Catfish Efficiency

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Selecting Broodstock

- Use disease resistant strains
- Stock at reasonable densities and move fish as they grow larger than 10 pounds
- Use fast growing and aggressive strains
- Sort your brooders each year for good traits
- Keep brooders well-fed and in good water quality
Stocking Fry

- Choose an ending size and stock accordingly
- Never stock more than 200,000 per acre - 150,000 or less is better
- Consider vaccination
- Stock when pond is properly prepared
Selecting Fingerlings

- Plan ahead to buy when fingerlings are in good condition.
- Buy the largest fingerling you can afford and at least a 4 inch size.
- Know the health history of the fingerlings you use, visit the hatchery.
- Inspect all fingerling deliveries for health and size.
Stocking Catfish for Fast Growth

- Plan to harvest catfish within 5-6 months after stocking.
- Densities of 5,000 to 7,500 catfish per acre are most successful.
- Restock fingerlings only after most of the older catfish have been harvested.
- Stock in Feb-April or Sept-Nov if possible.
Harvest at 1.5 pounds or larger
Basics of Successful Feeding

- Know the nutritional requirements
- Feed the proper form and size
- Study fish feeding behavior
- Keep good records
Catfish Nutrient Requirements

- Protein
data: 28 to 36%
- Fiber
data: > 4%
- Vitamin C
data: 80 mg/kg Stable C
- Other Vitamins
data: Complete (12 items)
- Minerals
data: P, Zn, Co, Cu, I, Se, Mg, Fe, Ca
Feed Form and Size

- Pellets are packages of complete diet
- Water stable for 20 to 30 minutes
- Floating pellets cost more but may be more efficient for warm water fish
- Feed size that smallest fish consume
- 5/32 to 3/16 in diameter pellet
Feed Forms and Sizes
## Feed For the Size Catfish

<table>
<thead>
<tr>
<th>Size</th>
<th>% Protein</th>
<th>Pellet Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fingerling</td>
<td>35 to 40</td>
<td>1/16 to 3/16 in</td>
</tr>
<tr>
<td>Grow-out</td>
<td>28 to 32</td>
<td>3/16 to 3/8 in</td>
</tr>
<tr>
<td>Brood fish</td>
<td>25 to 30</td>
<td>3/8 and larger</td>
</tr>
</tbody>
</table>
How Much to Feed?
-Choose a Method

- Restricted Feeding Based on Weight of the Catfish
- Computer Simulations
- Satiation Feeding Based on Field Observations
- Account for Warm or Cold Weather and the ESC Feeding System
Use Experienced Workers for Feeding Duties and Decisions
How much feed is enough?

- Are you feeding enough for growth, or just enough for maintenance?
  - The 5 minute rule = restricted feeding
  - The 20 minute rule = satiation
Most fish are under-fed.

- Over-stockling causes limits on feeding
  - 100 lb/A/day = 3,333 lbs/A
- Method of feeding misses some fish
  - Large ponds, small feeding areas = unfed fish
- Once a day feeding restricts daily feed intake
  - Fish benefit from multiple feedings
Warm Weather Feeding of Catfish

- Start with 32% protein in Spring (smaller fish at start of season)
- Feed 28% protein in warmer weather
- Feed once per day until temperatures reach 95 F
- In hot weather feed every 2nd or 3rd day
- Set an amount between 100 and 120 pounds per acre per day as Maximum
What Protein Content to Feed?

- No significant difference between 28% and 32% protein feed in a commercial setting (goal of 2 pound catfish)
- **However, higher protein is better for catfish less than 1 pound**
- Research has shown that 35 to 36% protein has more efficient feed conversion for catfish, $\frac{1}{2}$ to 1 pound
## Cost Benefit Comparisons
Example (lower prices)

<table>
<thead>
<tr>
<th>Protein</th>
<th>Cost per ton*</th>
<th>Feed /Gain</th>
<th>Cost per pound fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>28%</td>
<td>$280</td>
<td>2.0</td>
<td>$0.28</td>
</tr>
<tr>
<td>32%</td>
<td>$350</td>
<td>1.8</td>
<td>$0.32</td>
</tr>
<tr>
<td>36%</td>
<td>$400</td>
<td>1.6</td>
<td>$0.32</td>
</tr>
</tbody>
</table>

*Actual costs vary with feed source and pricing.*
### Cost Benefit Comparisons

Example (higher prices)

<table>
<thead>
<tr>
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<th>Cost per ton*</th>
<th>Feed /Gain</th>
<th>Cost per pound fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>28%</td>
<td>$380</td>
<td>2.0</td>
<td>$0.38</td>
</tr>
<tr>
<td>32%</td>
<td>$415</td>
<td>1.8</td>
<td>$0.37</td>
</tr>
<tr>
<td>36%</td>
<td>$450</td>
<td>1.6</td>
<td>$0.36</td>
</tr>
</tbody>
</table>

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Bulk Feed Delivery at a Commercial Fish Farm

1,000 Pounds per DAY for 10 Acres of Pond
Cold Weather Feeding of Catfish

- Below 70 F, feed three times weekly
- Choose warm days to feed
- Winter feeding prevents weight loss
- Small fish should be winter fed
- Large catfish may not need winter feeding
- Nutrient concentrated, 25% protein
ESC Feeding System

- Feeding may affect the way ESC bacteria cause disease epizootics
- Heavy feeding may result in high losses
- Restrict feeding as cool fronts approach
- Feed 1/2 the daily ration until the cool front passes
- Does satiation feeding stress catfish?
for ESC disease
Calculating a Restricted Feeding Rate at 3% per day

- Weight of fish $\times 3.0\%$

- Amount feed / Conversion
  
  $= \text{Weight of Fish Gain}$

- Initial Weight $+$ Weight of fish gain $\times 3\%$
  
  $= \text{New Feeding Rate}$
Catfish Feed Consumption

- At optimum Temperature (78 to 82 F)
- 60 to 300 lb/1000 feed 2.5 - 4.5% BW
- 750 to 1000 lb/M feed 1.3 - 2.5% BW
- Above 1000 lb/M feed 1.0 - 1.2% BW
How fish are counted

- **Weight per thousand**
  - 10 lb/thousand = 0.01 pound /fish
  - 50 lb/thousand = 0.05 pound /fish

- **Inch groups**
  - 3-5 inch /fish average of 4 inch fish
  - 5-7 inch/fish average of 6 inch fish
Catfish Feed Rate per Day at Different Sizes, lb/1000

At 78 to 82 degrees F
Factors that Affect Feeding Behavior in a Negative Way

- Dissolved oxygen below 4.0 ppm
- Cool or hot water temperatures
- Changes in pond water level
- Disturbance by seining, etc.
- Disease
- Presence of aggressive fish
- Time of day (early morning – low DO high CO₂)
Channel Catfish Growth at Different Densities (lb/1000)

The University of Georgia
Feeding Caged Catfish

- Higher protein, 36 to 38%
- Must be complete
- Feed once daily
- Use automatic feeders to reduce labor
- Use feed rings or skirts to retain feed
- Stock 6-8 inch fingerlings and minimize time in cages
Reduce the Stress on Your Catfish

- Keep dissolved oxygen levels at 4.0 ppm or higher.
- Maintain a chloride level of at least 50 ppm by adding salt.
- Maintain at least 50 ppm alkalinity by liming.
- Handle fingerlings and food fish carefully during harvest and stocking, avoid crowding in baskets or tanks.
Chemistry is part of Aquaculture
Use Adequate Aeration – 1-4 HP/A
Disease Treatments

- Few approved
- Few cost effective for sport fish ponds
- Chemicals
  - Salt
  - Permanganate – oxidize organic matter
  - Formalin – parasite control
  - Copper – algae control
  - Medication for catfish and salmonids only
    - Terramycin or Romet
Aeromonas hydrophila
The University of Georgia

Saddle-back Lesion (F. columnare)
Proliferative Gill Disease
Costia effects on catfish skin
Multiple Pathogens

- Correct identification is important
- Feed medicated feed while disease is in early stages
- Prevent bacterial disease from overcoming fish already weak from parasite infestation
Summary

- Stock healthy and fast growing fish
- Feed the correct form and size
- Monitor and control water chemistry
- Reduce stress to prevent disease
- Treat diseases early
- Harvest to match the market requirement