Future Trends in Recirculation Technology for Sustainable Fish Production

Marcelo Varela
Billund Aquaculture
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- Billund Aquaculture was established in Denmark in 1986.
- Billund Aquaculture Chile was established in 2004.

- Australia – 2
- Bali, Indonesia – 1
- Chile – 13
- Denmark – 20
- Finland – 1
- Greece – 2
- Italy – 5
- China – 2
- Libya – 2
- Malaysia – 1
- Moldova – 3
- Norway – 3
- Spain – 1
- Sweden – 1
- South-Korea – 1
- Taiwan – 8
- Thailand – 3
- Germany – 2
- Vietnam – 1
# Billund Aquaculture

Billund Aquaculture has technical and biological experience in planning and construction of intensive production of all kind of warm and cold fresh- and saltwater fishes for example:

<table>
<thead>
<tr>
<th>Freshwater species</th>
<th>Saltwater species:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Atlantic Salmon</td>
<td>• Sea Bass</td>
</tr>
<tr>
<td>• Trout</td>
<td>• Sea Bream</td>
</tr>
<tr>
<td>• Barramundi</td>
<td>• Cod</td>
</tr>
<tr>
<td>• Carp</td>
<td>• Turbot</td>
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<tr>
<td>• Pike Perch</td>
<td>• Halibut</td>
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<tr>
<td>• Pike</td>
<td>• Cobia</td>
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<tr>
<td>• Perch</td>
<td>• Grouper</td>
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<tr>
<td>• Sturgeon</td>
<td>• Snapper</td>
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<tr>
<td>• Tilapia</td>
<td>• Sole</td>
</tr>
<tr>
<td>• Eel</td>
<td>• Yellowtail Kingfish</td>
</tr>
<tr>
<td>• Catfish</td>
<td>• Coral fish</td>
</tr>
<tr>
<td>• Tench</td>
<td></td>
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</tbody>
</table>
Definition of Recirculation

Production unit where the same water is re-used in a closed circuit after passing through a treatment system.

[Diagram showing recirculation flow, new water flow, and water discharge]
Advantages

- Low water requirement: 1% of the water flow needed in traditional systems.
- Full water quality control, enabling optimal and stable production all year round, independent of environmental seasonal variations, this makes the production predictable for 365 days.
- Optimal and stable production secure high and stable quality of the fish.
- The incoming water can be treated to achieve the desired quality, reducing the risk of diseases.
- The effluent can be reduced to a minimum, and therefore be controlled, minimizing the environmental impact.
STATUS AND TRENDS
Atlantic Salmon
Chile 2011

55.000.000 Atlantic Salmon Smolt

192.000 Tn LW
Chile 2012

72,000,000 Atlantic Salmon Smolt

252,000 Tn LW

30% Increase
Norway 2012

20,000,000 Atlantic Salmon Smolt

70,000 Tn LW
Reality - Salmon

G. Out
Future - Salmon

- Smolt
- Eggs
- Broodstock
- G. Out

- W_x \geq 100g
- Langsand Laks
- Denmark
- Salmones Rio Coihue
- Chile
- Norway
Project “Langsand Laks A/S”

1,000 Tn/Year 4,5 Kg Atlantic Salmon

• The project is located by the Danish west coast

• Investment USD 7.5 Mill

• Reduced energy consumption. 2,5 → 1,5 KW/Kg Feed
Sturgeon for Caviar and Meat Production
Aquatir - Moldova

5 Tn/Year Beluga Sturgeon Black Caviar
100 Tn/Year Beluga Sturgeon Meat

• Reality: Russian, Sterlet and Bester sturgeon caviar and meat production

• Future: Caviar production time reduced in 12 years compared to nature, first production expected in 2014
Aquatir - Moldova

Total area: ~ 30,000 m²
Aquatir - Moldova

Sturgeon Facility: Live Feed, Incubation, Hatchery, Startfeeding, and Juvenile Units
Aquatir - Moldova

Sturgeon Facility: On-Growing and Broodstock Units
Other Species:

Pike Perch in Denmark – 2011/2012

Cobia
Thanks for the attention

Marcelo Varela