,” says George Chamberlain, a former president of WAS, “it is being confronted with an increasing number of international issues of a political or business nature, which are beyond the educational and scientific mission of our Society.

“Many of these issues transcend national borders and might best be addressed through a coordinated international effort.”

This indicates a need for an organisation, independent of WAS, to address the global needs of the industry.

Representatives of many leading aquaculture organisations around the world are being invited to participate in this forum.

Anyone interested in attending should contact George Chamberlain at World Aquaculture '97. Fax: +1 (206) 483 6319.

George Chamberlain, Wide international issues.
Wonderful Country,
Wonderful City...Thank You!
Just two Good Irish Boys and Their Friend from Seattle

“Don’t worry, we only drink water.”
Last year...

2016 Guangzhou China

Healthy Fish | Healthy People | Healthy Planet
And this year...

The Next 20:

What will we make of our next 20 years?

What is our “fire in the head”—our vision—for The Next 20?

Wally Stevens
Global Aquaculture Alliance
‘Great Expectations’ from Aquaculture

- Predictable supply
- Predictable cost of products
- Respect for the environment
- Respect for workers
- Proper care of animals
- Safe products, safe food
Collective Effort: It Takes All of Us

Fisheries
- Fishery
- Vessel
- Port
- Processing Plant
- Fishmeal Factory
- Feed Mill
- Marketplace Operators

Aquaculture
- Hatchery
- Farm
- Processing Plant

GOAL Global Aquaculture Alliance

The Next 20
Aquaculture production is highly resource efficient

<table>
<thead>
<tr>
<th></th>
<th>Protein retention</th>
<th>Energy Retention</th>
<th>Edible Yield</th>
<th>Feed Conversion Ratio (FCR)</th>
<th>Edible Meat pr 100 kg fed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21%</td>
<td>10%</td>
<td>46%</td>
<td>2.2</td>
<td>21 kg</td>
</tr>
<tr>
<td></td>
<td>31%</td>
<td>23%</td>
<td>68%</td>
<td>1.1</td>
<td><strong>61 kg</strong></td>
</tr>
<tr>
<td></td>
<td>18%</td>
<td>14%</td>
<td>52%</td>
<td>3.0</td>
<td>17 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>41%</td>
<td>4-10</td>
<td>4-10 kg</td>
</tr>
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</table>
So, we are in the right business!

-- Dr. Lyons
Where are the aquaculture regions?

88.8% in Asia/China
Problems     Opportunities
Challenges → Opportunities

- Pollution
- Efficiency
- Disease
- Safety
- Transparency
State of Shrimp Farming
(See George’s interview slides)

• Repeated themes: Environmental deterioration, increasing bacterial and parasitic diseases in major production areas of China and Southeast Asia – EMS, WFD and EHP.

• Shrimp farming growth slow overall: Continued expansion in Ecuador and India, but tempered by contraction in China.

• Disruptive technologies necessary to overcome current bottlenecks.
State of Shrimp Farming (cont.)

- Must breed shrimp to be more resilient to challenging environments.

- Intensifying production in more controlled environments.

- New reality in China: “The era of easy shrimp farming is gone forever.”

- Collaborative approach helps. *If we want to go far, we must go together.*
Shrimp Producer Survey: Issues & Challenges

Asia
1. Disease
2. Seed stock quality and availability
3. Access to disease-free broodstock

Latin America
1. Production costs: feed/fishmeal
2. Disease
3. Market prices
Global Shrimp Production Expectations

- 2016-17: + 2%
- 2017-18: + 5%
- 2016-19: + 4.8% per year

2018 Expectations:
- Generally expect higher feed prices
- Stronger shrimp markets (slightly more positive than last year)
- Better global economic conditions (also slightly more positive)
Finfish: Did They Double in a Decade?  2007-2017

Catfishes  + 235%
Tilapia     + 149%
Barramundi + 147%
Turbot      + 94%
Carp        + 74%
Bluefin Tuna + 69%
Atlantic Salmon + 62%
Small Trout + 55%
Cobia       + 51%
Pangasius (Vietnam) + 46%
Global Economic Growth Forecast: What does this mean for aquaculture?

<table>
<thead>
<tr>
<th>(IMF JULY 17)</th>
<th>2016</th>
<th>2017f</th>
<th>2018f</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Output</td>
<td>+3.2%</td>
<td>+3.5%</td>
<td>+3.6%</td>
</tr>
<tr>
<td>Advanced</td>
<td>+1.7%</td>
<td>+2.0%</td>
<td>+1.9%</td>
</tr>
<tr>
<td>US</td>
<td>+1.6%</td>
<td>+2.1%</td>
<td>+2.1%</td>
</tr>
<tr>
<td>Euro Zone</td>
<td>+1.8%</td>
<td>+1.9%</td>
<td>+1.7%</td>
</tr>
<tr>
<td>Germany</td>
<td>+1.8%</td>
<td>+1.8%</td>
<td>+1.6%</td>
</tr>
<tr>
<td>France</td>
<td>+1.2%</td>
<td>+1.5%</td>
<td>+1.7%</td>
</tr>
<tr>
<td>UK</td>
<td>+1.8%</td>
<td>+1.7%</td>
<td>+1.5%</td>
</tr>
<tr>
<td>Japan</td>
<td>+1.0%</td>
<td>+1.3%</td>
<td>+0.6%</td>
</tr>
<tr>
<td>Emerging</td>
<td>+4.3%</td>
<td>+4.6%</td>
<td>+4.8%</td>
</tr>
<tr>
<td>China</td>
<td>+6.7%</td>
<td>+6.7%</td>
<td>+6.4%</td>
</tr>
<tr>
<td>India</td>
<td>+7.1%</td>
<td>+7.2%</td>
<td>+7.7%</td>
</tr>
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And the Effect of Projected Population Growth?

<table>
<thead>
<tr>
<th>Region</th>
<th>2015</th>
<th>2030</th>
<th>2050</th>
<th>% 2015-2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>7,349</td>
<td>8,501</td>
<td>9,725</td>
<td>+32.3%</td>
</tr>
<tr>
<td>Africa</td>
<td>1,186</td>
<td>1,679</td>
<td>2,478</td>
<td>+109%</td>
</tr>
<tr>
<td>Asia</td>
<td>4,393</td>
<td>4,923</td>
<td>5,267</td>
<td>+19.9%</td>
</tr>
<tr>
<td>Europe</td>
<td>738</td>
<td>734</td>
<td>707</td>
<td>-4.2%</td>
</tr>
<tr>
<td>Latin Am. &amp; Caribbean</td>
<td>634</td>
<td>721</td>
<td>784</td>
<td>+23.7%</td>
</tr>
<tr>
<td>North America</td>
<td>358</td>
<td>396</td>
<td>433</td>
<td>+20.9%</td>
</tr>
<tr>
<td>Oceania</td>
<td>39</td>
<td>47</td>
<td>57</td>
<td>+46.2%</td>
</tr>
</tbody>
</table>
Global Food Production: Our chance to shine

- Population projections to 2050 → 60% increase in agricultural consumption
- Challenges: Feed the world and nurture the planet
- Sustainability the big theme
- Weather certain to disrupt production
- Food security will become more important
If farmed fish have a much better FCR then terrestrial animals, why are animal proteins cheaper per kilogram of meat?

A number of reasons account for the price difference

1. Scale
2. Maturity
3. Logistics / distance to market
4. S/D balance
5. Feed price is high
6. High mortality / biological cost
Due to the scarcity of fishmeal and fish oil, alternatives have attracted attention and investors.

- Key alternative source so far
- Logistics issues
- No growth in supply long term?

- Lower protein content
- Anti-nutritional factors
- Will not work for all species

- Lack minerals, amino acid profile
- Also limited in supply

- Expensive?
- Lack minerals, amino acid profile

Future alternatives:
- Krill and mesopelagicus
- Marine worms
- Algae
- Yeast-based ingredients
- Bacterial proteins
- Insect-based feeds
- Guar protein
- Farmed fish
- GM canola

Vegetable meal concentrates

Trimmings

Vegetable and nut meals

PAP & Animal by-products
Aquaculture is open to the aquatic environment......
and most aquaculture is performed by smallholders

Typical Shrimp farming business model in Asia

- Vertical integrators: Capital-efficient model, suited to Asia and good for rapid growth
- But farming remains out of the vertical integration, very fragmented and difficult to control
These and other features means biosecurity is an acute issue in aquaculture

- Farming in open environment
- Small holders
- Volumes growing rapidly mostly combined with increasing farming density
- Over 90% is in a tropical (high biodiversity) climate
- Mostly a developing country industry (grey sector / lack of legislation)
- Aquatic animals are recently domesticated— we do yet know what we lost while breeding for growth

High likelihood of disease / biosecurity issues
Due to technology and growth investor interest towards aquaculture is improving

**Venture capital** – attracted by new technology solutions in aquaculture. Some driven by the CSR qualities of aquaculture

**Private equity** moving from a focus on seafood processing to a focus on aquaculture value chain technology. Increasingly understand disease risk and cyclicality of aquaculture better

**Family & sovereign wealth funds:** attracted by long term growth drivers of aquaculture, modernisation and technological changes

**Listed equity investors:** primarily attracted by stellar share performance of listed salmon companies but increasingly interested in the rest of the industry

(Source: Rabobank, 2017)
As we observe the 20th anniversary of the Global Aquaculture Alliance, we have much to celebrate.
GSSI Recognized Schemes

- Certified Responsible Fisheries
- Alaska Seafood
- Marine Stewardship Council
- Iceland Responsible Fisheries
- Best Aquaculture Practices Certified
But we cannot rest...

Q10 Are you familiar with this logo?

<table>
<thead>
<tr>
<th>ANSWER CHOICES</th>
<th>RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>58.02%</td>
</tr>
<tr>
<td>No</td>
<td>41.98%</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
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©Dr. James E. Griffin on behalf of G.A.A.
...because open-ended responses showed no awareness of its relation to farmed seafood.
Foodservice Survey Observations from Dr. Griffin

1. Food safety outweighs sustainability in priority.
2. Chefs associate “sustainability” with environmental and ecological responsibility, and traceability.
3. Sustainability deemed “extremely important” by 2/3 of chefs.
4. Impact of eco-labelling on purchasing is mixed. MSC is more widely recognized than BAP. (But few know what they mean.)
5. Chefs indicate they frequently check seafood’s sustainability.
6. Only 1/3 of chefs view farmed seafood positively.
7. Over 80% of chefs check the country of origin of frozen seafood – with strong preference for sources closer to home.
“It takes 20 years to build a reputation and five minutes to ruin it. If you think about that, you’ll do things differently.”

– Warren Buffet
**Our ‘Great Expectations’ for The Next 20?**

- Predictable supply
- Predictable cost of products
- Respect for the environment
- Respect for workers
- Proper care of animals
- Safe products, safe food
If you want to go fast, go alone.
If you want to go far, go together.  

African proverb
Safe travels and see you next year...location TBD!