SCIENTIFIC KNOWLEDGE AND CONSUMER PERCEPTION ON STOCKING DENSITY IN ORGANIC AQUACULTURE

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Background

OrAqua = European Organic Aquaculture - Science-based recommendations for further development of the EU regulatory framework and to underpin future growth in the sector

FP7-KBBE. 2013.1.2-11 Assessment of organic aquaculture for further development of European regulatory framework
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www.oraqua.eu
OrAqua will

Provide recommendations for the revision of the current EU regulatory framework for organic aquaculture production based on reviews of

- relevant available scientific knowledge on organic and conventional aquaculture productions,

as well as

- consumer perceptions, socio-economics and Institutional frameworks related to organic aquaculture
Aim for today....

This presentation will discuss the relations between current organic regulations from the EU, consumers’ perception and scientific knowledge of stocking density in Atlantic salmon, trout, sea bass and sea bream. The stakeholder’s opinions and interests, will also be presented.

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EU regulations related to stocking density

According to Reg. EC 889/2008, Article 25f (1) “The husbandry environment of the aquaculture animals shall be designed in such a way that, in accordance with their species specific needs, the aquaculture animals shall: (a) have sufficient space for their wellbeing; (b) be kept in water of good quality with sufficient oxygen levels, and (c) be kept in temperature and light conditions in accordance with the requirements of the species and having regard to the geographic location”.
Current EU regulations and stocking density

Optimal density requires optimal water quality; 1st prio = oxygen

Add oxygen?
“The use of oxygen is only permitted for uses linked to animal health requirements and critical periods of production or transport, in the following cases: (a) exceptional cases of temperature rise or drop in atmospheric pressure or accidental pollution, b) occasional stock management procedures such as sampling and sorting, c) in order to ensure the survival of the farm stock”.

Increase flow?
“The design and construction of aquatic containment systems shall provide flow rates and physiochemical parameters that safeguard the animals’ health and welfare and provide for their behavioural needs”.

Reduce stocking density?
Too low and too high densities may impair welfare:

Tank systems
## EU regulations vs science

<table>
<thead>
<tr>
<th>Prod. system</th>
<th>Species</th>
<th>EU regulations</th>
<th>Scientific knowledge</th>
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</thead>
</table>
| FW tank      | Salmon           | 20 kg/m³       | 1. Better growth, less aggression, lower CF at 30 kg/m³ compared to 8kg/m³.  
|              |                  |                | 2. Optimal WQ and feed availability: Welfare 43 kg/m³ = 65 kg/m³ = 86 kg/m³ |
| FW tank      | Brown/Rainbow trout | 25 kg/m³    | 1. Welfare impaired above 70 - 80 kg/m³ and below 10 kg/m³  
|              |                  |                | 2. “….what is considered low density and what is considered high density appears to vary between studies. …”»  
|              |                  |                | 3. Few negative welfare effects <70kg/m³ (with optimal WQ and feed availability) |

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<tbody>
<tr>
<td>SW cage</td>
<td>Salmon</td>
<td>10 kg/m³</td>
<td>Fish do not use the whole cage, feeding systems and environmental factors matter</td>
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<tr>
<td></td>
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<td>1. 7-11 kg/m³ better welfare than 18-27 kg/m³</td>
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<td>2. 5.6-14.5 kg/m³ better welfare than 16.7-23.1 kg/m³</td>
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<tr>
<td>SW cage</td>
<td>Sea bass/bream</td>
<td>15 kg/m³</td>
<td>Commercial prod: 10-20 kg/m³. Feeding systems and environmental factors matter.</td>
</tr>
<tr>
<td>Tanks</td>
<td>Sea bass/bream</td>
<td></td>
<td>1. With optimal water quality no welfare effects (FI, growth, aggression, fin damages, cortisol) was seen up to 50 kg/m³.</td>
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<td>2. Another study shows elevated cortisol &gt; 50 kg/m³</td>
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<tr>
<td>Earth ponds</td>
<td>Sea bass/bream</td>
<td>4 kg/m³</td>
<td>Bird predation matters</td>
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OrAqua survey: Factors that define organic fish for consumers in the UK, France, Italy and Germany, ranked in order of relevance to the total sample. Relevance is reported as percentage of participants in all countries that agree that each factor is relevant to the official EU definition of organic fish.
Consumer perception survey - interpretation

• Good welfare more important to define organic aquaculture than stocking density. This may look as consumers do not perceive stocking density as a welfare issue.
  – Another project (BREEDWEL) showed that *stocking density is very much related to fish welfare in consumers’ minds*.

• Not too many consumers think of *low stocking density* when considering organic. Welfare and water quality are more important
  – Does this mean that consumers might accept oxygenation when this improves WQ? This may facilitate farmers possibilities to make organic aquaculture profitable
  – Average consumers are seldom experts in farming or organic aquaculture. Reflections of important factors to identify organic may thus depends on communicating the correct arguments. – the communication strategy and it’s elements should be carefully planned and designed based on consumer priorities and science.
Economy – when forced to decrease density

• With decreased allowed densities, increased production costs (e.g. feed, juveniles), decreased market demand (?) and increased labor costs, the organic production may be more expensive than conventional.

<table>
<thead>
<tr>
<th></th>
<th>Salmon</th>
<th>Trout</th>
<th>Sea bass/bream</th>
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<tbody>
<tr>
<td>Labour costs</td>
<td>+15%</td>
<td>+15%</td>
<td>+15%</td>
</tr>
<tr>
<td>Stocking density</td>
<td>-40%</td>
<td>-15%</td>
<td>-15%</td>
</tr>
<tr>
<td>Production costs</td>
<td>+25-40%</td>
<td>+15-20%</td>
<td>+30-40%</td>
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<tr>
<td>Growth</td>
<td></td>
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<td>-20%</td>
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<tr>
<td>FCR</td>
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<td>+5%</td>
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</table>
Stakeholders – responses to stocking density (Café-dialog)

• 1st stakeholder event in Istanbul October 2014*
  – Carrying capacity looks better than stocking density
    – The stakeholders were very firm in their view that density itself is not a good way to determine the amount of fish in a cage for organic.
    – The carrying capacity is a better way, since optimal stocking density varies per site and production system, based on environmental variation at the site of the cage.
    – The farmers say that the optimal density for organic should be determined based on the carrying capacity of the cage and thus can be different per site

*The discussions only were about cages
Stakeholders (1st event) – responses to stocking density (Café-dialog)

1. “Should be no differences in stocking density between organic and conventional aquaculture”

2. “Stocking density not the main factor for fish wellbeing, therefore consider in combination with other parameters of water quality and husbandry practices”.

3. “Stocking density still influences fish welfare, therefore some limits are necessary to be set”.

4. “Account has to be made to the behavioral needs of fish in the wild when discussing stocking density”.

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Conclusions

• Recommendations to regulations should
  – be based on basic organic principles (principles of health, ecology, fairness and care)
  – based on scientific facts (nutritional, welfare, husbandry, water quality needs etc.)
  – based on discussions with consumers
  – consider the possibility for profitability for farmers (economic sustainability)
Thank you for your attention

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