SRAC Publication No. 442

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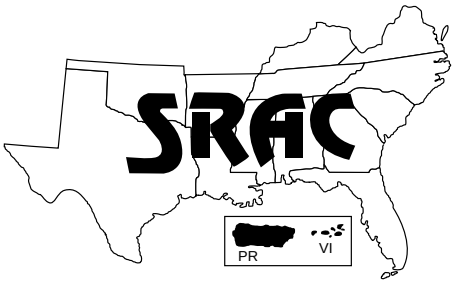

November 1997

Small Scale, On-farm Fish Processing

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Because of the small size (5 to 20 acres) of many catfish farms, these businesses have high production costs compared to more efficient farms of 50 acres or greater located in the leading catfish producing states. The large, efficient farms in Mississippi, Alabama, Arkansas, and Louisiana are a direct result of quality clay soils, flat land, lower construction costs, and lower feed costs. An added advantage in these states is the close proximity to processing plants that allows farmers to sell fish directly to a local processor.

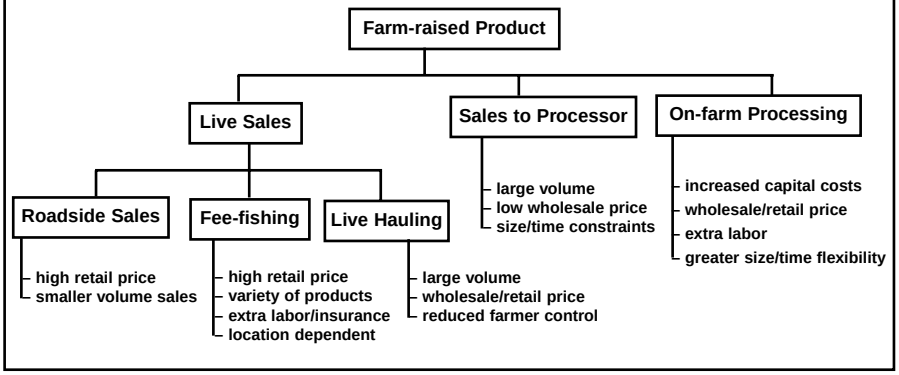
This wholesale type marketing, however, is often not profitable for small farms. To maximize profit potential, retail marketing is suggested. Live sales, fee-fishing, and direct sales of processed fish to restaurants and grocery stores are common retail market opportunities. Direct retail sales can be more profitable than selling to an established processor, but there are important considerations to evaluate prior to production (Tables 1 and 2).

Retail markets often want diverse product forms including live and processed fish in varied sizes and consistent supply. Small farm producers need to carefully consider the increased requirements, time, and cost of retailing their product before starting production. Providing good service and supplying timely and complete orders to retail customers are essential. Another important consideration is that many retail markets buy large quantities of product from larger processors at lower prices, making it difficult for small processors to compete. If local niche markets that are not being supplied by larger processors can be identified, on-farm processing may be a marketing option for small farms.

Table 1. Example of costs and profits for small farms with various catfish markets.

Market Outlet	Farm Cost per Pound ($)	Selling Price per Pound ($)	Profit per Pound Live Weight ($)
Processor	0.75 - .85	0.80	(0.05) - 0.05
Live Sales	0.85	1.25 - 1.50	0.40 - 0.65
Fee-Fishing	1.00	1.25 - 1.75	0.25 - 0.75

Table 2. Catfish marketing options and considerations.



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Facility design and requirements

The basic concept of on-farm processing is a low-cost, manual fish cutting operation using family or farm labor to process limited quantities of fish. To demonstrate the flexibility of facility design, a prototype was developed at the University of Florida. The on-farm processing facility utilized a 15 feet x 15 feet area of an existing metal building. An example floor plan is shown in Figure 1.

The facility is designed to process 500 pounds catfish (live weight) per day, and the necessary infrastructure is relatively compact and simple, enabling development in an existing farm building (Table 3). Actual equipment requirements and costs will vary depending on desired processing capacity, fish species, product form, and local regulatory requirements.

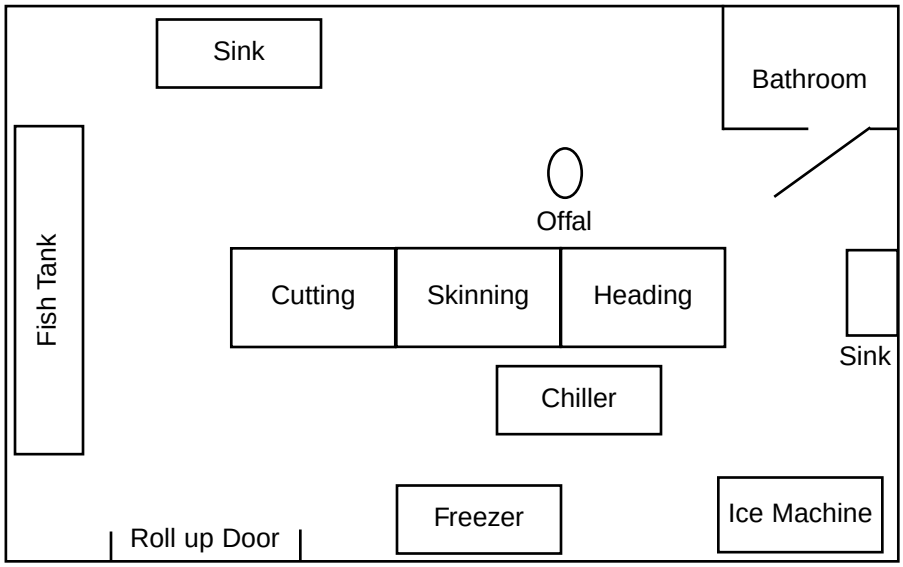

Figure 1. Example of a small, on-farm catfish processing facility.

Table 3. Example of facility equipment and infrastructure requirements.

Item	Cost ($)
Concrete Floor and Block Walls	2,100
Window Air Conditioner	300
Door	275
Suspended Ceiling and Lighting	325
Plumbing and Electrical	900
1,050 Gallon Septic Tank	1,300
Fish Holding Tank	500
3 Compartment Stainless Steel Sink and Hand Sink	1,000
Fish Processing Table	525
Chiller Tank	125
400 lb/day Ice Machine	2,400
25 Cubic Foot Freezer	600
Miscellaneous Supplies	300
TOTAL	**10,650**

Facility processing capacity can be variable and should be based on the farm's identified market opportunities. The facility can be constructed in an existing building or use a new building. It is recommended that construction allow for insulation to maintain adequate heating and air conditioning requirements. Prices for construction, septic system, and processing equipment will vary with location and processing capacity. Small machinery such as a tabletop catfish skinner could be incorporated increasing the cost approximately $4,000. Increasing the capacity of the facility to include use of traditional processing equipment, e.g., electric shocking system, band saw for deheading, and an eviscerating system, will significantly add to the investment cost and break-even price. In addition, freezer/refrigeration space needs will be dependent on an individual farm's market demand for fresh versus frozen products.

Regulatory considerations

A processing facility must meet all necessary state and federal permits and regulations. In most southern states, several government agencies will be responsible for regulating small scale fish processing operations. Often these agencies include the state department of agriculture's division of food inspection and the state or county health department. In addition, all facilities will be required to meet the U.S. Food and Drug Administration HACCP (Hazard Analysis Critical Control Point) requirements. Specific information on HACCP can be obtained from state food inspection agencies or the FDA. A state annual food handling permit is typically required and involves initial facility approval and regular inspection. The basic requirements for a fish processing facility include: washable floors and walls, floor drains, washable ceiling, adequate lighting and ventilation, hand washing and bathroom facilities, approved water supply,

sanitary equipment and utensils, specific sanitation practices, refrigeration at 40ºF or less, and freezing at 0ºF or less. Fish waste, or offal, must be stored in sealed containers with daily removal or freezing capabilities.

In most states, the state department of health is typically responsible for testing the water source quarterly and permitting the septic system. Regulations and responsible agencies vary from state to state. In some states the amount of daily water use will dictate the agency and specific requirements. The discharge water used in cleaning the fish and facility is commonly classified as commercial wastewater in most states and can be treated by a septic tank and drain field system. Water use from the University of Florida prototype facility is reported in Table 4. Complete details on specific regulations and permitting in your state can be obtained from the department of agriculture, county health department, and environmental agencies. Contacting these resources is an important first step to identify current regulations and will aid in determining facility design and cost.

Operational guidelines

The following is the basic procedure for processing catfish in an on-farm facility:

1. Withhold feed from fish 2-3 days and test fish for off-flavor prior to harvest. Off-flavor fish should not be processed.
2. Transfer harvested fish into fish tank in processing room and hold overnight in well water with aeration.
3. Prior to processing, chill-stun fish by draining most of the water from fish tank and placing ice on fish.
4. Skin fish using manual pliers (an electric, floor, or tabletop skinner can be used).
5. Remove head and guts and place waste into plastic can.
6. Place processed fish into chill tank (water and ice).
7. Rinse and pack fish on ice for sale, or blast freeze in storage freezer.

The offal can be handled in several ways. These methods include burying it on-farm the same day and covering the offal with enough soil to prevent an odor or fly problem. Composting with hay or lawn litter is another method. Preliminary findings have shown that even the bony skeleton can decompose in a short period, 6 to 8 weeks, if handled properly. The result is a high quality compost/fertilizer. Also, the offal can be rendered by grinding and cooking for use as a feed supplement to livestock. If quantities are significant, the offal can be frozen for pick up by established rendering companies. It is recommended to check with regulatory agencies for proper handling of offal.

Economic considerations

A summary of the University of Florida prototype processing trials and an operating budget are shown in Tables 4 and 5.

Table 4. Example of processing results for 500 pounds of 1.5 pound live catfish.

Item	Value
Labor (hours)	12.5
Dressout Percentage	61.7%
Dressout Weight (pounds)	308.5
Water Usage (gallons)	180

The cost of processing per pound of dressed fish includes the total cost minus live fish costs divided by the total dressout weight. The break-even price stated is an estimate of all costs associated with processing fish and operating the prototype facility. It is calculated by dividing total cost by the number of dressed pounds. It is assumed that half of the estimated $10,650 investment cost is borrowed and all fixed costs are based on 100 days of operation/year. In addition to the processing costs, packaging, delivery costs, and time must be considered and included when determining a

Table 5. Example daily operating budget for a 500 pound per day small scale, on-farm processing facility using 1.5 pound catfish.

Item	Quantity	Unit Cost ($)	Total Cost ($)
Variable Costs			
Live Catfish	500 lbs	0.80	400.00
Labor	12.5 hrs	7.00	87.50
Electricity			5.00
Water	180 gals		4.00
Miscellaneous Supplies			11.00
Fixed Costs			
Interest			5.00
Depreciation			17.00
Fees/Insurance			5.00
Total Costs			534.50
Processing Cost per Pound (dressed weight)			0.44
Break-even Price per Pound (dressed weight)			**1.74**

profitable selling price. When processing smaller fish, the amount of labor required is greater since more time is required to remove heads and skin. Also the dress-out percentage (headed and gutted) for smaller fish is lower.

Actual costs of processing will vary depending on processing capacity, fish species, labor processing efficiency, and equipment and facility development costs. To determine the economic feasibility of this type of facility, it is necessary to have local selling prices for processed fish. The local selling price of processed fish must be greater than fish processing costs. In addition, the added cost of marketing (advertising, labor, and delivery) must be covered for the operation to be truly profitable. In the example in Table 5, the break-even price to the on-farm processor is $1.74 per pound. Marketing costs such as telephone charges, transportation, and labor for delivery and packaging are extra. Packaging costs, e.g., a waxed cardboard box with a 50 pound capacity for ice packing, would range from $0.03 to 0.05 per pound of whole dressed fish. Delivery costs will vary depending on distance to markets and volume of products sold. Assuming delivery of 300 pounds of processed product with a packaging cost of $0.04/pound, a 50 mile round trip @ $.30/mile, and three hours of labor @ $7/hour, the approximate marketing cost would be $48 or $0.16 per pound of processed product. Adding this marketing cost to the break-even price per pound from Table 5 gives a total break-even price of $1.90 per pound. Retail prices of whole dressed fish will vary depending on location. The on-farm processor must find niche markets that will pay enough to cover all costs plus what ever profit margin is required to justify the investment of resources - both time and money.

Summary

The relative simplicity of on-farm processing and the low investment costs may provide an affordable marketing tool for small catfish farmers that have identified a market niche. The facility can be designed to operate at a variety of capacities to fit the area market demand and farm production. Supplying local retail markets provides a higher price than traditional processors and allows rural farms with little or no access to established processors to sell an increased volume of product. Farmers should be aware of local regulations and permits and consider the increased time and labor input when servicing retail markets.

Close proximity to retail markets is recommended to minimize time and money spent on product delivery. Scheduling processing to ensure consistent supply to customers is essential and is a major challenge for small farms. With careful planning, on-farm processing is an alternative strategy for small farms allowing access to retail markets.

Additional Readings

Processing Channel Catfish. SRAC Publication No. 183.

Processed Catfish: Product Forms, Packaging, Yields and Product Mix. SRAC Publication No.184.

Processed Catfish: Product Quality and Control. SRAC Publication No. 185.

Small-Scale Marketing of Aquaculture Products. SRAC Publication No. 350.

Testing Flavor Quality of Preharvest Channel Catfish. SRAC Publication No. 431.

The work reported in this publication was supported in part by the Southern Regional Aquaculture Center through Grant No. 94-38500-0045 from the United States Department of Agriculture, Cooperative State Research, Education, and Extension Service.