Combating Antibiotic-Resistant Bacteria in Aquatic Livestock Production

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Assuming NO Abx (or little use)

Alternatives: Appropriate first responses:

• Biosecurity for primary pathogens
• Environment control/modification for species
• Vx for expected and economically important
• Clinical Dx for distinction of etiologies
• Passive immunity for contrary infections
• Discontinue/alternate Disinfectants
Globally:

17 industrialized species of aquatic livestock
~40 countries w/ significant activity
Major progress in marine/estuarine spp.
Aquatic livestock + wild > ½ beef + pork + poultry
Aquatic livestock growing twice population growth
1 billion use fish as main source of animal protein
3 billion get > 20% animal protein from fish
Current Abx Use Scenario:

Approved Abx available
- US has three FDA approved for food fish
- Unapproved to ornamentals (low regulatory)
- Japan has ~29 single or combinations
- Chile has ~17 available
- Some countries using Abx banned in US
- Integrated production-feces to production water
Current Abx Resistance Landscape:

- 90% seafood consumed in US is imported
- 50/50 ratio farmed/wild ($17.4 Billion 2012)
- NOAA reported on 23+ spp imported in 2012
- ~27% shrimps; 13% Salmon; 11% tuna, etc
- 30 countries > $100 million fisheries products
- Evaluated under FDA Seafood Processor HACCP
Abx Resistance Success story:

- Norway Salmon Farms late 1970’s
  - Medicated feeds became uneffective
  - Vaccines developed w/ Norwegian Vet. Inst.
  - Second wave of diseases brought different vaccines

- Presently -
  - Norwegians utilize 50,000 kg/yr for sick people
  - Salmon farms utilize 1,000 kg/yr for diseased fish
  - Biomass on Salmon farms is twice humans!
Table 1
Some examples of preservatives and Antibiotics to which resistance has been reported

- Benzalkonium Chloride
- Benzisothiazolone
- Benzoic acid
- Chloroallyltrianzine-azoniadamantane
- Chloramine
- Chlorhexidine
- Chlorophenol
- Dibromodicyanobutane
- Dimethyldithiocarbamate
- Dimethoxy dimethyl hydantoin
- Formaldehyde
- Glutaraldehyde
- Hexahydrotrienyl triazine
- Hydrogen peroxide
- Imidazolidinyl urea
- Iodine
- Mercuriec salts
- Methylenebishchlorophenol
- Methylchloro/methyl-isothiazolone
- Methyl paraben
- Phenylmercuric acetate
- Propyl paraben
- Povidone iodine
- Quaternary ammonium compounds
- Sorbic acid
- Tetrahydrothiadiazinthione
- Trifluoromethyl dichloro-cabanilide

USA:

Major species (CCF, RBT, ASL, TLP)
VFD since 2006 for Aquaflor. OTC & RMT
1 Health Authority but 3 Federal Agencies regulate
3 categories of livestock (farmed, conserv., pet fish)
Inadequate disease reporting thru DNR’s, hobbyists
Few states with active aquatic livestock regulations
Snap-shot of majority of USA Aquatic Livestock Facilities

ROUTE FARMING IN IDAHO
https://ustfa.org/

ATFISH FARMING ON MISSISSIPPI DELT

FLORIDA TROPICAL FISH FARM
http://www.ftffas.com/content/fish_farming_in_fl.php

http://thefutureofthings.com/6281-robotic-fish-cages/

www.coastalwatershedinstitute.org
• Assuming NO Abx (or little use)
  Alternatives: Appropriate first responses:
  • Biosecurity for primary pathogens
  • Environment control/modification for species
  • Vx for expected and economically important
  • Clinical Dx for distinction of etiologies
  • Passive immunity for contrary infections
  • Immunostimulants for innate mobilization
  • Control of biotope populations
  • Discontinue/alternate some Disinfectants

Thank you!