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
- Fiber
- Vitamin C
- Other Vitamins
- Minerals

- 28 to 36%
- > 4%
- 80 mg/kg Stable C
- Complete (12 items)
- 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
Catfish Feeding Activity

The University of Georgia
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-stocking 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>
<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>$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>

*Actual costs vary with feed source and pricing.
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 $+ \text{Weight of fish gain} \times 3\%
  = \text{New Feeding Rate}$
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)
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
Saddle-back Lesion (F. columnare)
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