DTU Technical University, of Denmark

rAqua

Production and Socio-economic Issues related to Organic Aquaculture

Juveniles - Production systems – Nutrition - Welfare - Environment – Consumers – Economics - Institutional Frameworks

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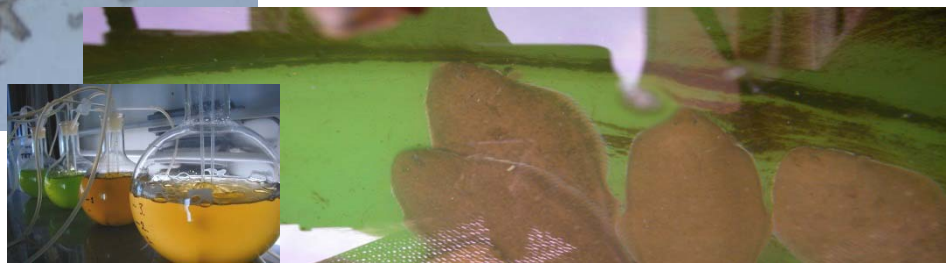
www.oraqua.eu

1st Stakeholder Event – Istanbul
11 – 12 October 2014

Sourcing of Juveniles

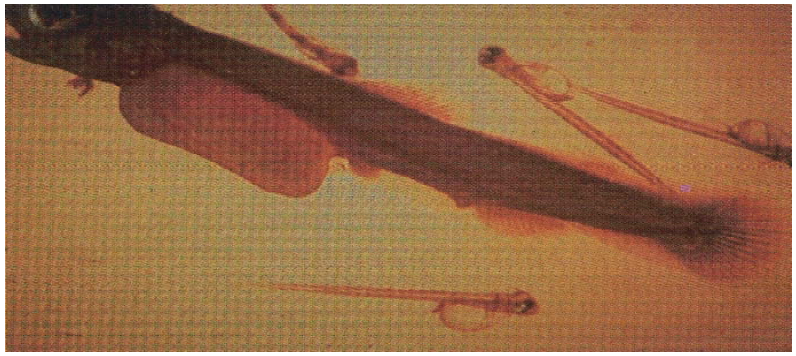
Complete Organic Life Cycle from 1. January 2016



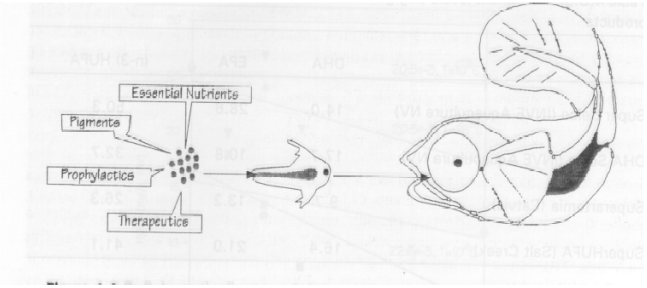
Sourcing of juveniles

Max. non-organic juveniles:

- 80 % by 31.12.2011
- 50 % by 31.12.2013*
- 0 % by 31.12.2015

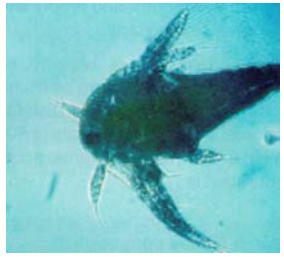


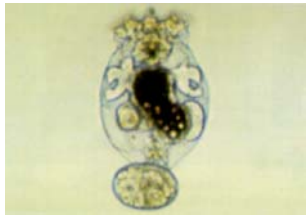
*Postponed to 01.01.2015 for units approved under national organic rules before 01.01.2009



Challenges of Sourcing of Organic Juveniles

1. Inadequate supply of organic juveniles (+ organic trout ova, DK)
2. Lack of specific rules for organic hatcheries (FW & SW) to distinguish organic and non-organic hatcheries, e.g.
   - Breeding (Tools/objectives, selection, robustness etc.)
   - Stocking densities
   - Management
   - Phytoplankton and zooplankton production
   - Essential nutrients
   - ”Organic” weaning diets etc. (Hatching → weaning of juveniles)

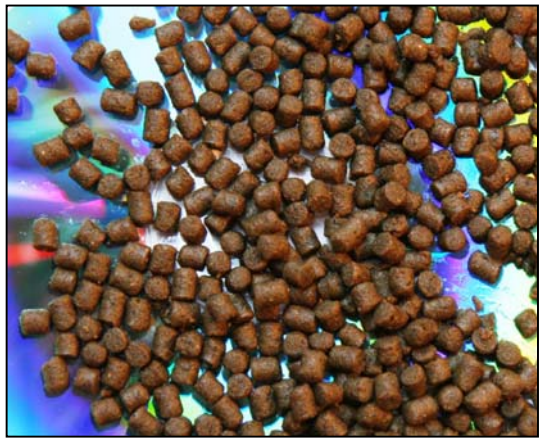




Feed and Nutrition - Carnivorous aquaculture

Sourcing priority of feed ingredients:

1. **Organic feed products of aquaculture origin**
2. **FM & FO from org. aquaculture trimmings**
3. **FM & FO derived from trimmings of fish caught in sust. fisheries**
4. **Org. feed mat. of plant origin (max. 60 %)**



Feed and Nutrition

Organic feeding regimes priority:

- Animal Health
- High product quality/human health
- Low environmental impact

Feed and Nutrition

Sourcing priority of feed ingredients:

1. Organic feed products of aquaculture origin

2. FM & FO from org. aquaculture trimmings

   - Prohibited to feed fish with ingredients derived from the same species
   - Limited organic production → Limited trimmings
   - Below the critical level needed for sustainable manufacturing processes

3. FM & FO derived from trimmings of fish caught in sust. fisheries

Feed and Nutrition

Fish Meal & Fish Oil derived from trimmings of fish

Considerations:

- **Optimum nutrient balanced diet (Amino acids (AA) – Fatty acids (FA)) is crucial for optimum performance**
- **Fish meal and Fish oil - well balanced nutrient source**
- **FM from trimmings is lower in protein/essential AA**
- **Supplementation with AA is prohibited**
- **FM from trimmings is higher in Phosphorus (P)**

→ ***Decreased performance (growth, health, quality)!***

→ ***Increased environmental impact!***

Feed and Nutrition – Alternative options

FM & FO are limited resources

- **FM from whole fish caught in sustainable fisheries may be prioritized**
- **FM & FO from trimmings for limited use**
- **Alternative sources of proteins and lipids urgently needed to optimize dietary AA-profile (micro-/macro organisms high in essential AA and FA, plants, PAP etc.)**
- **Supplementation with essential AA and FA and other essential nutrients derived from processes in line with organic principles**

Feed and Nutrition – Omnivorous/Polyculture/»Extensive» Aquaculture

- Carps, shrimps, tilapia: Natural feed/add. comp. feed
- Molluscs: Extract nutrients from natural local feed web/ organic fish production/water quality issues
- Sea weed: Extract nutrients from the environmental water body/organic fish production

Health – Veterinary treatments

Order of preference:

1. **Substances from plants, animals or minerals in a homoeopathic dilution (stimulate self-cure)**
2. **Plants and their extracts not having anaesthetic effects**
3. **Trace elements, metals, natural immunostimulants or authorised probiotics**
4. **Allopathic treatments**

Health – Veterinary treatments

Allopathic treatments:

- **Max. 2 treatments/year – life cycle > 1 year**
- **Max. 1 treatment – life cycle < 1 year**

Anaesthesia prior to vaccination – counts for treatment?

Parasite treatments

- **Max. 2 treatments/year**
- **Max. 1 treatment – life cycle < 1,5 year**

Prolonged withdrawel period for all treatments

Health – Cleaning and disinfection

Parasite treatments:

- **Only Limestone and Dolomite permitted but without anti-parasitic effect**

  ➡ **Need of effective sanitizers for proper management of disease risks in organic open systems, welfare and environmental protection**

Substances for consideration **in line with organic principles, e.g.:**

- **Hydrogen peroxide**
- **Sodium percarbonate**
- **Peracetic acid and peroctanoic acid**
- **Calcium hydroxide**

Aeration/Oxygenation

- Only mechanical aerators
- Prefer renewable energy sources
- Pure oxygen only permitted in critical situations

Stocking density

Salmonids in freshwater (FW):

- **Salmon, arctic charr: Max. 20 kg/m^3**
- **Sea- and rainbow trout: Max. 25 kg/m^3**

Salmonids in seawater (SW):

- **Salmon, sea- and rainbow trout: Max. 10 kg/m^3**

Cod, bass, bream, turbot (SW):

- **Turbot: Max. 25 kg/m^2**
- **Others: Max. 15 kg/m^3**

Carp family and associated Species in polyculture (perch, pike, catfish, coregonids):

- **Max. 1.500 kg/ha/y**

Consider: Holistic approach

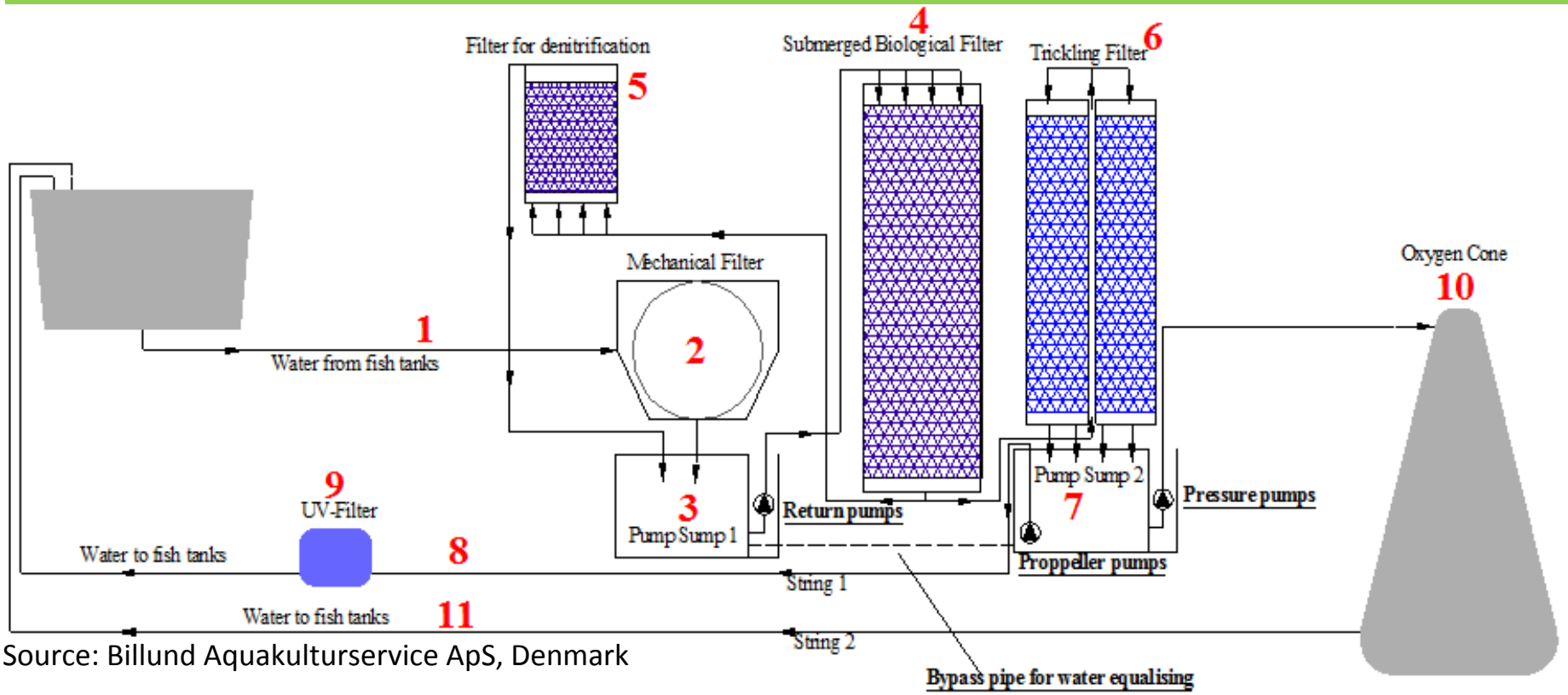
Welfare

Interactions:

- **Feed quality**
- **Stocking density**
- **Water quality**
- **Rearing conditions**
- **Daylength - Geography**
- **Physical injuries**
- **Transportation**
- **Slaughter methods (preventing suffering in fish, preserving the flesh quality, human safe)**

Consider: Holistic approach

Closed Recirculation Aquaculture Systems (RAS)
NOT permitted – excl. hatcheries & juveniles



Source: Billund Aquakulturservice ApS, Denmark

RAS: Advantages and Disadvantages. Intensive & energy issues

***Consider:* Reuse of water – save water resources – renewable energy in line with organic principles.**

Environmental interactions

Escapes

Recycling and waste

Marketing & Sale

- **Production vol.**
- **Distance**

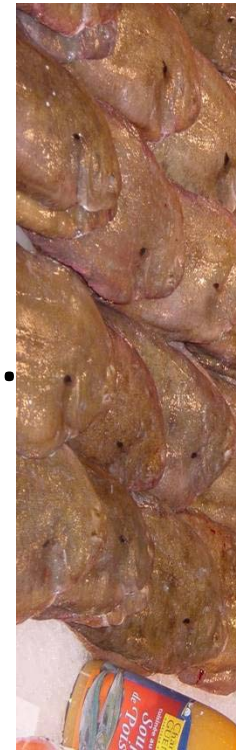
Consumer Perceptions of Organic Seafood and the production systems

1. ***Positive*** **to aquaculture → *Positive* to organic aquaculture**
   If *Negative* → Remain *Negative*

2. ***Positive*** **about organic production → Also *willing to pay* for organic**
   - Link stronger at high *Education*, high I*ncome*, high *Knowledge* about organic and have young *Children*

3. ***High Knowledge about organic* → *rational* to organic prod.**
   ***Low Knowledge about organic* → *Emotional* to organic**

4. ***Health*** **benefits of organic fish, *Naturalness* of *Local/ Domestic* production and *Food Safety***



Consumer Perceptions of Organic Seafood and the production systems

5. **Only a small segment concerned about *welfare* regimes among consumers in general**
   - Priority to *Quality, Freshness, Taste*

6. **Realising aquaculture *protecting wild stocks* ➡ perceive aquaculture *protecting the environment***

7. ***Missing common understanding* of organic aquaculture; i.e. *Missing distinction* between labels: Organic, Ecological, Green, Sustainable, Fair Trade ➡ *Transparency – Tangibility***

Consumer Perceptions of Organic Seafood – A Survey

- **Low familarity with labels – in particular the EU leaf**

- **More familiar with national labels**

Consumer Perceptions of Organic Seafood – A Survey

High priority:

1.No use of *toxic chemicals*

***2.Natural* living conditions**

3.Water quality

4.No medicines

Consumer Perceptions of Organic Seafood – A Survey

Lower priority:

1.Environment

2.Welfare

3.Organic feed

***4.Sea cage* or *pond* farming**

5.Min. water use

6.Feed utilization

7.Escapees

Lesson:

Consumers' perception* of organic seafod seems *not in line* with the *EU regulation definition of organic seafood

Consumer Perceptions of Organic Seafood – Knowledge gaps

1. ***Tangible*** **information about specific production systems and feed → balancing food *choices* between *moral* and *physical* attributes of organic fish**

2. ***TRANSPARENCY*** **: *Information* transfer and product *labelling* → *Organic aquaculture make a difference* in the European and global markets**

Transparent Information Strategy on Organic Seafood Production

Economics - and Competitive Position of Organic Aquaculture Products in EU

I. **Preliminary main findings of Organic versus Conventional production**

1. **Higher Production Costs**
   - **Salmon: 20 – 30 %**
   - **Trout: 25 – 40 %**
   - **Sea bass/Sea bream: 20 – 30 %**
   - **Carp: 10 – 20 %**

2. **Higher estimated selling price**
   - **15 – 30 %**

Economics - and Competitive Position of Organic Aquaculture Products in EU

II. Main reasons for higher production costs of Organic production

1. Lower production intensity → higher costs/kg prod.
2. Feed price 25 – 30 % higher
3. Higher price of organicly raised fingerlings/juveniles
4. Rel. more labour hours and skills – special care/quality/risks

Institutional Frameworks – Constraints to the Growth of Organic Aquaculture

I. Preliminary identified main constraints of the organic aquaculture regime in Europe:

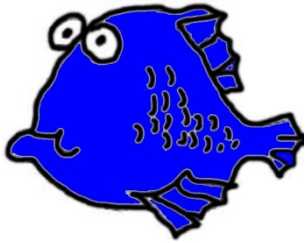
- **Complex and fragmented → Challenging the whole chain**
- **Bureaucratic production rules and control provisions**
- **Complexity of bureaucracy hamper the transition to organic certified production**
- **Lack of national policy support for achieving a critical mass of organic aquaculture production**
- **Lack of relevant statistics and updated information on organic aquaculture**
- **Great variation between the countries with respect to standards and certifications hampers export to international markets**

Institutional Frameworks – Constraints to the Growth of Organic Aquaculture

- Cost of certification and requested control programs are relatively hígher for small-scale aquaculture producers
- Lack of knowledge/confusion among consumers about organic/conventional and other labels
- Organic aquaculture production may be challenged by stricter regulation for conventional production, which may wipe out some of the differences between organic and non-organic production

Reflections (I)

- Basically organic production aims natural processes and sustaining the cycle in Nature
- Extensive production in line with organic principles – cf. omnivorous fish, seaweed, molluscs – minor/no input of feed/polyculture
- Contradicting to production of carnivorous fish, i.e. salmonids, bass, bream
  - Pressure on FM & FO
  - Trimmings (P, environment, energy)
  - Transport of ingredients (Carbon-footprint)



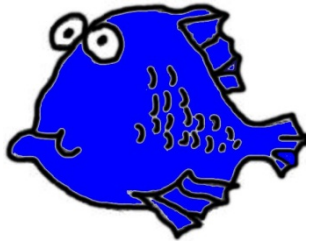
Reflections (II)

- Flow through systems for on-growing (No RAS)
  - Risc of infections – limited treatment options
  - Interaction with predators
  - Escapees
- Max. stocking densities: ”Extensive”
  - Question mark economical sustainability
- Establishment of robust brood stocks; i.e. stress resilient, disease resistant, ethical welfare
- Critical mass of organic aquaculture production (Ova, juveniles, feed)
- Need of organic aquaculture statistics (database)

Reflections (III)

- Small producers face market barriers
  - Relatively high costs of control and certification
  - Exclude the organic spirit of development rural areas, improve employment and social structures

- Europe has big potential for organic aquaculture products
  - However great imports at competeting prices, high carbon-footprint and contradicting organic principles/Institutional frameworks



THANK YOU FOR YOUR ATTENTION