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# Catfish Efficiency

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# Selecting Broodstock

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- 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

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- 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

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- 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

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- 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

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

# Catfish Nutrient Requirements

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- 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

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- 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

Size	% Protein	Pellet Size
Fingerling	35 to 40	1/16 to 3/16 in
Grow-out	28 to 32	3/16 to 3/8 in
Brood fish	25 to 30	3/8 and larger

# 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



# How much feed is enough?

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- 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.

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- 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?

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- 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, ½ to 1 pound

# Cost Benefit Comparisons

## Example (lower prices)

Protein	Cost per ton*	Feed /Gain	Cost per pound fish
28%	\$280	2.0	\$0.28
32%	\$350	1.8	\$0.32
36%	\$400	1.6	\$0.32

# Cost Benefit Comparisons

## Example (higher prices)

Protein	Cost per ton*	Feed /Gain	Cost per pound fish
28%	\$380	2.0	\$0.38
32%	\$415	1.8	\$0.37
36%	\$450	1.6	<b>\$0.36</b>

# 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

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- 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 X 3.0 %
- Amount feed / Conversion  
= Weight of Fish Gain
- Initial Weight + Weight of fish gain X 3%  
= New Feeding Rate

# Catfish Feed Consumption

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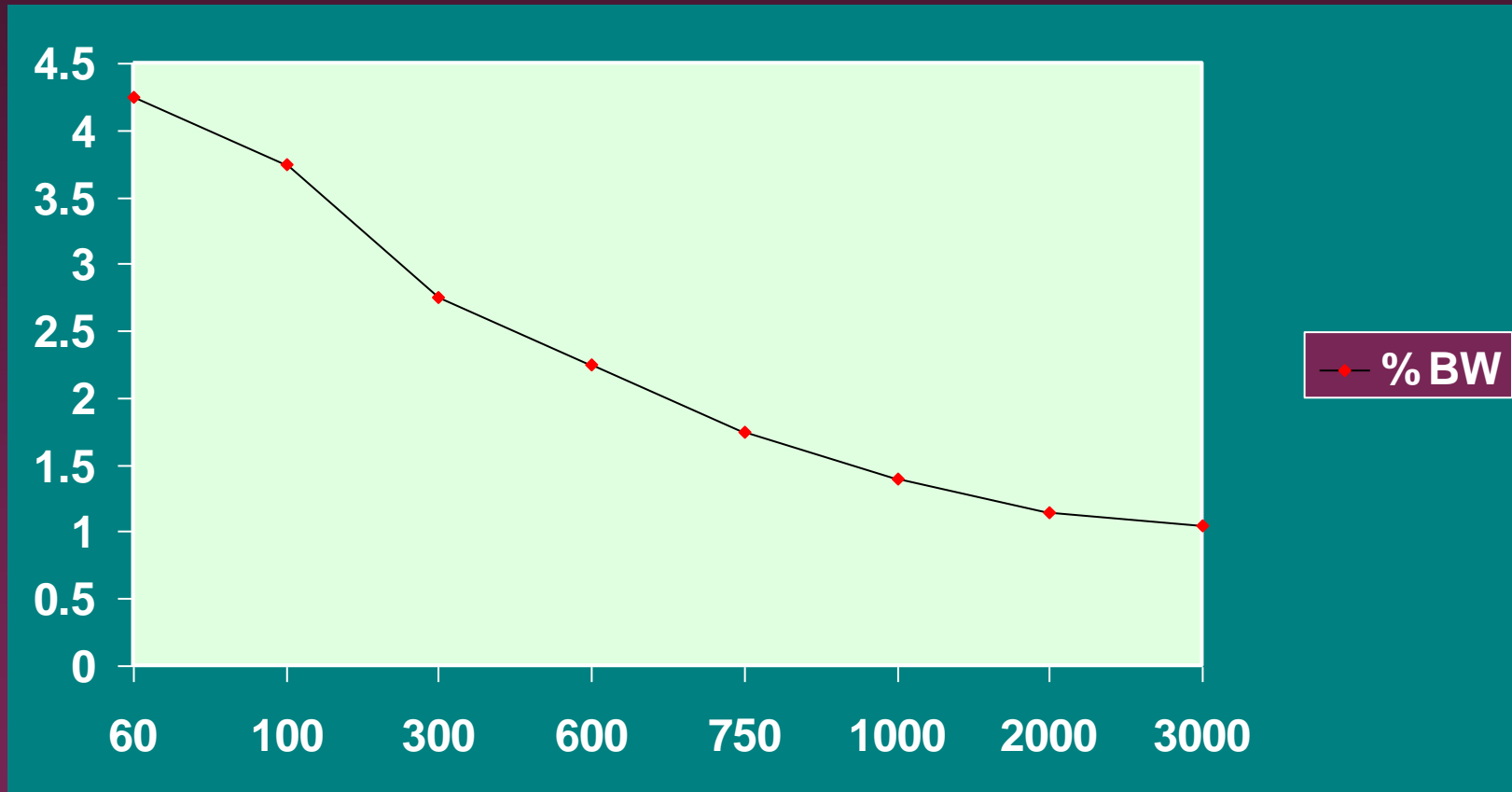
- At optimum Temperature ( 78 to 82 F)
- 60 to 300 lb/1000 feed 2.5 - 4.5% BW
- 750 to 1000 lb/M feed 1.3 - 2.5% BW
- Above 1000 lb/M feed 1.0 -1.2 % BW

# How fish are counted

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- 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

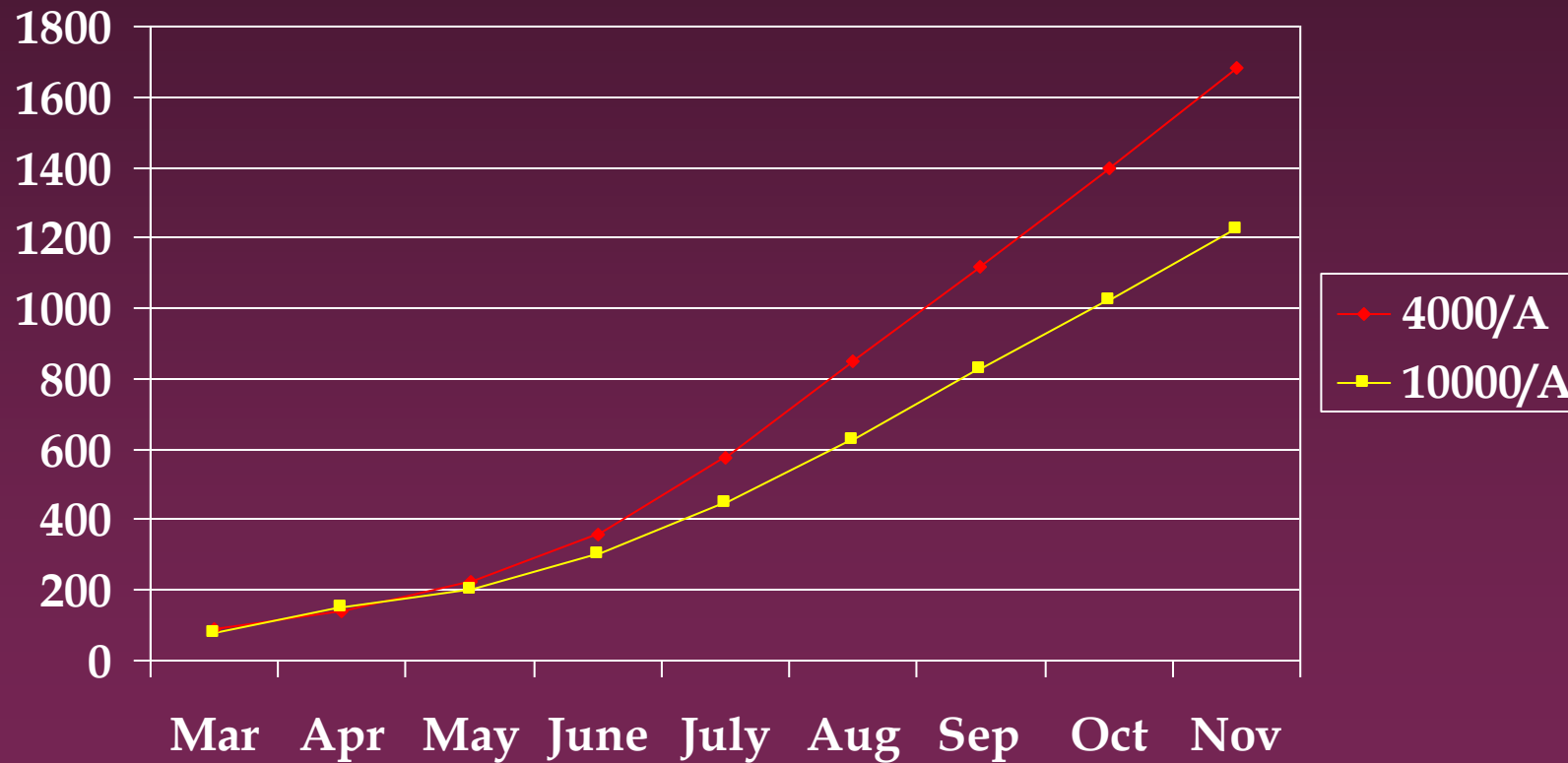
# Catfish Feed Rate per Day at Different Sizes, lb/1000



# 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 CO<sub>2</sub>)

# Channel Catfish Growth at Different Densities (1b/1000)



# Feeding Caged Catfish

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- 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

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- 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

A photograph of a fish, possibly a salmon, lying on a light-colored surface. The fish's body is covered with several large, circular, reddish-brown lesions, which are characteristic of bacterial infections like Aeromonas hydrophila. The lesions are concentrated on the upper part of the fish's body, near the dorsal fin. The background is a plain, light-colored surface.

***Aeromonas hydrophila***



Saddle-back

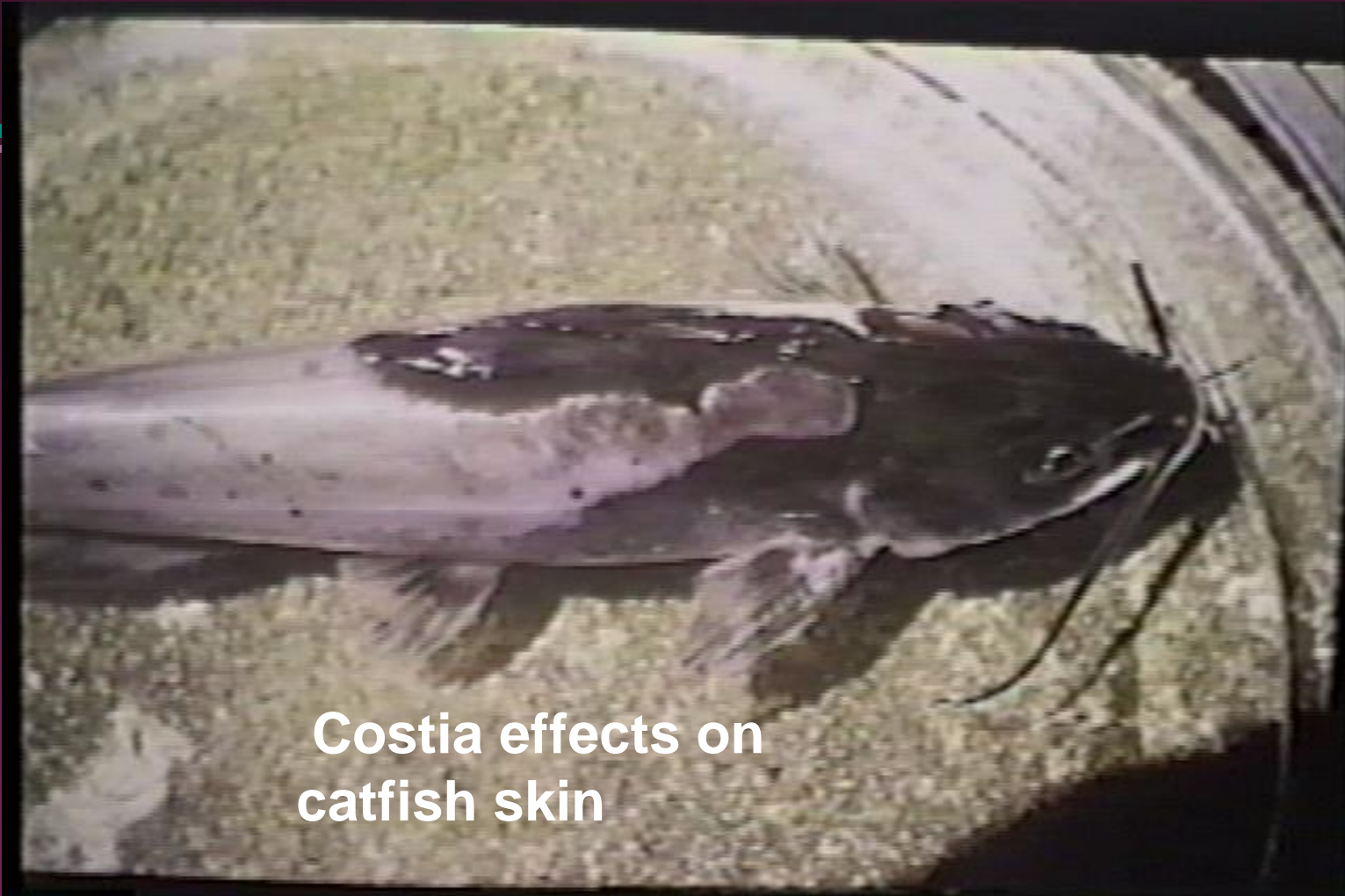
Lesion (*F. columnare*)





*Ichthyophthirius multifiliis*





**Costia effects on  
catfish skin**





# Multiple Pathogens

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- 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

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- 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