Economically feasible fish feed for GIFT Tilapia (*Oreochromis niloticus*) food fish culture in Sri Lanka

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Introduction:

Tilapias are

• hardy fish
• well established in water bodies of Sri Lanka
• mainstay of reservoir fisheries
• cheap animal protein source for the poor people

it has a big demand
• Among these Tilapia varieties, recently introduced (2001) GIFT Tilapia (Oreochromis niloticus species) has shown better performance in aquaculture practices than reservoir fisheries.
Accordingly, it could be used in aquaculture practices

- cage culture
- pen culture
- pond culture

To enhance the tilapia production beyond the level of consumption of the rural poor population

Aiming Urban Markets
Large & Medium Perennial Reservoirs

Mud ponds in Mahaweli area

Small Perennial Reservoirs

Hill country Estate ponds

Ragangana Reservoir
Abandoned shrimp ponds and clay pits are new resources that could be used in Aquaculture
Most of the farmers use Poultry feed as it is cheaper than fish feed available in market

Poultry Feed = Rs. 70.00/kg (0.65 US$)

Fish Feed = Rs. 160.00/kg (1.05 US$)
Feed cost is the highest operating cost in semi-intensive aquaculture practices in Asia (De Silva, 1988)
Objective

- Introduce an economical feed for GIFT Tilapia food fish culture (semi-intensive culture)
Methodology

Trial was carried out in an abandoned clay pit.

Area = 1.5 ha

Depth = 4 - 5 m
Prepared 9 plastic mesh cages.

Size of cages:
- Length = 1m
- Width = 1m
- Height = 1m

Capacity = $1m^3$. 
Advanced Fingerlings of GIFT Tilapia were stocked in these cages

Stocking density = 100 fingerling /m$^3$
(100 fingerlings /cage)

Mean Length = 9.7 ± 2.08 cm;
Mean weight = 18.7 ± 12.07 g)
GIFT Tilapia Advanced Fingerlings were obtained from Aquaculture Development Centre in Dambulla
Two economical Feeds (Feed-A & Feed-B) were formulated.

Protein % was adjusted through Pearson's Square method as 20.

Ingredients were mixed through Electronic Mixer

Prepared as dough in situ
Tested these 2 feeds with control feed (poultry feed) in triplicate
<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Feed-A</th>
<th>Feed-B</th>
<th>Control feed (Poultry feed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poonac</td>
<td>Poonac</td>
<td>Poonac-8</td>
<td></td>
</tr>
<tr>
<td>Ricebran</td>
<td>Ricebran</td>
<td>Ricebran-18.6</td>
<td></td>
</tr>
<tr>
<td>Fm(Malaysian)</td>
<td>Fm(Malaysian)</td>
<td>Fm(999)-8</td>
<td></td>
</tr>
<tr>
<td>Soybean meal</td>
<td>Soybean meal-20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin premix</td>
<td>Vitamin premix</td>
<td>Vitamin premix-0.3</td>
<td></td>
</tr>
<tr>
<td>Wheat flour (Binder)</td>
<td>Wheat flour (Binder)</td>
<td>Raw rice-10</td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td>Maize-33.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shells</td>
<td>Shells-1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20% protein</td>
<td>20% protein</td>
<td>20% protein</td>
<td></td>
</tr>
</tbody>
</table>
• Feed provided twice /day according to 5% of body weight

• Random sampling was carried out monthly & Feed amounts were adjusted accordingly

• Culture period was lasted 125 days
• Following indices were determined

1). Average Daily Growth (ADG)

2). Specific Growth Rate (SGR)

3). Condition Factor (CF)

4). % Survival

5). Feed Conversion Ratio (FCR)

6). Cost of feed
SGR-W  =  Ln Final weight−Ln Initial weight x 100
Exp. duration

ADG  =  Final weight of fish- Initial weight of fish
       Days of rearing

FCR  =  Weight gained by fish (g) x 100
       Weight of feed consumed (g)
CF = \frac{W \times 100}{L^3} \quad \text{Ricker, 1977}

\% \text{ Survival} = \frac{\text{No. of fish harvested} \times 100}{\text{No. of fish stocked}}
Water quality data were measured

- Temperature °C
- pH
- Dissolved Oxygen (mg/l)
- Total Ammonia Nitrogen (mg/l)
Results

Specific Growth Rate

<table>
<thead>
<tr>
<th>Feed</th>
<th>22 day</th>
<th>63 day</th>
<th>125 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed-A</td>
<td>0.52</td>
<td>1.26</td>
<td>1.06</td>
</tr>
<tr>
<td>Feed-B</td>
<td>2.43</td>
<td>1.7</td>
<td>1.29</td>
</tr>
<tr>
<td>Feed-C</td>
<td>0.03</td>
<td>1.26</td>
<td>1.04</td>
</tr>
</tbody>
</table>
Average Daily Growth (ADG)

<table>
<thead>
<tr>
<th>% ADG (g/day)</th>
<th>22 day</th>
<th>63 day</th>
<th>125 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed-A</td>
<td>5.27</td>
<td>18.62</td>
<td>21.55</td>
</tr>
<tr>
<td>Feed-B</td>
<td>32.12</td>
<td>29.9</td>
<td>31.23</td>
</tr>
<tr>
<td>Feed-C</td>
<td>1.74</td>
<td>18.8</td>
<td>20.77</td>
</tr>
</tbody>
</table>
% Survival

Not significantly different (P>0.05)
Condition factor

![Bar chart showing Condition factor for Feed-A, Feed-B, and Feed-C.]

- Feed-A: 1.8617
- Feed-B: 1.9373
- Feed-C: 2.1077

Not significantly different (P > 0.05)
### Feed Conversion Ratio (FCR) and Cost of Feed

<table>
<thead>
<tr>
<th></th>
<th>Feed-A</th>
<th>Feed-B</th>
<th>Feed-C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FCR</strong></td>
<td>2.03</td>
<td>1.69</td>
<td>1.99</td>
</tr>
<tr>
<td><strong>Cost of Feed (US$)</strong></td>
<td>0.59</td>
<td>0.48</td>
<td>0.61</td>
</tr>
</tbody>
</table>
Water quality data were not significantly different (p>0.05)

• Temperature  27-30 °C
• pH      7.5 – 8.5
• TAN  0.001 -0.003
Conclusion

• Feed-B could be recommended as an economical feed for Tilapia (GIFT strain) food fish culture (semi intensive culture).
Recommendations

• This feed should be provided to the market in pellet form for the convenience of farmers.
Acknowledgements

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Thank you