Topics

Is aquaculture important?
Validity of current approach to fish health?
What is the key factor in fish health management?
How can the veterinary community meet the sector’s needs?
Aquaculture?

World Farmed Fish and Beef Production, 1950-2012

Based on FAO data
Sea-water cages
Intensive ponds
ASSESSING FARMED FISH WELFARE IS DIFFICULT

• Fish welfare is obscured by the aquatic rearing environment
  • Difficult to observe behaviour, physical condition or health in commercial systems
  • Only see the sick fish
  • Many alternative measures of fish welfare are invasive

• Fish farms comprise very large populations of animals
  • Fish are viewed as populations as well as individuals
  • How do you assess severity and number affected in these large populations?

• The causes of poor welfare are complex
  • Water quality parameters interact

• Not all stakeholders have the same perspective on welfare
Aquaculture Mortality Trends
Ongrowing salmon in Norway 1990-2011
Can a mammalian approach work?

- Fish are ectothermic
  - Efficiency of immune response highly dependent on ambient temperature and behavioural thermoregulation
    
    (Boltana et al. 2013)
  - Food deprivation may be less of a welfare concern
- Fish (and birds) erythrocytes are nucleated
  - Involved in immune response
    
    (Morera et al. 2011)
- Fish gills do not appear to show an immune response
  - Only cell proliferation
  - Pathogens can pass straight through
    
    (Ruyra et al 2013)
Conventional veterinary preventative strategy....
Other differences affecting welfare:

- Fish vary
  - Between species (30K and counting)
    - Needs differ widely between species
  - Within species, dramatic metamorphoses within the production cycle
    - Needs differ widely between stages
- Many fish live in dense schools, in the wild and in farms
  - High densities may not be detrimental
- Intensive fish farming is relatively new
  - Fewer generations farmed
  - Less adapted to farming environment
Major Fish Welfare Concerns

- Stocking Density?
- Water Quality
- Slaughter
- Transport
- Predator protection
- Genetic manipulation
  - Triploids
  - All female stocks
- Diseases
  - Lack of effective medicines
- Environmental impact
  - Escapees
  - Pollution
  - Parasites
- Artificial photoperiods
Animal Based (OWI’s)

- Behaviour
- Mortality trends
- Ventilation rate
- Colour
- Fin condition
- Growth
- Obvious disease and injury
Environment Based

- Water quality parameters, incl.
  - Water flow
  - Water velocity
  - Algal blooms etc.
  - Thermal stratification
Strategic welfare initiatives

- Capital Investment e.g.
  - Anti-predator
  - Water Quality
  - Feeding
  - Biosecurity
- Contingency planning
  - e.g. Veterinary Health Plan
- Staff development:
  - Recruitment
    - Empathy
  - Training and assessment
What can vets do for welfare in aquaculture?

- Engage with the sector
- Ensure good training available in vet schools
  - Educate on importance of aquaculture
  - Include on-farm practical experience
- Emphasise (beyond standard vet approach)
  - Difference from terrestrial animals
  - Husbandry
    - Needs and how they can be met
    - Behaviour: the language of the animal
Conclusions

• Aquaculture is HUGE and will continue to grow and intensify
• Intensification will lead to welfare challenges
• Fish are a special case – do not project mammalian knowledge
• Veterinary care needs to move toward preventative health/welfare management
• The future of welfare-friendly intensive aquaculture depends on a large number of veterinary graduates entering the sector.
Further reading:
-www.fishwelfare.net

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.....Questions?