NOAA’s Perspective on Aquaculture in Federal Waters
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Janet Whaley, DVM
NOAA Lead Veterinarian
Offices of Aquaculture, International Affairs and Seafood Inspection
Topics
• Overview of U.S. seafood industry
• Marine aquaculture
• A role for veterinarians
• Seafood safety
• Seafood buying tips
• Test your senses (if time)
Case for Increase U.S. Seafood Production

- **Global demand for seafood growing:** need additional 40m tons in 20 years
- **Federal nutrition guideline:** eat 2x more seafood (supply need ~6m tons more per year)
- **Jobs,** especially in coastal fishing communities
- **Seafood security:** ~90% of seafood Americans eat is imported, ½ from aquaculture. Growing middle class in Asia is competing with us for that seafood.
- **Reduce $14b seafood trade deficit** and create export opportunities
- **Healthy oceans:** US practices responsible aquaculture
- **Restoration** of species and habitats using aquaculture
## Untapped Aquaculture Potential in U.S.

<table>
<thead>
<tr>
<th>Country</th>
<th>Production (metric tonnes aquaculture)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>1,308,515</td>
</tr>
<tr>
<td>Vietnam</td>
<td>2,671,800</td>
</tr>
<tr>
<td>Thailand</td>
<td>1,286,122</td>
</tr>
<tr>
<td>Myanmar</td>
<td>850,697</td>
</tr>
<tr>
<td>Egypt</td>
<td>919,585</td>
</tr>
<tr>
<td>Philippines</td>
<td>744,695</td>
</tr>
<tr>
<td>Norway</td>
<td>1,008,010</td>
</tr>
<tr>
<td>Chile</td>
<td>701,062</td>
</tr>
<tr>
<td>Japan</td>
<td>718,284</td>
</tr>
<tr>
<td>India</td>
<td>4,648,851</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2,304,828</td>
</tr>
<tr>
<td>China</td>
<td>36,734,215</td>
</tr>
</tbody>
</table>

### Top 13 Aquaculture Producers Worldwide

Total aquaculture production in relation to land and water resources.

#### Sources of all seafood consumed in U.S.

- **U.S. Farming**: 2.5% (2.5%)
- **U.S. Wild-caught**: 6.5% (6.5%)
- **Imported Wild-caught**: 45% (45%)
- **Imported Farmed**: 46% (46%)

AQUACULTURE GROWS RESILIENT COASTAL COMMUNITIES

Marine aquaculture builds resilient coastal communities by growing working waterfronts, improving environmental quality, and providing healthy, secure food.

1. Oyster, mussel, and algae aquaculture provide local seafood, improve water quality, protect against storm surge and provide essential habitat.

2. Net pen aquaculture provides environmentally and economically sustainable seafood and diversifies maritime jobs and commerce.

3. Innovative offshore technology like submersible cages allows large-scale food production compatible with other ocean uses.

Courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science (umces.edu/symbols/)

NOS National Centers for Coastal Ocean Science
Coastal Aquaculture Planning and Environmental Sustainability Program
Marine Aquaculture in the United States

2014 Aquaculture Production Highlights

Marine and Freshwater National Totals

- U.S. Value: $1.3 billion dollars
- 19% of total U.S. seafood production & fishery products by value
- 607 million pounds
- 15th in global aquaculture production

Marine Species Totals

- Oysters: $169 million, 33 million pounds
- Clams: $121 million, 10 million pounds
- Salmon: $76 million, 41 million pounds
- Shrimp: $10 million, 5 million pounds
- Mussels: $10 million, 0.7 million pounds

Regional Marine Totals

- Pacific: 37% by value
- Atlantic: 49% by value
- Gulf of Mexico: 14% by value
Key Constraints to Expansion of Marine Aquaculture

- Conflicting coastal uses
- Aquaculture industry is diverse, no unified voice
- Regulatory burden
Signs of Progress

- 5%+ annual growth in marine aquaculture
- Aquaculture is now the third most valuable fishery in New England
- Many new aquaculturists are from fishing families
- Major US seafood companies own US fish and shellfish farms
- Public perception shifting
Government Commitment
Government Commitment

Unified and Coordinated Goals to expand marine aquaculture and decrease US seafood trade deficit

- USDOC 2018-2022 Strategic Plan
- NOAA Blue Economy Initiative
- Wicker bill S.3138 and Palazzo bill H.R. 6966
  - Advancing the Quality and Understanding of American Aquaculture Act (AQUAA Act)
  - to establish a regulatory system for marine aquaculture in the United States Exclusive Economic Zone, and for other purposes.
Offshore Aquaculture Potential

- Gulf of Mexico
- Southern California
- New England
- Hawaii
Gulf of Mexico Aquaculture Permit (GAP Rule)

Final Rule published in 2016

- Plan developed by the Gulf of Mexico Fishery Management Council under authority of the Magnuson-Stevens Act
- Coordinated permit process
- Requires **plan for aquatic animal health**
  - NOAA Model for offshore aquaculture in other Regions of the U.S.
GAP Aquatic Animal Health

**Current Rule (§ 50 CFR 622):**

- Involve an Aquatic Animal Health expert (AAHE)
- Health certification required prior to stocking
- 24 hour reporting of OIE diseases and other pathogens of concern to NOAA/USDA
- Annual status report – reportable diseases
Additional Guidance for Permit Applicants

• Guidance developed in collaboration with NOAA and USDA
  • Based on Commercial Aquaculture Health Program Standards (NAA and USDA voluntary program)

• Appendices:
  • Developing a Biosecurity Plan
  • Biomonitoring and Surveillance Strategies for Pathogens of Concern
  • Sampling, Reporting and Responding to an Outbreak of a Pathogen of Concern
    • What to include in a Site Specific Response and Communication Plan
Additional Guidance for Permit Applicants (con’t)

• Permit Applicants provide written AAH Plan
• AAHE be a licensed Veterinarian (in accordance with AVMA policy)
• Required Health Certification for stocking in accordance with the GAP Rule requirements (draft HC form being developed by NOAA and APHIS)
• Initial Draft has been reviewed by Marine Fisheries Advisory Committee – Aquaculture Task Force (advises NOAA)
Veterinary Licensing in U.S. Waters Outside State Jurisdiction

The practice of veterinary medicine is required for the health and welfare of aquatic animals in U.S. waters outside of state jurisdiction. Throughout the U.S., involvement of veterinarians is required for diagnosing, prescribing, issuing VFDs and international health certificates, and other acts of veterinary practice. For these reasons, the AVMA holds that licensed and federally accredited veterinarians must be utilized in aquaculture systems within U.S. waters outside of state jurisdiction.

The AVMA recommends that the criteria for veterinarians to practice veterinary medicine in these waters consist of three components:

1. The veterinarian is licensed and in good standing to practice veterinary medicine in any state within the U.S.
2. The veterinarian holds a USDA-APHIS category II veterinary accreditation that includes completion of USDA-APHIS aquatic animal health modules.
3. The veterinarian has a valid veterinarian-client-patient relationship with the facility in which he/she is practicing veterinary medicine.

Furthermore, AVMA recommends that USDA-APHIS-VS be the lead agency for aquatic animal health oversight for commercially cultured aquatic animals in waters outside state jurisdiction.
Five Principles:

1. Aquatic animal health team
2. Risk characterization & management
3. Surveillance
4. Investigation and reporting
5. Response

Developed

• USDA APHIS Veterinary Services and National Aquaculture Association
• Voluntary
• Maintain compliance
Antibiotic Use in Aquaculture requires Veterinary Oversight

Very few antibiotics approved for aquaculture compared to other animals

In the past decade, there has been more emphasis on judicious use and preventing antimicrobial resistance. FDA has issued more restrictions.

Veterinary oversight is required for all use of antibiotics in aquaculture including prescriptions, veterinary feed directives, and extra-label use.

Veterinary-Client-Patient Relationship (VCPR) is required

— Veterinarian assumes responsibility
— Client agrees to follow instructions
— Veterinarian has sufficient knowledge of animals
— Veterinarians is available for follow-up
<table>
<thead>
<tr>
<th>FDA Approved Antibiotics for Use in Aquaculture</th>
<th>Catfish</th>
<th>Freshwater Salmonids</th>
<th>Warm Freshwater Finfish</th>
<th>Freshwater Finfish</th>
<th>American Lobster</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aquaflo®</strong> (generic name = fluorfenicol)</td>
<td>Control of mortality due to enteric septicemia associated with <em>Edwardsiella ictaluri</em></td>
<td>Control of mortality due to coldwater disease associated with <em>Flavobacterium psychrophilum</em> and due to furunculosis associated with <em>Aeromonas salmonicida</em>.</td>
<td>Control of mortality due to streptococcal Septicemia associated with <em>Streptococcus iniae</em></td>
<td>Control of mortality due to columnaris disease associated with <em>Flavobacterium columnare</em></td>
<td></td>
</tr>
<tr>
<td><strong>Romet-30® and Romet TC®</strong> (generic name = sulfadimethoxine and ormetoprim)</td>
<td>Control of mortality due to enteric septicemia associated with <em>Edwardsiella ictaluri</em></td>
<td>Control of furunculosis caused by <em>Aeromonas salmonicida</em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Terramycin® 200** (generic name = oxytetracycline dehydrate) | Control of bacterial hemorrhagic septicemia caused by *Aeromonas liquefaciens* and pseudomonas disease | *- Control of ulcer disease caused by *Hemophilus piscium*, furunculosis caused by *Aeromonas salmonicida*, bacterial hemorrhagic septicemia caused by *Aeromonas liquefaciens* and pseudomonas disease  
- Control of mortality due to coldwater disease associated with *Flavobacterium psychrophilum*  
- Control of mortality due to columnaris disease with *Flavobacterium columnare*  
- Pacific salmon: fry and fingerlings for skeletal marking (aging) | | | Control of gaffkemia caused by *Aerococcus viridans* |
| **Terramycin® 343, OXYmarine™ Tetroxy® 343, Pennox 343®, Tetroxy® Aquatic** | | | | | |

Generic name = oxytetracycline hydrochloride  
Immersion or bath treatment = written Veterinary Prescription required

**All Species** Fry and Fingerlings for skeletal marking (aging)
Guidance for Veterinarians
American Association of Fish Veterinarians

The Mission of the AAFV is:

- to further the art and science of fish veterinary medicine by enhancing veterinary knowledge, proficiency, professional standards, and viability of fish medicine for veterinarians;
- to increase the value, visibility, and acceptance of fish veterinary medicine for our stakeholders; and,

Voting member on several AVMA Committees

Fishvets.org

AAH and Seafood safety data to assist Siting of Aquaculture Farms

• Bench level science could be directed toward filling data gaps or answering key questions
  - pathogens and epidemiology
  - seafood safety

• Applied research to develop Risk Assessment Tools/Models
  - Better siting of coastal and offshore aquaculture
    forecast disease, animal and public health risks
    how to deal with uncertainty

• Applied research to develop Best Management Practices
  - disease prevention and mitigation