Present status and future prospect of Pacific bluefin tuna aquaculture in Japan

October 2013
Maruha Nichiro SeaFoods, Inc.
Aquaculture Operation Department
Akira Itoh
1. Introduction of Maruha- Nichiro Group’s efforts on bluefin tuna aquaculture

2. Present state of Japanese bluefin tuna aquaculture

3. Future prospect of bluefin aquaculture
Introduction of Maruha-Nichiro Group’s efforts on bluefin tuna aquaculture

1. Taiyo A & F Co., LTD. (TAFCO)

* The first company that started tuna farm business both in Morocco and Japan in 1985

* Number of stations: 4

* Annual harvest: 1,500 tons
  25,000–30,000 fish
Introduction of Maruha-Nichiro Group’s efforts on bluefin tuna aquaculture

2. Maruha Nichiro Seafoods, Inc. (MNSF)
   * The first private company that produced artificial seedlings and succeeded the full-cycle culture of Pacific bluefin tuna.
     Next to Kinki Univ.

   * Number of stations: 4

   * Annual harvest: 1,500 tons
     30,000 fish
Present state and future prospect of Japanese bluefin tuna aquaculture

1. Basic system of Japanese style tuna farming
2. Rapid raise of production
3. Cost competition
Securing of juvenile tuna

Tsushima
Goto
Kashiwajima
Tosa Bay
Kii Channel
Kumano Coast
Oki

15~25cm
Feed tailored to growth of tuna

Carefully examined feed

Fresh frozen chub mackerel
'Tunafood' (Patent acquired)

Features (sausage type)
• Nutritional composition adjustable
• Length and thickness can be adjusted to suit fish size
• Environmentally friendly (no feed waste or dripping)
State of aquaculture in Japan

- Total annual production (tons)
- Total numbers of company

- Estimated figure

Graph showing the growth in aquaculture production in Japan from 2001 to 2012. There is a sudden growth in production around 2009.
Potential capacity of production

(1) Wild juveniles (Yokowa)
535,000 Juveniles \times 70\% \times 50\text{kg} \\
\Rightarrow 17,000\text{tons}
(limits of Fishries Agency of Japan)

(2) Artificial seedlings
might be…
200,000\text{seedlings} \times 70\%\times 50\text{kg} \\
\Rightarrow 7,000\text{tons in 2020} \ ???

\Rightarrow 24 \text{kilo tons in total ?}
Main area of the stations
Growth difference between Amami and Kumano
Composition of the cost in Amami station

- Diet: 53%
- Fixed cost: 40%
- Fingering: 7%
Composition of the fixed cost

- Repair cost, Rent
- Material Cost 20%
- Fuel, Ropes, Nutrient
- Depreciation 15%
- Insurance 13%
- Etc. 23%
- Labor cost 29%

Composition of the cost in Amami station
- Diet 53%
- Fixed cost 40%
- Fing Erin 7%
### How to cut the cost of Diets down

<table>
<thead>
<tr>
<th>Character of Diets</th>
<th>Raw fish</th>
<th>Moist Pelet</th>
<th>Artificial food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit price</td>
<td>○</td>
<td>◎</td>
<td>△</td>
</tr>
<tr>
<td>Feed conversion ratio</td>
<td>○</td>
<td>○</td>
<td>△</td>
</tr>
<tr>
<td>Apetite</td>
<td>◎</td>
<td>◎</td>
<td>×</td>
</tr>
<tr>
<td>Quality controll</td>
<td>△</td>
<td>○</td>
<td>◎</td>
</tr>
<tr>
<td>Transportaion cost</td>
<td>×</td>
<td>△</td>
<td>◎</td>
</tr>
<tr>
<td>Potential</td>
<td>×</td>
<td>△</td>
<td>◎</td>
</tr>
</tbody>
</table>

◎: very good ○: good △: medium ×: bad
Method

Fig. Schematic diagram of an ex vivo stomach culture apparatus for bluefin tuna. St, stomach; CM, culture media in a glass beaker; CP, stirring cool plate for temperature regulation; Gas, 98% O₂-2% CO₂ gas mixture; M, test proteins or meals suspended with artificial sea water.
<table>
<thead>
<tr>
<th>Maruha Nichiro Group’s Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial breeding: research and development of techniques to nurture healthy strains of bluefin tuna</td>
</tr>
<tr>
<td>Development of blended feed for tuna: raising tuna using only ‘Tunafood’ on an operational basis (ongoing)</td>
</tr>
<tr>
<td>Challenge of offshore fisheries: improvement of submarine type cages by TAFCO</td>
</tr>
</tbody>
</table>
Please check our URL
http://www.fish.maruha-nichiro.co.jp
http://www.fish.maruha-nichiro.co.jp/yokatoto/index.html