Understanding Market Channels and Alternatives for Commercial Catfish
Aquaculture Markets & Marketing

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Department of Fisheries and Allied Aquacultures
Auburn University

Marketing Module Contents

- Supply and Demand
- Markets, Marketing and Market Channels
- Marketing by producers
- Marketing skill inventory
- Marketing opportunities
- Market Maker
**Market or Marketing?**

What is a market?
- Supply and Demand for Seafood, Catfish

![Graph showing supply and demand for seafood, catfish](image)

**World Fish Supply**

![Graph showing world fish supply](image)
Imported Catfish, Monthly
1990 - 2010

U.S. Catfish Industry- Overview of Catfish Supply and Distribution
### U.S. Top Ten Seafoods, per-capita consumption

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Pangasius (0.356)
Thus, we need to understand MARKETS and MARKETING,…, for the survival of the US farm-raised catfish industry!
Marketing Economics

• Individual Firm Marketing
  – Is there a market for the product?
  – What is the market potential of the product?
  – What are the factors affecting the demand and prices of the product?
  – What market segments can be penetrated?
  – Can the product be distributed and sold efficiently?
  – What are the institutional constraints?

A Market is:

• An arena for organizing and facilitating business activities for answering the following basic economic questions:
  – What to produce
  – How much to produce
  – For whom to produce
  – How to distribute production
  – …and at what PRICE?
Marketing of Aquacultural Products

- Marketing of aquacultural products is:
  - The performance of all business activities involved in the flow of products and services from the point of initial production until they are in the hands of consumers
  - Management process responsible for finding out what customers need and supplying them as efficiently and profitably as possible
  - Marketing begins on the farm and ends with the satisfied customer

Marketing Channel
Marketing is Productive

• It creates UTILITY
  1. **Place** – transfer of the fish from farm gate to supermarket
  2. **Time** – overwintering of live fish or storage of processed fish products
  3. **Form** – the transformation of fish into fillets
  4. **Possession** – the consignment of fish from wholesale to retailer

Marketing Functions

1. **Exchange** – transfer of title of fish
   A. **Buying** (assembling) of fish or fish products
      • Seeking sources of supply
   B. **Selling**
      • Merchandising – physical arrangements or display of goods
      • Advertising and other promotional efforts
         — To influence or create demand for fish
      • Packaging
Marketing Functions

2. **Physical** – solving the problems of when, what and where
   
   A. **Storage** of the fish product
      - Making fish available at the desired time
      - Either in the pond, holding tanks, refrigerators, or in warehouses
   
   B. **Transportation**
      - Making fish available at the appropriate place
   
   C. **Handling and processing**
      - Freezing, drying, salting, smoking, canning, fish reduction

Marketing Functions

3. **Facilitating** – smooth performance of the exchange and physical functions
   
   A. **Standardization**
      - Establishment and maintenance of uniform measurements and grades
   
   B. **Financing**
      - Use of money to carry on the various aspects of marketing
   
   C. **Risk bearing**
      - Acceptance of the possibility of loss in the marketing of the fish product
   
   D. **Market intelligence**
      - Collecting, interpreting, and disseminating the large variety of data necessary for the smooth operation of the marketing process
Marketing Channel

- Institutional structure needed for movement and exchange to take place
  - If product is marketed through a structured channel, relatively good records are maintained
  - As product moves from producer to consumer there is a flow of information generated
  - This is essential to any marketing channel

Marketing Channel

- If there is mutual agreement over the conditions of the sale, a physical transaction flow involving the product and payment will occur

- Examples of how Market Channels are depicted
Distribution Channels for Fish do:
- Add costs at each additional level
- Add value at each level
- Add higher price at each level
‘Price Taker’ or ‘Price Maker’

• Large volume producers are typically selling to processors set up to accept large volumes of fish
  — Producer is a “price taker”

• Smaller volume producers can sell their products directly
  — Can be “price makers” when not competing with larger suppliers

Marketing

Inventory of Resources and Talents
## Inventory of Resources and Talents

### Marketing Skills

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<tr>
<th>Question</th>
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<td>Are your skills best suited to marketing traditional agricultural commodities</td>
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<td>Would you rather be in the field than negotiating with buyers?</td>
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<td>Do you feel time on the phone is time wasted?</td>
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<td>Do you negotiate input costs?</td>
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<td>Do you lock in a profit when it is offered to you?</td>
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<th>Question</th>
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<td>Do you have skills suited to marketing niche market, value added, wholesale, or retail products</td>
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<td>Do you know how to estimate the market for a product?</td>
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<td>Are you good at closing a deal?</td>
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<td>Do you develop positive relationships with buyers and sellers?</td>
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<td>Do you have skills in advertising and promotion?</td>
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<td>Are you good at making pricing decisions?</td>
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<td>Do you know who your competitors are?</td>
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<td>Do you target your products at a specific market?</td>
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Evaluation of Marketing Skills

• Many agricultural producers have no experience in:
  — Estimating market size
  — Target marketing
  — Advertising and promotion
  — Pricing

• Options:
  — Concentrate on improving production efficiencies in commodity agriculture
  — Take classes, attend seminars, and learn skills needed for niche marketing, direct marketing, selling to wholesalers or directly to retailers

Options to Improve Profitability

Increase the Profit Margin

Successful managers continually try to pry the profit margin apart by:

• Reducing the cost of production
• Increasing the market price received
Options to Improve Profitability

Increase the Market Price
- Marketing skills can make a big difference in profitability.
- Some grains net only 20 to 30 cents per bushel, a 10 cent price increase can increase net income by 33-50 percent.

Expand the Business
- Expanding the business has allowed many to generate sufficient income to continue to support their family.
- As profit margins have tightened, sometimes the size of the business just isn’t adequate to support the families involved.
Options to Improve Profitability

Expand the Business

• When considering an expansion, care should be taken when doing financial planning to verify the expansion will improve your financial situation.

• If the profit margin is in fact negative, or the added volume will cause overhead costs to increase, an expansion may just put your business in a deeper financial hole.

Options to Improve Profitability

Creative Innovative Alternatives

• Many producers are looking for ways to improve income, some have very successfully developed innovative strategies to increase profits.

• These may include new farm-based businesses or investing in value-added businesses.
Options to Improve Profitability

Producers have developed many strategies including:

- Value-added products
- On-farm processing
- Direct marketing
- Niche products and markets
- Recreational & agri-tourism opportunities
- Contracts with businesses & municipalities

Marketing Opportunities
Marketing Alternatives

Key marketing concepts
Marketing margin
• Difference between farm price of a raw commodity and retail price of a finished food product
• Represents amount of money available to pay for marketing services (e.g., transportation, storage, processing and packaging)

Marketing Alternatives

• Many alternative marketing strategies represent an effort by the producer to capture more of the marketing margin
• For any alternative marketing strategy
  – increase in returns must be enough to compensate the producer for additional marketing activities being performed
Marketing Alternatives

It is important to understand consumer preferences
• Capitalize on existing demand rather than try to create demand
• Understand what consumers want in terms of product form
  — Fresh vs. frozen product
  — Steaks vs. fillets
  — 3-5 oz fillets (1.5 lb live fish)

Marketing Alternatives

Potential catfish marketing alternatives
• Sales to processors
• Direct sales
  — To wholesalers, retailers, restaurants
  — To final consumers
  — Fee fishing
  — Live haul sales
Marketing Alternatives

Sales to processors

• Advantages
  — Outlet for large volume of fish
  — Available year-round

• Disadvantages
  — Producer is a price taker (no negotiating power)
  — No guarantee that processor will buy your fish

Marketing Alternatives

Key information for comparing processors

• Historical prices paid for fish; dockage rates
• Required stock purchases or billbacks
• Transportation charges
• Payment frequency; typical time from delivery of fish to receipt of payment
• Delivery volume requirements; delivery quotas; scheduling patterns
• Fish size requirements; quality standards
• Availability of contracts; contract terms/conditions
• State bonding requirements
Marketing Alternatives

Direct sales to wholesalers, grocers, restaurants

• Advantages
  —Potentially high margin

• Disadvantages
  —Difficult to establish relationships
  —Retailers may have strict requirements for suppliers
    • Quality and/or volume considerations
  —Likely to require on-site processing
    • HACCP plan
  —Product liability

Marketing Alternatives

Direct sales to consumers

• Advantages
  —Potentially high margin

• Disadvantages
  —Typically low volume
  —Can be very time consuming
Marketing Alternatives

Direct sales to consumers vs. direct sales to wholesale/retail outlets

- HACCP requirements and product liability may be less of an issue than for sales to retail outlets
  - Depends on product form
- Need to conform to a particular retail outlet’s product standards is eliminated

Marketing Alternatives

Fee fishing

- Advantages
  - High margin outlet
  - Does not require further processing
- Disadvantages
  - High labor requirements
  - Inconsistent and highly seasonal sales
  - Relatively low volume
Marketing Alternatives

Live haul sales
- **Advantages**
  - Higher margin than sales to processors
- **Disadvantages**
  - Typically low volume
  - Inconsistent sales

Market Maker
A Market Planning Tool for Direct Marketers
Market Maker is a comprehensive state and regional directory of food producers and buyers.

Includes:
- All fresh and processed foods
- All levels of production from farm to retail
- Data accessible from a growing number of partner states
  - 16 states and Washington, D.C.
  - Alabama is next to come on line!

Market Maker
Headed toward a regional/national buying and supplying network

- Regional development
- New tools and capabilities expected to be added
- Buyers increasingly drawn to “regional” product searches
- Great opportunity for specialty products
Register Your Business

Welcome to the MarketMaker registration site! This is where you sign up your business to be included in our database. There are 3 ways you can do this:

1. Complete the online registration process by clicking on the drop down menu below and selecting the type of business you are. Fill in the information about your business that is asked and submit it for inclusion on our site.
2. Contact Sandy Shadley by phone at 309/780-2000 and ask her to either mail you a registration form or have her complete your registration while you are talking on the phone.
3. Email Sandy Shadley at sandys@msu.edu, and request that she mail you the correct registration form for the products you sell.

Online Registration:
To register, select the type of business from the drop down menu. Complete the steps to the registration form. If you are a supplier/producer, you will have the option to add as many products as you produce.

Registration forms that are completed, processed, and entered into the database. Once your registration is processed, verifying the information. You should contact MarketMaker staff at 309/780-2000 to verify any information. We respect the privacy of our customers and, therefore, will not sell or otherwise intentionally release your personal information to any third party. You always have the option of removing your information from our database.
Site Development Partnership

• More Information Coming Soon

• Auburn University
• Alabama Cooperative Extension Service
• Alabama Department of Agriculture
Marketing Alternatives

Key questions
• Will higher returns from alternative marketing strategy cover additional costs associated with the alternative?
• Is the alternative marketing strategy compatible with available resources and consistent with business and family goals?

Conclusions
• The marketing concept begins by knowing what the consumer wants and working back from the consumer level through each market channel level to assure each level provides the needed actions to ensure proper value addition occurs
Conclusions

• Market channels provide informational flow, product flow, and information among the agents involved from production through consumption

• Coordination is required for goods and services to be moved in an orderly fashion from fish producers to fish consumers

Conclusions

• Marketing functions include:
  – **Coordination** – orderly flow of product, information, financing from producer to final consumer
  – **Exchange** – transfer of title of fish
  – **Physical** – solving the problems of when, what and where
  – **Facilitation** – smooth performance of the exchange and physical functions

• An institutional structure is needed for movement and exchange to take place
Conclusions

• An inventory of marketing skills may indicate whether non-traditional outlets for your product would be an appropriate alternative.

• It is important to understand consumer preferences:
  — Easier to tap into existing demand than to create new demand.

• Potential catfish marketing alternatives involves sales to processors or direct sales, each having their advantages and disadvantages.

Conclusions

• Will higher returns from alternative marketing strategies cover additional costs associated with the alternative?

• Is the alternative marketing strategy compatible with available resources and consistent with business and family goals?
The End

Questions
The Efficient Use of Chemicals on Catfish Farms

Gregory N Whitis
Extension Aquaculturist
Alabama Cooperative Extension System

Current list of Approved Chemicals

Chemicals Used for Disease Control
Antibiotics used in feeds
  Florfenicol (Aquaflor)
  Oxytetracycline dehydrate (Terramycin)
  Sulfadimethoxine and ormetoprim (Romet)

Formalin products
  Parasite S, Parasite F and Formacide B
Hydrogen peroxide
MS 222 products Finquel and Tricaine
Diuron
Chemicals currently unapproved with low regulatory status

- Can be used in the following conditions
  - Proper use is warranted for the conditions
  - Use at recommended rates
  - Follow good management practices
  - Use an appropriate grade for foodfish
  - Use in an environmentally safe manner

Low regulatory status

- Acetic acid
- Calcium carbonate (agricultural lime)
- Calcium chloride
- Calcium oxide (quick lime)
- Calcium hydroxide (hydrated lime)
- Calcium Sulfate (gypsum)
- Carbon dioxide gas
- Magnesium sulfate
- Potassium chloride
- Povidone iodine
- Sodium bicarbonate (baking soda)
- Sodium chloride (salt)
- Sodium sulfite
- COPPER SULFATE
- POTASSIUM PERMANGANATE
Herbicides

- As of August 2010 there were no approved herbicides except for copper sulfate and hydrogen peroxide products allowed for use in foodfish ponds.

- This includes endothal, 2,4 D, diquat, glyphosate, fluridone, imazapyr, triclopyr, and carfentrazone

Agricultural Lime

Calcium carbonate (CaCO₃)
Uses
- Neutralize acidic soils – raise total alkalinity
- May aid in reducing muddiness of water
- Raises total hardness too
- May act as a pH buffer in low alkalinity waters

Needs
- Catfish ponds should have a minimum total alkalinity of 30 ppm.
- Most black belt ponds have a range of 50-150 ppm.

Rate of application
- 1-4 tons per surface acre.

Downside to using in a catfish pond unnecessarily
- Promote the availability of free phosphorous in water column
- As alkalinity increases, the rate of copper increases also
Hydrated lime
Calcium hydroxide  Ca(OH)₂

Uses
- Immediate increase of pond pH
- Reduction of carbon dioxide
- Sterilization of pond muds
- Fish eradicant
- Remove turbidity

Not Recommended
- Remove off flavor

“There is no research to verify its effects on off flavor and no reason to suspect that it will.” CE Boyd

The Hydrated Lime Formula

- For prairie ponds
  Hydrated lime (ppm) = 1.68 x ppm of CO₂

For example, 10 acre pond, 5 feet average depth, 40 ppm CO₂.
We want to remove 20 ppm ASAP (fish are visibly stressed)
Hydrated lime rate (ppm) = 1.68 x 20 = 33.6
Acres x avg depth x 2.71 x hydrated lime rate = total pounds
10 x 5 x 2.71 x 33.6 = 4553 pounds of hydrated lime
455 lbs per surface acre

Since we typically have aerators running also, biologists rec’d about half this amount. No aeration (power problems) max rate.
Removing Carbon Dioxide with hydrated lime

- Remember three things
  1. Concentration of carbon dioxide goes down as pH goes up. At a pH of 8.3, there is negligible carbon dioxide
  2. As pH goes up, ammonia becomes more toxic
  3. Hydrated lime raises the pH of the water

Treatment for carbon dioxide with hydrated lime is an immediate treatment. You cannot head off high carbon dioxide with a preemptive strike.

Baking Soda

- Treatment de jour back in the late eighties
  - Off-flavor control (baking soda in refrigerator?)
  - Reduction of carbon dioxide ????

- The use of sodium bicarbonate as a treatment for high carbon dioxide is without basis. Craig Tucker
- Carp farmers in Asia use sodium bicarbonate to *produce* carbon dioxide as carbon dioxide is a good anesthetic (2.4 grams per gallon)
Baking Soda

- The Merck Index- An Encyclopedia of Chemicals, Drugs and Biologicals

- Sodium bicarbonate
  - “in an aqueous solution it breaks up into carbon dioxide and sodium carbonate”

One potential use for Baking Soda in Catfish Ponds

- Removal of excess copper sulfate in an overdose situation
- Possible scenario: Mistreatment of a pond by farm workers- treating a 10 acre pond with a 20 acre dose
- Sodium bicarbonate will raise total alkalinity 1 ppm with 3.7 pounds per acre foot
- Why baking soda? Dissolves very quickly Much better than hydrated lime. Safer.
Toxic Algae Bloom

Toxic algae blooms are caused by various algae that release toxins probably in an effort to reduce competition for resources (light and nutrients). In catfish ponds, toxin may reach levels high enough to kill fish.

Potassium Permanganate

- KMnO₄
  - Potassium (24.7%)
  - Manganese (34.8%)
  - Oxygen (40.5%)
- Powerful oxidizer
  - Burns up organic matter
- Multiple Uses
  - Remove hydrogen sulfide and iron from water
  - Detoxify rotenone
  - Treat external parasites and columnaris
- Detoxify toxins from algae blooms
Potassium Permanganate Demand Test

Critical test for determining exact amount required

Test is based on the amount of organic matter in pond water

Residual KMnO₄ actually treats the surface and gills of the fish in a disease treatment

For toxic bloom treatments a full treatment may not be necessary

Using KMnO₄ Wisely

- For disease treatments a demand test is necessary to determine exact dosage
- Not using enough is a complete waste of chemical
- For toxic bloom treatments, a demand test is preferred but in the interest of time may not be possible. Dosage should be at least half the demand. Giving a biologist a description of the bloom intensity may be good enough.
SALT
- NaCl (39.3% sodium, 60.6% chloride)
- Used for nitrite protection and as a hauling aid
- Need 50 lbs for 10 ppm chloride per acre foot
- Need 10 ppm chloride for every ppm nitrite

Sample calculation
- 10 acre pond, five feet deep, 5 ppm Nitrite protection
- 10 acres x 5 feet deep x 50 lbs/acre-feet x 5 = 12,500 lbs

How Much Salt Do I Need?
- Ammonia is the source for nitrites
  - High feeding rates= high ammonias
  - Conversion rate from ammonia to nitrite for all practical purposes is one to one
  - Based on Fish Center records, ammonia rates on the average peak around 5 ppm in September
  - Average nitrite levels are lower however- around 2 ppm
  - Record nitrite level at Fish Center is 17 ppm Nitrite!
How Much Salt Do I Need

- Most producers salt to a 50 ppm level
- Levee ponds will retain some salt from year to year
- Watershed ponds will typically flush and lose residual salt
- Fish Center recommends 50 ppm chloride as a minimum. Add more for elevated ammonia/ nitrite levels on an as needed basis.
- Monitor ammonia levels twice a month

Calculating Salt Amounts

- Surface acres x average depth x ( Desired Chloride concentration – Current Chloride concentration) x level of protection desired = total pounds for the pond

- 10 acres x 5 x ( 50-25) x 5 = 6250 lbs

Fish Center can run chloride checks for producers-
Check levels twice a year ( April and September)
Copper Sulfate Pentahydrate

CuSO₄·5H₂O
Copper (15.4%)  
Sulfur (12.8%)  
Oxygen (25.6%)  
Hydrogen (6%)  
Oxygen (32%)

Uses  
Herbicide  
Algaecide  
Parasiticide  
Bactericide  
Fungicide

Other  
- Occurs in seawater at .02 ppm  
- A trace element essential for animals and plants  
- One ounce is human lethal dose  
- 150 mg is the rec’d daily dose for humans
  - Solubility in water is 1.73 lbs per gallon at 68 F

Copper Sulfate is a very effective and efficient off flavor tool

- Tucker and Hanson Study  
  - Economical to use crystals  
  - Suspended bagged copper near aerators  
  - Used 5 lbs per acre per week when water above 70 F  
  - Harvested in August

Results  
- Copper ponds had higher annual net returns

Conclusions  
- Inability to harvest fish in a timely fashion exposed fish to greater disease losses
Current Recommendations for Using Copper Sulfate for Off Flavor

- Use copper on a regular basis if you plan to harvest fish before fall
- Use copper only for off flavors caused by algaes
- If fish are off-flavor and there are no off flavor algaes present, treatments will not be effective
- Use enough copper for an effective dosage—“vitamin” dosages are a waste of time and money

Algaes Differ in Copper Toxicity

- Least Resistant
  - Most problematic blue greens- Anabaena, Aphanizomenon, Oscillatoria, and Microcystis
  - Doses in the ¼ to 1 ppm range effective
- Most resistant
  - Greens and filamentous algaes- Chlorella, pithophora, and chara
  - Doses in 1 ppm to 2 ppm range may be needed
Liquid Copper

- Three forms
  - Copper and water mixtures
    - Solubility of copper is 1.73 lbs per gallon at 68 F
  - Chelated copper mixes
    - Chelate is typically an organic compound such as citric acid that binds to copper and makes it more residual
  - “Non chelated” but “better” than copper and just water. The compound that makes it “better” is often deemed proprietary

The Advantage of Chelated Copper

- The components that make up the total alkalinity of the water tie up or bound the copper rendering it non toxic
- Biologists attempt to overcome this chemistry by adjusting treatment rates based on total alkalinity
- Chelated products supposedly are more residual and work (kill algae) longer before they eventually are also bound up
Now the bad news

- In experiments conducted at UAPB, the toxicity of unchelated liquid coppers, was the same as plain copper sulfate at low, medium and high alkalinity when properly dissolved.
- THERE IS NO EVIDENCE THAT UN CHELATED LIQUID PRODUCTS ARE IN ANY WAY BETTER THAN COPPER SULFATE ALONE PROVIDED THAT PLAIN OLE COPPER SULFATE IS DISSOLVED IN THE POND

* Andy Goodwin, UAPB Fish Health Specialist

---

Is Agritech an economical and efficient product?
Liquid Copper (AgriTec)
Copper Sulfate Pentahydrate 19.8%
Metallic Copper 5%
Inert Ingredients 80.2%

AgriTec weighs 9.9 lbs per gallon
Five gallons of AgriTec weighs 49.5 lbs
Copper Sulfate Pentahydrate 9.8 lbs
Metallic Copper 2.48 lbs
Inerts (pc and water) 39.7 lbs

Current Cost of AgriTec is $120.50 for five gallons
$120.50 / 9.8 lbs of copper sulfate
$12.30 per lb
Sack of copper $78 or $1.56 per lb
$12.30/$1.56 or 8 times as expensive

Is AgriTec Worth the Expense?
• If you think AgriTec is 8 times more effective than plain old copper sulfate, go ahead and use it

• UAPB
  • There is no scientific evidence that chelated copper products or un chelated copper products are even two times as effective as plain copper sulfate
Making Your Own Liquid Copper

- Use a 200 gallon plastic tank (watering trough)
- Add two pounds of copper sulfate per gallon of water
- Mix with an airstone or mechanically
- To treat a pond, every gallon has 2 lbs of copper sulfate

Making Your Own Chelated Copper

- Add citric acid at a 1 to 10 ratio to copper sulfate
- For example: 200 gallon tank
  - Need 400 lbs copper @ 77 F
  - Need 40 lbs citric acid ($90 / #50)
  - Mix to dissolve
- 10 acre pond, 5 feet deep, 100 TA
  - 10 x 5 x 2.71 x 100/100 = 135.5 lbs max dose
  - Use 67.75 gallons of mix
  - Cost of above mix (copper $211.38, CA $72)
    - Total $283.38 for 135.5 lbs of homemade chelated copper sulfate
    - Agritec equivalent (135.5 / 1.96 lbs per gallon) = 69.1 gallons
    - 69.1 gallons @ $24.1 per gallon = $1665.31
Efficient and Economical Use of Chemicals

Summary

1. Use hydrated lime as needed for immediate carbon dioxide control
2. Don't use baking soda for carbon dioxide problems
3. For disease control with potassium permanganate, do a demand test and use the recommended rate
4. Maintain at least 50 ppm chlorides in heavily fed catfish ponds. Add more salt as ammonia levels become elevated.
5. Use copper sulfate on a regular basis for off flavor control for fall harvest fish.
6. If fish go off flavor, use copper sulfate for off flavor problems only if off flavor algae are present
7. Copper must be dissolved to be effective in pond water.
8. Don't use expensive liquid copper products unless you know for a fact that they are worth it.

Questions and Comments

Gregory N. Whitis
Extension Aquaculturist
Alabama Cooperative Extension System

Alabama Fish Farming Center
334-624-4016
In-pond raceway systems developed in West Alabama

Travis W. Brown, Jesse A. Chappell, Terry R. Hanson
Department of Fisheries & Allied Aquacultures
Auburn University

Concept:
• Develop a more competitive production model
• Combine the advantages of recirculating aquaculture with the lower cost of pond aquaculture.
Objective - Improve production efficiency that emphasize our competitive advantages

- Improve fish survival to > 90%
- Improve FCR to better than 1.7 : 1
- Reduce cost per unit gain
- Gain greater control over inventory
- Reduce energy usage per unit produced
- Reduce labor costs per unit
- Utilize other production by-products and resources

First Design & Layout

- System Footprint = 100’ x 45’ or 0.10 acres located in a 6-acre earthen pond
- Six raceway cells (37’ x 16’ x 4’)
- Fish culture area (25.3’ x 16’ x 4’ or 1619 cubic feet or ~45 tons)
- Water Mover = 1.2 rpm paddle wheel powered by a ½ hp VFD motor;
- Water exchange about every 5-6 minutes
- Supplemental aeration = 1.5 hp regenerative blower w/ diffuser grid
- Waste collection trough located at the tail end of each raceway
Feeding Approach

- Catfish were offered feed multiple times per day during warmer months to achieve best survival and high feed efficiency.
  - Feed allowance was based on total fish biomass in raceways, average size of fish, and water temperature.
**Fish Sampling**

- Fish sampled every 30 days.
  - Average weight
  - Length-weight measurements
- Emphasized inventory knowledge and control.

**Stocking**
### IPRS Fish Production Over a 220 Day Growing Season

<table>
<thead>
<tr>
<th>Species</th>
<th>Total weight stocked (lbs)</th>
<th>Total weight harvested (lbs)</th>
<th>Production (lbs)</th>
<th>Production (lbs/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel &amp; Hybrid catfish</td>
<td>40,713</td>
<td>109,808</td>
<td>69,095</td>
<td>11,516</td>
</tr>
<tr>
<td>Tilapia</td>
<td>29.80</td>
<td>8,710</td>
<td>8,680</td>
<td>1,447</td>
</tr>
<tr>
<td>Paddlefish</td>
<td>504.50</td>
<td>5,293</td>
<td>4,789</td>
<td>798</td>
</tr>
<tr>
<td>Subtotal (co-cultured fish)</td>
<td>534.30</td>
<td>14,003</td>
<td>13,469</td>
<td>2,245</td>
</tr>
<tr>
<td>Grand Total (all fish)</td>
<td>41,247</td>
<td>123,811</td>
<td>13,761</td>
<td></td>
</tr>
</tbody>
</table>

### IPRS Fish Production

<table>
<thead>
<tr>
<th>Species</th>
<th>Mean Survival (%)</th>
<th>Mean FCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel &amp; Hybrid catfish</td>
<td>83.7</td>
<td>1.50</td>
</tr>
<tr>
<td>Tilapia</td>
<td>100.0</td>
<td>-</td>
</tr>
<tr>
<td>Paddlefish</td>
<td>85.9</td>
<td>-</td>
</tr>
</tbody>
</table>
## Water Quality

<table>
<thead>
<tr>
<th>Parameter</th>
<th>IPRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved oxygen (mg/l)</td>
<td>6.38 ± 3.62</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>25.15 ± 5.12</td>
</tr>
<tr>
<td>pH</td>
<td>7.74 ± 0.48</td>
</tr>
<tr>
<td>TAN (mg/l)</td>
<td>1.45 ± 1.15</td>
</tr>
<tr>
<td>Nitrite-N (mg/l)</td>
<td>0.17 ± 0.19</td>
</tr>
<tr>
<td>Total alkalinity (mg/l)</td>
<td>164.6 ± 16.4</td>
</tr>
<tr>
<td>Chloride (mg/l)</td>
<td>705.3 ± 75.6</td>
</tr>
</tbody>
</table>

## Simulated Models - Production

<table>
<thead>
<tr>
<th>Projected models</th>
<th>Total weight stocked (lbs)</th>
<th>Total weight harvested (lbs)</th>
<th>Production (lbs/acre)</th>
<th>Survival (%)</th>
<th>FCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Channel catfish w/ co-culture fish</td>
<td>14,698</td>
<td>94,255</td>
<td>13,260</td>
<td>78.0</td>
<td>1.74</td>
</tr>
<tr>
<td>All Hybrid catfish w/ co-culture fish</td>
<td>22,345</td>
<td>153,367</td>
<td>21,837</td>
<td>89.1</td>
<td>1.36</td>
</tr>
</tbody>
</table>
Initial summary and outlook:

- Design modifications needed on waste removal system.
- Produce advanced fingerlings/stockers onsite in floating raceways for immediate availability.
- Next step: run the system with stockers (100-130 gram) over a longer period for more in-depth economic evidence.
The current model that has evolved:

• For a 2.5 ha pond, 1.2 meter average depth
• Production system has a footprint of approximately 10mx25m
• 2 production cells; each 5mx22m
• Floor of 10 cm thick concrete, fiberglass reinforced, with preformed post holes
• Posts with key-holes hold side panels
• Fish contained by plastic wall panels 40-60 mil HDPE and PCV-coated steel upstream and downstream gates.
Current model, continued

- Water movers: either large paddles or preferably air lifts using low-pressure air blowers to provide sufficient water flow to exchange water every 5 to 6 minutes.
- A zone for solid settling at the end to allow for collection of fish feces and removal.
- Walkways can be installed.
- Bird nets can be added.
- Fish can be easily crowded and removed.
- Can use automated feeding but not required.
- Can have emergency oxygen supply.
- Should have some fish in the open pond: some filter feeders like silver carp and a few bottom feeders like black carp.
- Total production capacity is about 63 tons in the 2.5 ha pond.

Costs

- Concrete slab, about 25 cubic meters fiberglass-reinforced concrete (10m x 25m x 10cm)
- Wall panels, 15 units, HDPE on galvanized frame with hanging hardware
- Posts: 12 units, each piece about 2.5 meters
- Water movers (2): airlift apparatus with blower
- Confining gates (4)
- Walkways (2)

Total cost is about $24,000
Add in emergency generator, bird exclusion gear, and supplemental oxygen system at $8,000 additional
Advantages

• Improved survival
• Improved FCR= reduced cost of feeding
• Eliminate predation by birds or other fish
• Reduced energy costs
• Better inventory control
• Allows for staggered stocking/harvesting to provide better cash flow
• Easier fish health management; less costly to treat diseases
• Easier to grade the fish
• Less area to manage
• Capture of nutrients for removal and use in gardens, worm production, or methane production

Disadvantages

• High initial cost of installation
• Different management compared to traditional; must have good quality feed
• Need to master different technical skills such as maintaining the water movers, removing wastes.
• Requires constant electricity supply
Summary
• China has, in the past, led in aquaculture innovations such as the manure-based carp polyculture systems.
• However, China and many other countries will be facing severe shortages of clean freshwater in the near future.
• There will also be increasing population pressure on the land.
• We cannot continue throwing wastes into water to generate fish feed.
• And we need to be able to more effectively remove fish wastes and use them to produce more food.

• By investing in infrastructure and by using high quality feed, energy use per kg fish produced can be reduced, water quality can be sustained, AND production per unit area can be increased.
• The examples shown here are only the first steps towards better water use and better energy efficiency.
• How will freshwater fish farming look in China 25 years from now? 50 years from now?
### IPRS Fish Production

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</tbody>
</table>

### IPRS Catfish Production

![Graph showing total biomass over time](image-url)
### Economics after 220 days

<table>
<thead>
<tr>
<th>Species</th>
<th>Receipts ($/lb)</th>
<th>COP ($/lb)</th>
<th>Estimated Net Returns ($/lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel &amp; Hybrid catfish</td>
<td>$0.74</td>
<td>$0.71</td>
<td>$0.03</td>
</tr>
<tr>
<td>Tilapia</td>
<td>$3.00</td>
<td>$0.05</td>
<td>$2.95</td>
</tr>
<tr>
<td>Paddlefish</td>
<td>$2.50</td>
<td>$0.20</td>
<td>$2.30</td>
</tr>
<tr>
<td><strong>Grand Total (all fish)</strong></td>
<td><strong>$0.98</strong></td>
<td><strong>$0.63</strong></td>
<td><strong>$0.35</strong></td>
</tr>
</tbody>
</table>

### Simulated Models - Economics

<table>
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<th>Estimated Net Returns ($/lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Channel catfish w/ co-culture fish</td>
<td>$1.07</td>
<td>$0.66</td>
<td>$0.41</td>
</tr>
<tr>
<td>All Hybrid catfish w/ co-culture fish</td>
<td>$0.96</td>
<td>$0.53</td>
<td>$0.43</td>
</tr>
</tbody>
</table>
# IPRS Economics

## 2 cell Floating IPRS

<table>
<thead>
<tr>
<th>Economic Analysis of the 2 cell Evolved IPRS and HYBRID catfish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ponds Raceway System, 2 cells 32' x 30', footprint, construction and equipment cost</td>
</tr>
</tbody>
</table>

## I. INVESTMENT

<table>
<thead>
<tr>
<th>Item</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Capital cost</td>
<td>$ 14,380</td>
</tr>
<tr>
<td>B. Equipment</td>
<td>$ 3,800</td>
</tr>
<tr>
<td><strong>TOTAL INVESTMENT</strong></td>
<td><strong>$ 18,180</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Value or Cost</th>
<th>Per Acre</th>
<th>Cost Per Lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gross Receipts</td>
<td>99,490</td>
<td>16,582</td>
<td>0.750</td>
</tr>
<tr>
<td>2. Variable Costs</td>
<td>78,197</td>
<td>12,270</td>
<td>0.589</td>
</tr>
<tr>
<td>3. Income Above Variable Cost</td>
<td>21,293</td>
<td>4,312</td>
<td>0.161</td>
</tr>
<tr>
<td>4. Fixed Cost</td>
<td>3,498</td>
<td>683</td>
<td>0.026</td>
</tr>
<tr>
<td>5. Total Costs</td>
<td>85,193</td>
<td>13,436</td>
<td>0.642</td>
</tr>
<tr>
<td>7. Net Returns Above All Specified Expenses</td>
<td>17,796</td>
<td>3,728</td>
<td>0.134</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Net Returns Per Acre</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Above Specified Variable Costs</td>
<td>3.548</td>
</tr>
<tr>
<td>Above Specified Total Costs</td>
<td>2.988</td>
</tr>
<tr>
<td>Break-even Price to Cover Specified Variable Expenses</td>
<td>0.788</td>
</tr>
<tr>
<td>Total Expenses</td>
<td>0.545</td>
</tr>
</tbody>
</table>
Six Year Cash Flow of 2-cell In-Pond Raceway System with Hybrid Catfish
Characteristics of Consistently Successful Farms

Jamie Yeager
Extension Economist-
Farm Business Management
Alabama Fish Farming Center

What Does a Successful Farm Look Like?

• A Mansion on the hill with a neatly manicured farmstead with all new farm equipment, and is always driving a new truck.

• A rundown house with a farmstead that is grown up in the bushes with 30+ year old farm equipment and an old truck that barely runs.

Both or Neither

You Can’t Judge a Book by it’s Cover
What Does a Successful Farm Look Like?

• The one common characteristic that I have found between all types of successful farms is:
  • Longevity

What makes a Successful Farm Successful

• We have analyzed different types of farms from all over the state to determine what they are doing that other farms are not that makes them successful and we have found that what sets them apart is:
  • A combination of a lot of small things that add up over time.
  • It is not 1 specific thing that they are doing that makes them successful.

• The devil is in the details
Characteristics

Diversification

• Spread your risk
• Enterprises that complement each other with use of existing resources (Labor, Mg’t, Land etc)
  • With broilers and cattle the broiler litter is used as fertilizer for hay and pasture land.
  • Work load does not divide, it multiplies.

Characteristics

Good Record Keepers

• Most successful farmers tend to be good Record Keepers, and use this information to manage their business.
• Update their books and reconcile their bank statements regularly.
• They have a year long business relationship with their accountant or tax preparer rather than a once a year visit during the peak of tax season.
Characteristics

Good Businessmen

• Everyday when they get up they *tend to business*, they are thinking about and looking for ways to improve their operations everyday.

• Business skills are essential on today’s farming operations, because not only do you have to know how to grow your product profitably, but you have to know how to market your product for a profit.

• Most of these business skills are common sense, but most farmers are so busy taking care of daily activities on the farm that the business end tends to have a lower priority.

Critical Control Points
Fish Sales

- Sell fish on a schedule (X lbs/week, month, qtr)
  - Provides regular cash flow
  - Decreases the amount of borrowed capital necessary,
    - Also decreases the interest expense
  - Addresses big fish problem
  - Allows for opportunity to receive higher prices

- Holding fish hoping for better price is risky
  - This will hurt you in the long run
  - Odds are you will not hit the high
  - Increased chance of getting docked for big fish
  - Bigger fish are eating feed that the understocking needs, which will delay the harvest of understocking.
  - Harvest delays such as off-flavor could delay restocking
  - If not sold timely could cause you to max out your line of credit during the height of feeding season.

Feed Cost

- Feed makes up 50%+ of the cost to grow catfish, so any improvement here could translate into big savings down the road.

- The person driving the feed truck should also be the person paying the feed bills.
  - This usually eliminates wasted feed.
Feed Cost

• Understand how the movement of the grain markets affect the price of feed and monitor these markets on a regular basis.
• Understanding what causes the grain markets to move will help you be better prepared to make a decision on pricing your feed.

August 2011 Soybean Meal
Booking Feed

• Booking feed has resulted in large savings for some farms in the past few years.
• Start watching the feed prices for next year early in the year (June-July).

• If you can get a favorable price that you can make a profit at go ahead and lock in 1/4 to 1/3 of your needs, then continue to watch the markets and book more as the market presents opportunities.

Booking Feed Example

• A Farm buys 1,000 tons of feed a year and is considering booking feed for next year. For example lets say he books the following:
  • 250 ton @ $315/ton
  • 250 ton @ $345/ton
  • 250 ton @ $370/ton
  • 250 ton @ $390/ton (Spot price)
    – His average price for the year is $355/ton
    – The average spot price was $375/ton
    – He saved $20,000
Booking Feed Example

• A Farm buys 1,000 tons of feed a year and is considering booking feed for next year. For example lets say he books the following:
  • 250 ton @ $315/ton
  • 250 ton @ $285/ton
  • 250 ton @ $260/ton
  • 250 ton @ $240/ton (Spot price)
    – His Average price was $275/ton
    – The Average spot price was $265/ton
    – His feed cost was $10,000 more than spot

Hired Labor

• Labor is expensive.

• Labor can cost you more than the wages they are paid.

• A good employee is worth many times what he is paid in most cases, but a bad employee can cost you more in 15 minutes than he will earn in a year.
Hired Labor

• When you hire someone and agree on a wage don’t forget that you have to match their FICA and Medicare taxes, and you may also be subject to unemployment taxes on their wages.
  • You hire an employee for $10/hour it will actually cost you $10.77/hour plus whatever unemployment rate you may have (unemployment tax rates have been going up the last couple years due to the high number of unemployment claims)

Hired Labor

• Many farm employers provide employees with non cash benefits such as:
  • Gas
  • Housing (utilities)
  • Truck
  • Meals
  – Note: employee does not have to pay taxes on these benefits.
True Cost of Hired Labor

• For example lets say you have an employee that you pay $350 per week. You also provide him with housing ($350/month, 1 tank of gas per week ($60/week), and you pay him mileage to pick up things in town from time to time ($2,000/year)

• What does this employee make annually?

---

True Cost of Hired Labor

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Salary</td>
<td>$18,200</td>
</tr>
<tr>
<td>Housing</td>
<td>$4,200</td>
</tr>
<tr>
<td>Gas</td>
<td>$3,120</td>
</tr>
<tr>
<td>Mileage</td>
<td>$2,000</td>
</tr>
<tr>
<td>FICA match</td>
<td>$1,392</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$28,912</td>
</tr>
</tbody>
</table>

Note: The employee received $9,320 tax free.

• This employee cost the farmer $10,712 more than his wages.
Hired Labor

• Keep a close watch on your Labor cost so it does not get out of control.

• Be mindful of employee theft.
  » Employees may abuse benefits resulting in theft.

• Monitor employee loans. In most cases you will never be completely repaid.

Hired Labor

• In most cases hired labor is more of a headache than it is worth.

• Manage your labor don’t let your labor manage you.
Utilities

• Monitoring systems are the best way to control electricity costs.

• Watch cell phone, telephone, and internet bills. These have been steadily climbing over the past few years.

Repairs

• Try to do as many repairs yourself as you can. This translates into large savings at the end of the year.

• Spend the winter on maintenance so you won’t have down time in the summer and you won’t spend your busiest time of year working on equipment.
Interest

- Over the last few years we have seen the interest expense steadily decrease for catfish farms mainly due to decreasing interest rates for short term loans, but also due to farms paying off long term debt that was financed at higher rates.

- If you have variable rate loans you should probably look into locking in a low rate.

Fuel

- Fuel cost on farms has been steadily climbing for the last few years.
- One way to combat this is to invest in cheap electric aeration rather than diesel. Farmer’s that have increased their electric aeration capacity have reported sharp decreases in their diesel usage.
- Not only is electric cheaper to run, but it turns itself on and off, and you don’t have to worry about diesel spills.
Fuel

- Over the last few years the amount of gas and fuel used by trucks and other vehicles on farms has contributed as much to the fuel bill as the diesel aeration in many cases.

- The only sure fire way to cut this expense is to cut the number of vehicles owned.
  - (sell some trucks)

Family Living Expenses

- What Does It Cost You to Live?
Family Living Expenses

• Family living expenses range from $15,000 to $70,000+ per year.

• Many farmers are borrowing money to pay living expenses, which cannot be sustained for long periods of time.

Family Living Expenses

• A W2 wage earner knows how much money he has to live on each month, but a farmer is different.
• Farmer’s usually have access to a line of credit that they draw from to pay bills (both farm expenses & family living expenses) and pay back when they receive income.
• With easy access to money it is hard for someone to stay on a budget, so increases in living expenses may go unnoticed until it is too late.
Family Living Expenses

- On multi-batch catfish farms it is even more difficult to control living expenses, because the production cycle never ends.

- There is no natural stopping point like there is with beef cattle or row crops.

- Lines of credit are generally renewed for another year without being paid off.

Family Living Expenses

- Controlling living expenses
- Put yourself on a budget
- Determine how much it should cost you to live for a year, and put that amount of money in an account and draw from it to pay living expenses for that year.
- When you see the balance decreasing faster than it should, it will force you to examine your living expenses for areas to cut.
Family Living Expenses

- Controlling living expenses
- Determine how much it costs you to live per month and draw that amount out of the farm each month, but once it is spent you can’t draw more.

- When a W2 wage earner’s pay check runs out he can’t go to his boss and ask for more, he has to wait until his next pay check, or draw it from savings.

Conclusion

Tend to your Business or Someone Else Will!