Food Safety and the Aquaculture Supply Chain in Canada
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Aquaculture Supply Chain – Canada

1. Aquaculture in Canada
   • Markets
   • Types of farming
2. Shellfish food safety
3. Finfish food safety
4. Aquaculture food safety – proving it!
5. Certification and standards
6. Summary and conclusions
Based on current consumption levels (15-16 kg per capita) there is expected to be a gap of 30 MMt by 2030 - the opportunity for aquaculture is good, but there are challenges.
Aquaculture Is the Fastest Growing Food Production Activity in the World (UN FAO)
In 2010, 50%+ of consumed seafood is farmed

25% fed, non-extractive species
75%+ non-fed, extractive species
Feed conversion for fish, poultry and swine - Less carbon output for fish production

<table>
<thead>
<tr>
<th>Species group</th>
<th>feed (energy) conversion ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. salmonids &amp; marine fish</td>
<td>1.0-1.3</td>
</tr>
<tr>
<td>2. shrimp</td>
<td>1.5-2.5</td>
</tr>
<tr>
<td>3. carp</td>
<td>2.0-3.0</td>
</tr>
<tr>
<td>4. poultry</td>
<td>1.9-2.2</td>
</tr>
<tr>
<td>5. swine</td>
<td>3.2-3.8</td>
</tr>
</tbody>
</table>

6. Ronald W. Hardy, Director, Hagerman Fish Culture Experiment Station, University of Idaho
The “Green” imperative

Carbon Footprint of Foods - kg CO2 / kg flesh

- Beef
- Poultry
- Pork
- Farmed Salmon
- Oyster
- Mussel
- Dairy
- Capture Fishery

Couturier 2009
Canadian Production Figures

- Canada produced ca. 150,000 tonnes in 2008 (10,000 t in 1988)
- Employed 18,000 full and part time
- Value in 2008 exceeded $2.1 B to Canadian economy ($800 M farm gate)
- 2008 Canadian production < 0.3% of world; ranked 21st or 22nd
Statistics: >5,000 km wide; >50,000 km of coastline; production limited to a few small areas (< 100 km)
Production levelling off in the past 3 years – limited sites, cumbersome regulatory environment, & competitive markets
• production in all 10 provinces and 1 territory
• Requires provincial and federal permits to operate
• governed by up to 73 pieces of legislation (many FS)
• The potential is to triple in volume and value in 7-8 years with leadership from gov’t & industry

Adapted from CAIA 2008, Stats Can 2006
Markets:

- export 65% of seafood products ($3 billion)
- 3X the value of beef (as food) export
- farmed bivalve exports 55% of volume
- farmed finfish exports 70% of volume

food safety is of paramount importance and is everyone’s business!
Primary Markets: USA (85%), Taiwan, France, China & Canada. 20+ other countries
Salmon farming – juveniles – vaccines
All have CoP or BMP guidelines
e.g., vaccines reduce antibiotic usage

FIGURE 6
Effect of vaccination on the use of antibacterials in Norway 1974 – 2003

Source: Subasinghe and Arthur, (eds.), 2005
Salmon farming – production
BMPs for farms
Salmon farming - harvest, processing, & distribution – full trace to pen
Aquaculture in Canada: Shellfish Farming
Mussels – farming
BMPs for farms
Mussels - harvesting
- 30 tonne harvester
- single or continuous droppers
Mussels – processing & distribution
Full trace to farm area
Sold in many product forms, mostly fresh or frozen

Examples:
- MAP shellfish and finfish
- Frozen products
- Kabobs
- Prepared meals
- Portions
Food Safety – Shellfish

- Canadian Shellfish Sanitation Program (CSSP)
- Audited by EU, USFDA, and importers
- Managed by 3 federal departments

- Food safety standards set by Health Canada
- **Approach:** growing water classification (<14 MPN/100mL), harvest regulations, meat testing (<230 MPN / 100g) on-farm & processing plant
- Veterinary inspection (province)
- Regular employee training
- Plant QMP (HACCP-based)
Food Safety – Finfish

- Full integration in the value chain (feed, seed, farm, processing, distribution)
- Farm-based HACCP & BMPs
- Independent MRL verification e.g., Healthy Salmon Program
- Feed stock testing, Supplier QA programs
- Contaminants, metals, microbiological verification (3rd party / gov’t)
- Veterinary inspection
- Regular training for employees
- Plant QMP (HACCP-based)
Regulatory oversight:

- Canadian Food Inspection Agency
- All seafoods must go through a federally registered plant
- Quality Management Program (QMP) HACCP-based
- Frequently inspected, regularly audited
- Audited by trading partners (EU, USFDA)
- Bilateral agreements on equivalency
Finfish food safety – proving it!
From egg to plate

- Feed supplier agreements
- Independent verification of specs
- Records for movements, ongrowing, harvest declarations, transport sign off
- Plant QMP with lot ID by cage
Shellfish food safety – proving it!

- Growing water records & licences
- Harvest declarations for suppliers (approved site, licence, area)
- Transportation records
- Plant QMP with mandatory lot identification (harvest date, location)
- End user required by law to maintain ID code for 4 months+

...many operations integrated
Certification & Standards

ISO 22000
ISO 65
ISO 17025
Trade relations

- Science-based, demonstrable FS standards
- Full traceability, from egg to plate
- FS sanctions very few
- Generally good trade relations, but occasional variances in import / export requirements not clear and result in trade barriers that are not FS related though disguised as such
Summary and Conclusions

1. Robust regulatory regime for Exp/Imp
2. Aquaculture industry best practices exceed regulatory requirements
3. Full traceability from egg to plate (in most cases)
4. Continuous improvements to minimize risks for food safety
5. Very few product recalls, & illnesses due to farmed Canadian seafood
Thank you for your attention!
Merci de votre attention!
Gracias!