Thank you to our gracious hosts here in India!
Some of us really got into the spirit of things.
BIG 3 Winners…Most Active on the App

1. Jorge Sanabria (Pescanova) – 1,165 points
2. Senthil Kumar (Society of Aquaculture Professionals) – 219 points
3. Vijayanand Dhanakoti (Salem Microbes PVT LTD) – 174 points
4. Travis Larkin (Seafood Exchange) – 10 points
Current Scenario

- Export Trade $7 Billion or ¥49.59 Billion
- Introducing Vannamal Shrimp to India
- Running Global Standard “Aquatic Quarantine Facility (AQF)”
- 3rd Largest Fish Producer
- 2nd Largest Aquaculture Producer
- Largest Supplier of Shrimp to USA & Japan
- Enrolled about 70k Farms with Geo-Tagging
- 4th Largest Exporter of Seafood
Keeping Fish in Our Future

Farmed seafood that's safe, sustainable, and ethically sourced

Learn More About Us
Our Global Impact

Improving production in 34 countries

Responsible seafood production is a global effort to keep fish in our future. BAP certification is transforming the farmed seafood industry in 34 countries.

Learn More
300,000+ jobs at certified facilities

Responsible aquaculture provides jobs to support communities and ensures that workers are paid fairly and treated well.

Meet a BAP Producer
21 billion meals with BAP-certified seafood

BAP helps keep fish in our future, delivering a healthy protein to billions of people worldwide. Responsible farming protects wild fisheries from being over-exploited so that seafood can be served for years to come.

Where to Find
Fabrice DeClerk: Seeking a healthy diet from a sustainable food system—the scale of the challenge

- 2 billion people lack key micronutrients like iron and vitamin A
- 155 million children are stunted
- 52 million children are wasted
- 2 billion adults are overweight or obese
- 41 million children are overweight
- 88% of countries face a serious burden of either two or three forms of malnutrition

And the world is off track to meet all global nutrition targets
## Target 1 – Healthy Diets

2500 kcal/day

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Macronutrient Intake</th>
<th>Caloric Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole grains</td>
<td>232</td>
<td>811</td>
</tr>
<tr>
<td>Rice, wheat, corn and other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tubers or starchy vegetables</td>
<td>50 (0–100)</td>
<td>39</td>
</tr>
<tr>
<td>Potatoes and cassava</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td>300 (200–600)</td>
<td>78</td>
</tr>
<tr>
<td>All vegetables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td>200 (100–300)</td>
<td>126</td>
</tr>
<tr>
<td>All fruits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy foods</td>
<td>250 (0–500)</td>
<td>153</td>
</tr>
<tr>
<td>Whole milk or equivalents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein sources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef, lamb and pork</td>
<td>14 (0–28)</td>
<td>30</td>
</tr>
<tr>
<td>Chicken and other poultry</td>
<td>29 (0–58)</td>
<td>62</td>
</tr>
<tr>
<td>Eggs</td>
<td>13 (0–25)</td>
<td>19</td>
</tr>
<tr>
<td>Fish</td>
<td>28 (0–100)</td>
<td>40</td>
</tr>
<tr>
<td>Legumes</td>
<td>75 (0–100)</td>
<td>284</td>
</tr>
<tr>
<td>Nuts</td>
<td>50 (0–75)</td>
<td>291</td>
</tr>
<tr>
<td>Added fats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsaturated oils</td>
<td>40 (20–80)</td>
<td>354</td>
</tr>
<tr>
<td>Saturated oils</td>
<td>11.8 (0–11.8)</td>
<td>96</td>
</tr>
<tr>
<td>Added sugars</td>
<td>31 (0–31)</td>
<td>120</td>
</tr>
<tr>
<td>All sugars</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What risk factors drive the most death and disability combined?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Malnutrition</td>
<td>1</td>
<td>1</td>
<td>-35.3%</td>
</tr>
<tr>
<td>Air pollution</td>
<td>2</td>
<td>2</td>
<td>34.9%</td>
</tr>
<tr>
<td>WaSH</td>
<td>3</td>
<td>3</td>
<td>-2.7%</td>
</tr>
<tr>
<td>Dietary risks</td>
<td>4</td>
<td>4</td>
<td>40.7%</td>
</tr>
<tr>
<td>Tobacco</td>
<td>5</td>
<td>5</td>
<td>12.9%</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>6</td>
<td>6</td>
<td>39.7%</td>
</tr>
<tr>
<td>High fasting plasma glucose</td>
<td>7</td>
<td>7</td>
<td>-33.8%</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>8</td>
<td>8</td>
<td>18.9%</td>
</tr>
<tr>
<td>High LDL</td>
<td>9</td>
<td>9</td>
<td>101.6%</td>
</tr>
<tr>
<td>Occupational risks</td>
<td>10</td>
<td>10</td>
<td>44.7%</td>
</tr>
<tr>
<td>High body-mass index</td>
<td>11</td>
<td>11</td>
<td>4.9%</td>
</tr>
</tbody>
</table>

Contributing to DALYs in 2017 and percent change, 2007-2017, all ages, number
Impacts vary by crop, practices, location, and environmental criteria.
Shrimp Aquaculture Production (2000-2021)

Southeast Asia includes Thailand, Vietnam, Indonesia, Bangladesh, Malaysia, Philippines, Myanmar, and Taiwan.
Species included are L. vannamei, P. monodon and Other. M. rosenbergii is excluded.
Trends in U.S. Shrimp Import Prices

Real Prices

Real prices increased sharply in 2013
Source: USDC/NMFS (2019)
Top Issues and Challenges in Shrimp Aquaculture – GOAL 2019 Survey

Asia vs. Latin America

- Diseases
- Production costs - Feed/Fishmeal
- International market prices
- International trade barriers
- Production costs - Fuel
- Access to disease-free broodstock
- Seed stock quality & availability
- Production costs - Others
- Access to Credit
- Environmental management
- Banned chemicals / antibiotic use
- Feed quality and availability
- Market coordination
- Product quality control
- Infrastructure
- Conflicts with other users
- Public Relations Management

Not Important | Moderately Important | Extremely Important

- Latin America
- Asia
Shrimp – Jim’s Key Conclusions

Top 4 Challenges to Growth:

**Asia:**
- Diseases (2018 – same)
- Costs – Feed (2018 - Antibiotic Use)
- Access to Disease-Free Broodstock (2018 - International Prices)
- Trade Barriers (2018- Costs-Feed)

**Americas:**
- International Market Prices (2018 - same)
- Costs-Feed (2018 - same)
- Costs-Fuel (2018 - Disease)
- Trade Barriers (2018 - Access to Credit)
Real Shrimp Prices:
Lowest in over 30 years

Global Shrimp Production Expectations:
2018-19: +1%
2018-2021: +3.5% per year
2021: expected to be 11% above 2018

The Global Market should be able to absorb these modest increases without further price declines...but there are disease uncertainties, a serious trade war, and global economic expectations—especially for China—that are difficult to assess.
Aquaculture Production of Fish Species and 10-year growth rate
FAO data 1990-2017

Source: FAO
Did they double in a decade?
Percentage growth, 2009-2019

- Marine: 73.3%
- Diadromous: 49.9%
- Freshwater ex. Carp: 85.7%
- Freshwater: 52.5%
- TOTAL EX. CARP: 74.7%
- TOTAL: 52.5%
What’s Reshaping the Global Seafood Trade?

- GORJAN NIKOLIK, RABOBANK
Seafood, the most traded protein globally
Salmonid trade in 2012

Source: UN Comtrade, Rabobank, 2019
Note*: Russia exports are inclusive of Belarus

- **Norway → USA (#7)**
  - 16,354 tonnes
  - $147.7 Million

- **Canada → USA (#4)**
  - 96,681 tonnes
  - $584.8 Million

- **Norway → EU (#1)**
  - 656,861 tonnes
  - $3,290.2 Million

- **Chile → USA (#5)**
  - 93,160 tonnes
  - $675.4 Million

- **Chile → Russia* (#6)**
  - 22,446 tonnes
  - $97.0 Million

- **Norway → Russia* (#3)**
  - 171,924 tonnes
  - $815.5 Million

- **Chile → Japan (#2)**
  - 194,143 tonnes
  - $1,134.3 Million

- **Chile → USA**
  - 194,143 tonnes
  - $1,134.3 Million
Salmon trade in 2018 shows relatively few changes so far, indicating the sector is maturing.

Source: UN Comtrade, Rabobank, 2019

Note*: Russia exports are inclusive of Belarus

<table>
<thead>
<tr>
<th>Origin</th>
<th>Destination</th>
<th>Tonnes</th>
<th>Value (Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>USA</td>
<td>153,229</td>
<td>$1,592.2</td>
</tr>
<tr>
<td>Canada</td>
<td>USA</td>
<td>89,198</td>
<td>$794.4</td>
</tr>
<tr>
<td>Norway</td>
<td>USA</td>
<td>53,772</td>
<td>$606.2</td>
</tr>
<tr>
<td>Chile</td>
<td>Russia*</td>
<td>63,397</td>
<td>$447.0</td>
</tr>
<tr>
<td>Norway</td>
<td>Russia*</td>
<td>13,601</td>
<td>$99.5</td>
</tr>
<tr>
<td>Norway</td>
<td>EU</td>
<td>803,267</td>
<td>$6,147.3</td>
</tr>
<tr>
<td>Norway</td>
<td>USA</td>
<td>53,772</td>
<td>$606.2</td>
</tr>
<tr>
<td>Norway</td>
<td>Japan</td>
<td>142,247</td>
<td>$1,071.4</td>
</tr>
<tr>
<td>Norway</td>
<td>Russia*</td>
<td>13,601</td>
<td>$99.5</td>
</tr>
</tbody>
</table>
Shrimp trade in 2012, pre-peak EMS

Source: UN Comtrade, Rabobank, 2019
Note*: It includes exports to China and Vietnam

- **Thailand → USA (#1)**
  - 129,455 tonnes
  - $1,149.7 Million

- **Ecuador → EU (#3)**
  - 86,245 tonnes
  - $492.7 Million

- **Ecuador → China* (#6)**
  - 24,322 tonnes
  - $150.6 Million

- **India → EU (#5)**
  - 70,495 tonnes
  - $445.8 Million

- **India → USA (#2)**
  - 105,563 tonnes
  - $600.2 Million

- **Indonesia → USA (#4)**
  - 72,880 tonnes
  - $595.5 Million
Shrimp trade in 2018: Major new trade flows emerge originating from Ecuador and India...This is a competitive sector

2018

Source: UN Comtrade, Rabobank, 2019
Note*: It includes exports to China and Vietnam

Ecuador → EU (#5)
103,294 tonnes $729.5 Million

Ecuador → China*(#1)
299,513 tonnes $1,797.8 Million

India → EU (#6)
75,361 tonnes $543.3 million

India → China (#3)
179,914 $1,095.0 tonnes million

Indonesia → USA (#4)
130,042 tonnes $1,173.2 Million

Thailand → USA (#7)
50,107 tonnes $556.0 Million

India → USA (#2)
248,160 tonnes $2,182.7 million

India à USA (#2)
248,160 tonnes $2,182.7 million

Ecuador à China* (#1)
299,513 tonnes $1,797.8 Million

Ecuador à EU (#5)
103,294 tonnes $729.5 Million

Source: UN Comtrade, Rabobank, 2019
Note*: It includes exports to China and Vietnam
Chinese Shrimp Imports

Official Trade Channels

Sources: World Integrated Trade Solution (2019); International Trade Center (2019); Chinese Customs (2019).
* Estimate.
Based on US shrimp imports, a clear picture emerges of India substituting Thailand and driving growth

*US shrimp imports in volume (left axis) and value (right axis)*

Source: UN Comtrade, Rabobank, 2019
Consequently India, once reliant on the EU and Japan, is now fully focused on US and China.

Source: UN Comtrade, Rabobank, 2019
Rising shrimp volumes and dropping values?...

Data suggest it’s time to focus more on *marketing* than on *production*. 
Shrimp Disease Updates from Loc Tran

Major challenges:
EMS/AHPND, WSSV, EHP, White Feces Disease, SHIV?
Antibiotics residue
Loc’s take-home messages

- **Antibiotics-free** shrimp farming is doable throughout the culture cycle
- **Functional diets, prophylaxis and fermented feed** have pretty good potentials in disease management
- Shrimp farming will be more science-based, controlled, sustainable, more predictable and more **cost effective**.
Necessity is the Mother of Invention
Shrimp Farming has evolved over time

Generation 1 (G1)
No aeration, 500-3 tons/ha
Large ponds; 5-30Ha

Generation 2 (G2)
Aeration, feed
3-12 tons/ha
1-2 Ha

Generation 3 (G3)
Viral biosecurity,
Domesticated shrimp,
10-20 tons/ha
0.5-1 Ha

Generation 4 (G4)
Toilets,
Recirculation,
More aeration,
Auto-feeder
15-40 tons/ha
0.2-0.5 Ha

Generation 5 (G5)
Total recirculation,
total waste capture
More control on environment
30-60 tons/ha
0.2-0.5 Ha
CONTROL IS KEY TO PRODUCING MORE FROM LESS:

<table>
<thead>
<tr>
<th></th>
<th>1995 (Wild <em>P. monodon</em>)</th>
<th>2017 Generation 4</th>
<th>2025 Generation 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield (tons/hectare/year)</td>
<td>4</td>
<td>35</td>
<td>200</td>
</tr>
<tr>
<td>Days of culture (30 grams)</td>
<td>135</td>
<td>100</td>
<td>70</td>
</tr>
<tr>
<td>FCR</td>
<td>2.3</td>
<td>1.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Protein retention efficiency</td>
<td>15</td>
<td>28</td>
<td>35</td>
</tr>
<tr>
<td>Fish in: shrimp out</td>
<td>3.2</td>
<td>0.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Fishmeal (% fishery by product) (CPF)</td>
<td>0</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Water exchange: m3/ton</td>
<td>20,000</td>
<td>3,600</td>
<td>0-200</td>
</tr>
<tr>
<td>Energy (kwh/ton)</td>
<td>3,400</td>
<td>2,750</td>
<td>2,400</td>
</tr>
</tbody>
</table>
Generation I: 1,750,000 ha

Generation II: 1,000,000 ha

Generation III: 450,000 ha

Generation IV: 320,000 ha

Generation V: 35,000 Ha Or 350 km²

Area to produce the World’s Shrimp 10 years forward (5.0 million tons)

Today 700-800,000 Hectares of Ponds producing the 3.8 million tons of shrimp; 5 tons/ha/year average
Donal Maguire taught us that CLAMS stands for *Coordinated Local Aquaculture Management System*

CLAMS eats Elephants!
Randy Brummett of the World Bank enlightened us on the challenges and opportunities in India...

India’s vast blue assets:

- 2.47 million ha of fish ponds;
- 7.8 million ha Floodplains/lakes;
- 9,058 (3.52 million ha) reservoirs;
- 1.24 million ha brackishwater;
- 388,957 km rivers;
- 5,160 glaciers;
- 7516 km coast line
...and Syed Huq shared the efforts to further Black Tiger ("Bagda") growth in Bangladesh
Ramanan Laxminarayan shared some insightful details on the current state of antibiotics

Two-thirds of the tonnage of antibiotics sold worldwide are used in agriculture and aquaculture.
Insights from Aditya Dash on aquaculture in India

• **Capital needed:** Crop insurance could help facilitate lending to the industry.

• **“Aquapreneurs” needed:** Like the former investment bankers turned shrimp farmers.
Aquaculture Innovation Award Winner: Ace Aquatech

Awarded for invention of “Humane Stunner Universal”
How in-water electric stunning works

Fish are pumped into the stunning pipeline

Electrodes coating the inside of the pipe electrify the water

Fish exit to a bleeding table or ice
We were reminded of our responsibility to everyone in our communities.
In all we do, “WE IS GREATER THAN ME”
And now, a final word from our fearless leader

Andrew Mallison
CEO
GAA
Prepare for certification
Training and Improvement
Best practice
Exceed standards
Education
Our Challenge
In 2020, Sam’s Club will:

• Undertake a pilot of a blockchain based traceability system. If successful, Sam’s Club will apply this technology to its wild and farmed seafood supply chain.

• Work with the Best Aquaculture Practice’s scheme on enhanced social audits in their farmed shrimp supply chain.

• Work with Global Seafood Assurance’s Responsible Fishing Vessel Scheme and Seafood Processing Standard in their wild seafood supply chain.
A Big Thank You!

And see you in Tokyo for GOAL 2020!